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THE INFLUENCE OF PEER COACHING ON TEACHER SELF-EFFICACY
IN ELEMENTARY MATHEMATICS

by

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ABSTRACT

THE INFLUENCE OF PEER COACHING ON TEACHER SELF-EFFICACY IN ELEMENTARY MATHEMATICS

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The purpose of this study was to determine if teacher self-efficacy is influenced by peer coaching in elementary mathematics. Survey, interview, and demographic data were collected from a purposeful sample of first year elementary mathematics teachers within a large, suburban school district located in southeast Texas. The *Teachers' Sense of Efficacy Scale* survey was used to determine teacher self-efficacy both pre- and post-peer coaching. One-on-one interviews further explored the challenges and perceptions of influential factors associated with the participants receiving peer coaching. Quantitative data were analyzed using a paired t-test, frequencies and percentages, while grounded theory utilizing an open and axial coding process analyzed the collected qualitative data. Quantitative analysis demonstrated teacher self-efficacy overall was not significantly influenced by peer coaching but was shown to have compelling influence on specific areas of teacher self-efficacy in relation to student engagement, instructional strategies

and classroom management. The qualitative analysis provided supporting evidence that there are clear distinctions about factors that influence teacher self-efficacy.

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CHAPTER I

INTRODUCTION

Teachers are actively involved in the shaping of their identity as an educator from the onset of their career. Teachers' self-efficacy has had a profound impact on their identity and their effectiveness as an educator. Several researchers have studied teacher identity in relation to their sense of power, vulnerability, agency, autonomy, and emotional engagement within the context of educational reform mandates (Day, 2002; Kelchtermans, 1996; Lasky, 2005; Lofty, 2006; van Lier, 2007). These studies have shown that the autonomy and identity of teachers may have diminished without support for growth. Teachers' emotional experiences influence their self-efficacy, while self-efficacy and evaluation generated emotional reactions as well (Cross & Hong, 2009). Peer coaching has played a significant role in helping teachers develop and form a positive self-efficacy.

Scott (2015) conveyed that there has been an obvious need for professional development for educators. Professional development has been described as progressively improving the professional skills needed to reach positive educational outcomes for all students (Murray, Ma, & Mazur, 2009). A majority of teaching contracts in the country have required teachers to participate in professional development annually (Kennedy, 2016). Providing teachers with peer coaching has been an effective form of professional development. Effective peer coaching has led to an increase in teacher self-efficacy (Ball, 2010). However, Scott (2015) also stated there has been no agreed upon best practice in the form of a most beneficial professional development method. Therefore, investigating a link between teachers' self-efficacy and peer coaching may provide teachers and districts with a strategy to best serve the goal of

professional development support for teachers and ultimately, educational success for all students.

Research Problem

The importance of quality professional development for teachers has never been more evident and challenging than currently in education (Saroyan & Trigwell, 2015). Professional development has been a significant part of a teaching career. Providing effective professional development has been the most cost-efficient tool to improve quality teaching (Guskey, 2009). The opportunity to engage in professional development has allowed teachers to fulfill the need to acquire new knowledge, skills, methods, and to strengthen their understanding of curriculum content (Loucks-Horsley, Love, Stiles, Mundry, & Hewson, 2003). However, according to Scott (2015), as few as 10% of teachers have implemented concepts or strategies learned in a professional development setting.

Teachers have been constantly growing and learning new strategies in order to improve and find the best practices to deliver instruction to their students (Loucks-Horsley et al., 2003). While there has been a considerable need for pedagogical change, educators have felt there have been few opportunities that have supported that change (Goodyear, Casey, & Kirk, 2014). Many educators have felt that most professional development has provided little incentive to change their teaching practices (Darling-Hammond & Richardson, 2009). It has also been suggested that teachers have often lacked requisite skills and background knowledge necessary to apply strategies communicated in professional development (Joyce & Showers, 2002).

Ongoing professional development and growth has provided teachers the skills required to identify and meet the needs of their students (Campbell, McNamara, & Gilroy, 2004). According to Guskey (2003), teachers engaging in ongoing professional

development opportunities has had a significant impact on the effectiveness of the development received. Programs found to be more effective have had features that include continued support for teachers (Blank & de las Alas, 2009). Continued development have also had a direct impact on student achievement (Guskey, 2002). It has been not easy for teachers to adjust their teaching styles and methods to fit the demands of professional development without some form of psychological shift and modification of their sense of self as a teacher, which comes from adopting different roles and perspectives (Hong & Vargas, 2015). The idea of professional identity, or how teachers see themselves professionally, has been constantly changing and may have affected their ability to adapt and implement new unfamiliar strategies.

Part of this lack of implementation may have stemmed from teachers' self-efficacy. Professional development has played an integral role in the formation of teachers' self-efficacy. Teacher self-efficacy refers to a teacher's perception of their effectiveness in a classroom. It has been the belief that learning has been possible even with the most challenged students (Tschannen-Moran & Woolfolk Hoy, 2001). It has included how teachers have viewed their professional responsibilities, instructional methods, personal goals, effectiveness as an educator and their level of career gratification (Kosnik & Beck, 2009).

Čepić, Vorkapić, and Kalin (2014) have suggested that the environment and culture in which teachers have worked in has played a direct role in the development of their self-efficacy. Therefore, teachers in a perceived positive environment may have formed a stronger self-efficacy based on their experiences in that culture. Being active and functioning participants in their peer coaching process has also been a key to forming professional identity (Coldron & Smith, 1999). The formation of a teachers' professional identity has been a process of building knowledge through integrating ongoing

professional development objectives deemed relevant to their teaching (Beijaard, Meijer, & Verloop, 2004). Teachers who have been active participants in their professional development and peer coaching have remained current on educational reform and gained a stronger understanding of their roles as educators.

Educators' self-efficacy have impacted their ability to effectively utilize peer coaching strategies in their classrooms. Identifying essential features of a teacher's self-efficacy has helped form more concrete characteristics that define professional identity. According to Kerby (1991), professional identity has been an ongoing process where teachers interpret and subsequently re-interpret their experiences throughout a lifelong process. The problem has been the need to build a positive self-efficacy for teachers while participating in peer coaching and monitoring it through reflection.

Current literature has shown that effective peer coaching has helped prepare more competent teachers. Teachers have needed support to maximize the potential benefits of ongoing and constantly changing professional development (Grosemans, Boon, Verclairen, Dochy, & Kyndt, 2015). According to Beijaard et al. (2004), teachers' professional identities have consisted of a sociological and a cognitive psychological perspective and have formed through interactions with other professionals. Teachers have then expressed their professional identity based on their perception of themselves and their goals as an educator based on these interactions. Quality development sessions facilitated teacher growth and subsequently impacted student achievement (Kennedy, 2016). Challenges have existed that have been detrimental to the development of a positive teacher self-efficacy. A strong peer coaching support has facilitated positive growth while navigating the constantly evolving educational world.

Significance of the Study

The goal of this study was to determine if and how teacher self-efficacy has been influenced by peer coaching in elementary mathematics. Participating in meaningful professional development has been an important process for teachers with regard to the formation of teaching identity and self-efficacy (Kennedy, 2016). Teacher self-efficacy has been influenced by professional development (Duran, Ballone-Duran, Haney, & Beltyukova, 2009; Locke, Whitehead, & Dix, 2013; Overbaugh & Lu, 2008; Stevens, Aguirre-Munoz, Harris, Higgins, & Liu, 2013). Forming a professional identity as a teacher has been facilitated through ongoing professional development that teachers have connected to their teaching (Beijaard et al., 2004). Peer coaching has involved teachers working together to utilize personal reflection skills to grow professionally through sharing ideas (Robbins, 1991). Choosing peer coaching as a form of professional development could potentially lead to increased levels of self-efficacy for elementary mathematics teachers.

Research Purpose and Questions

The purpose of this study was to determine if teacher self-efficacy was influenced by peer coaching in elementary mathematics. This study addressed the following research questions:

Quantitative Research Questions

1. Is there a statistically significant mean difference in teacher self-efficacy from pre- to post-peer coaching?
2. What are participant perceptions of their teacher self-efficacy pre- and post-peer coaching?

Qualitative Research Questions

3. What challenges are teachers experiencing with peer coaching?

4. What are teachers' perceptions of factors that influence their teacher self-efficacy?

Definitions of Key Terms

Peer Coaching - A process involving teachers working collaboratively to utilize personal reflection in order to refine skills, grow professionally, and share ideas (Robbins, 1991).

Professional Development – A systematic effort or process defined as ongoing, research based, job embedded training that challenges, develops, transforms and promotes the development of teachers' classroom instructional practices and/or pedagogical beliefs as well as the development and implementation of best instructional practices (Foltos, 2013; *No Child Left Behind Act*, 2001).

Professional Identity - How teachers see themselves professionally, including their sense of goals, responsibilities, work style, teaching effectiveness, degree of satisfaction and career development planning (Kosnik & Beck, 2009).

Self-efficacy - A person's perception of their capabilities and potential to manage, organize, and successfully complete a given task (Bandura, 1997).

Self-perception - An individual's view of his or her abilities in multiple areas such as creativity, intellect, and scholastic competence (Bineham, Shelby, Pazey, & Yates, 2014).

Teacher Identity - The way educators view themselves as professionals (Kosnik & Beck, 2009).

Teacher Self-efficacy - A teacher's perception of his/her ability to be effective in a classroom. It has been the belief that student learning has been obtained, even with difficult and unmotivated students (Tschannen-Moran & Hoy, 2001).

Conclusion

Teaching has been a career that has shaped a person's self-efficacy. A teacher's effectiveness as an educator has been impacted by the way they perceive themselves.

Self-efficacy is an ever-changing concept that has been influenced by many factors. Teachers who participated in peer coaching grow as educators (Ball, 2010). Some of these peer coaching sessions are mandated by the teacher's school district. However, strategies derived from peer coaching are not always implemented (Scott, 2015). Teacher self-efficacy has been constantly modified when learning new best practices. This study aimed to discover if there was a link between peer coaching and teacher self-efficacy in elementary mathematics. The next chapter is a literature review of the major topics that form this study.

CHAPTER II

REVIEW OF LITERATURE

This chapter examines current literature related to peer coaching as professional development and how it has influenced teacher self-efficacy in an elementary mathematics classroom setting. While implementing educational reform and improvement strategies, district policy makers have often incorporated professional development for teachers (Islas, 2010). Peer coaching opportunities have been available to teachers new to the profession and some school districts have provided a mentor for their first year. Some districts have initiated peer coaching for all teachers, not just those new to the profession. The need to constantly grow and learn has been evident in the current state of education (Saroyan & Trigwell, 2015). This literature review examines how peer coaching impacts teacher self-efficacy in elementary mathematics, how teacher self-efficacy of teachers receiving peer coaching differ from those not receiving peer coaching, what challenges teachers have been experiencing with peer coaching, and teachers' perceptions of factors influencing their self-efficacy.

Professional Development

Professional development has been a significant part of a teaching career (Kennedy, 2016). Many professional development opportunities have been directly connected to educational reform (Desimone, 2009). Without continual learning experiences that reflect the constant changes in education, teachers would be stuck using out-of-date methods to educate the learners of today and tomorrow.

Garet, Porter, and Desimone (2001) conducted a study to determine what makes professional development effective. The purpose of the study was to examine different features of professional development and their effects on participating teachers in the classroom. A total of 1,027 teachers dispersed over 358 school districts that attended a

specific type of professional development program, the Eisenhower Professional Development Program, participated in the study. Each teacher completed a survey and scales that required information about specific structural features of the professional development they had received. The structural features examined were the form (workshop, study groups, conferences, etc.), duration (number of hours and span of time), and collective participation (members of same school, district, grade level, or varying district participants) of the programs. The researchers also explored core features of content focus, active learning and coherence. Teachers were surveyed about the structural and core features and asked to provide answers on a scale or as an open response.

The researchers developed a formal causal model to determine the effects of the identified structural and core features of professional development on teachers. Key aspects of professional development identified by the researchers included emphasis of subject matter, encouraged change of teaching practices, clearly identified goals for student learning, and attention to the various ways different students learn. Professional development consisting of these aspects was most influential for teachers. The findings indicated that quality professional development strategy implementation was likely to be dependent upon being sustained over time. The duration of the professional development had a positive statistical influence on teacher reported skill enhancement, potential for active learning, and the potential for a change in teaching practices. The researchers reported time and cost as potential roadblocks to quality professional development.

While working to strengthen teaching abilities and integrate new strategies communicated through professional development, collaboration time is extremely beneficial. According to multiple studies, collaboration between teachers of similar content areas needs to be encouraged and pursued to maximize the benefits of a

successful professional development process (Darling-Hammond & Richardson, 2009; Henson, 2001). In order for professional development to be most effective, the opportunity to collaborate with colleagues regarding the skills and strategies acquired has been provided for teachers to maximize understanding of best practices and implementation (Darling-Hammond & McLaughlin, 2011).

In another study, Murray et al. (2009) attempted to determine the effectiveness of peer coaching as a form of professional development by describing its relationship with student mathematical achievement. A total of 14 teachers (Kindergarten to high school from two districts, experience ranging from 1-32 years) volunteered to partake in peer coaching for the study. There were 307 students (74 seventh-graders, 173 eighth-graders, 60 ninth-graders) that had their academic achievement measured in the study. Students were grouped in the study based on their mathematics teacher. Each student was required to take a 19-question mathematical skill and knowledge application test created by the Organization for Economic Cooperation and Development (2000, 2003) to evaluate mathematical performance.

Teachers participating in the study were given a short perception survey and conferences were held between peer coaches after observations to collect data. Conferences were recorded, transcribed, coded, examined and evaluated to determine teacher collaboration and reflection. Key aspects identified by the researchers during conferences included the number of interruptions, content of questions posed, statements made and compliments from peers. The compliments from peers were completely positive in tone and contained no criticisms of the teachers participating. The teacher sample reported perceived benefits of strategy sharing, feedback, perspective, support and communication with another teacher. Perceived barriers included scheduling, distance, timing and procuring a substitute. Student pretest and posttest scores were

collected and analyzed using a multiple-regression approach to Analysis of Covariance (ANCOVA) to determine a relationship between students learning from peer coaching teachers and academic achievement in mathematics. The findings did not show a statistically significant relationship among students learning from peer coaching teachers and academic achievement in mathematics. The lack of a statistically significant relationship may have been due to the time period of the study. A noted limitation of the study was that the six-month period may not have been long enough for an effect change to take place in teacher practices.

Professional Development and Teacher Self-Efficacy

Research has been conducted linking professional development with higher levels of teacher self-efficacy in mathematics (Ross & Bruce, 2007). Darling-Hammond et al. (2002) identified that teachers new to the profession develop efficacy based on how they perceive their own levels of preparedness for the job. The studies below further examined professional development and teacher self-efficacy.

A study was conducted by Powell-Moman and Brown-Schild (2011) with the purpose of assessing a professional development program specifically designed to develop teacher content knowledge and beliefs related to inquiry-based learning. The researchers were also interested in identifying participant characteristics that mediated the impact of the program. Twenty-three teachers were accepted to and completed the Kenan Fellows Program for this study (17 females, six males, mean number of years taught = 8.6, 61% high school teachers, 30% middle school teachers, 9% elementary teachers, 20 Caucasian, two African American, one other). Each participant was administered an online pre- and posttest using an instrument derived from a Likert scale designed by Marshall, Horton, Igo, and Switzer (2009). The instrument was altered to eliminate any questions not related to self-efficacy, inquiry-based behaviors, inquiry-based beliefs,

demographics and characteristics related to self-efficacy, beliefs, and behavior. The remaining questions focused on self-efficacy, administrative support, and behaviors related to inquiry-based instruction.

The researchers conducted a paired t-test analysis to determine that a significant increase ($t(22) = -2.81, p < .05$) in self-efficacy was reported. The one area that did not show a significant increase in self-efficacy for participants was in managing behavior during inquiry-based learning ($t(22) = -1.25, p = .22$). Teachers participating in the study reported a high level of administrative support before the program began and the level of support did not change over the course of the program. Significant changes were found in two inquiry-related behavior questions. Upon completion of the program, participant teachers felt less inclined to say that teaching all course objectives was more important than covering key concepts in greater depth and that connecting science and mathematics to other subjects is of great importance.

The researchers reported experience was positively correlated with self-efficacy scores ($r(21) = .46; p < .05$) provided before the program. However, after the program was finished, no correlation was found between the same two characteristics ($r(21) = -.06; p = .77$). Before the program, no correlation between experience and amount of time dedicated to inquiry-based learning was found. Teachers with less experience were found to be more likely to spend more time incorporating inquiry-based instruction into the curriculum. The findings showed that less experienced teachers reported more increased levels of content knowledge acquisition, research skills, and self-efficacy when compared to veteran teachers.

A similar study conducted by Duran et al. (2009) examined the effects of professional development designed to improve teacher self-efficacy and perception of knowledge. The purpose of the study was to determine the impact of a specific model of

professional development (Active Science Teaching Encourages Reform, or ASTER III) on teachers' self-efficacy and how they felt about teaching an inquiry-based science curriculum. A purposeful sample of 26 early education teachers (teaching experience ranging for three-20 years) from Ohio participated in the study. Each teacher had previously completed two earlier incarnations of the ASTER professional development model.

Each teacher was required to complete two surveys and a final written reflection as a part of a one-group, pretest-posttest mixed methods research design. Inquiry-based teaching beliefs were measured by the researcher designed 28-question Likert scale *Survey of Teacher Beliefs in Inquiry-Based Teaching* (STBIBT). This new instrument was found to have a reliability of 0.76. Beliefs about science teaching were measured using the 25-question Likert scale *Science Teaching Efficacy Belief Instrument* (STEBI-A) (Riggs & Enochs, 1990).

Data analysis referring to inquiry-based teaching beliefs indicated several key elements. Teachers agreed that inquiry-based teaching involved hands-on learning, allowed students to take ownership of their learning, increased student engagement and challenged students to prove their knowledge of concepts. The teachers also felt that inquiry-based learning pushed students towards higher-level thinking and helped them to retain knowledge they enjoyed gaining through cooperative learning settings. The researchers reported that teachers were also in agreement that this type of learning can happen in small or large group settings, requires more preparation time, and has been difficult to assess. Teacher beliefs about teaching science in general were found to be in agreement about a constant process of developing more effective ways of teaching that is related to improving student achievement. For the most part, those surveyed conveyed

they understood what and how to teach in science and attributed teacher effectiveness to increased achievement for students.

The researchers used repeated measures of Analysis of Variance (ANOVA) for testing chi-square analysis to investigate relationships between teacher self-efficacy and perceptions before and after the ASTER III program. No significant changes were found to exist with regard to efficacy for either inquiry-based teaching or science teaching in general. The findings from the written reflections were that three themes were evident. The themes were that teacher understanding of inquiry was impacted, confidence in the ability to teach science increased, and teachers saw the benefits of collaborating. Duran et al. (2009) believe the reason for no significant statistical changes in efficacy stem from the teachers involved already possessing a positive belief in their abilities. Significant changes appeared in teacher beliefs about inquiry-based learning, helping investigate topics in depth and increased levels of student apprehension.

Bairrington Brown et al. (2012) conducted research to evaluate efficacy related to teacher preparation academies in Texas. The purpose of the study was to examine the impact of The Mathematics, Science and Technology Teacher Preparation (MSTTP) academy professional development program on teacher quality. A total of 649 teachers participated in the study. Participants were a mixture of current mathematics and science classroom teachers plus students in teacher preparation programs emphasizing STEM-related fields.

Each participant was asked to complete a survey examining perceptions of their efficacy. The surveys were designed to specifically examine perceptions of subject matter, pedagogical knowledge, and the ability to integrate technology after completing the professional development academy. A small sample of 56 teacher participants also

participated in 18 question semi-structured interviews related to the program's goals and objectives.

The researchers reported findings that indicated the professional development strengths included a strong focus geared towards strengthening content knowledge and the development of teachers' professional commitment. Survey and interview data revealed that teacher efficacy related to content knowledge and instructional practices increased. Participants identified the time commitment of the professional development academies was a concern, as teaching is a time consuming occupation.

Teachers have been involved in an ongoing journey of professional development. Through different sessions of development, many strategies are communicated and presumed implemented. Many challenges to implementation exist that have hindered teacher change. Teacher commitment, self-efficacy, lack of accountability, minimal incentive, differing views of education and lack of support have all hindered strategy implementation. A teacher's self-perception of their teaching identity has been a significant factor for professional development implementation.

Self-Efficacy and Teacher Identity

A teacher's identity as an educator has been constantly changing and evolving. The formation of an identity has been a process that teachers undertake and redefine over the course of their career. The process of change for teachers has been complex and influences their beliefs and attitudes (Bairrington Brown et al., 2012). The challenges and successes teachers encounter have been integral in constructing their sense of self as an educator (Billett & Pavolva, 2005; Connelly & Clandinin, 1999). Self-perception has had an important impact on teaching practices and effectiveness as educators. Identifying essential features of a teacher's perception of their efficacy has helped form more concrete characteristics that define professional identity.

Peer mentors have been tasked with addressing the emotional and professional needs of new teachers as they acclimated to all the responsibilities of teaching (Alsurp, 2006; Timperley, 2010; Ulvik & Sunde, 2013). Mentor feedback concerning teacher experiences has been subjective and has contributed significantly to the development of a teaching identity (Akdağ & Haser, 2016; Coombs & Goodwin, 2013; Fantili & McDougall, 2009; Furlong, 2012; Ingersoll, 2012; Young & Erickson, 2011). According to Beijaard et al. (2004), interactions with other professionals has formed a sociological and a cognitive psychological perspective that have comprised a teacher's professional identity. They offered that teachers have then expressed their professional identity based on their perception of themselves and their goals as educators based on these interactions (Beijaard et al., 2004). These constructive relationships with other educators contribute to increase efficacy in learning and teaching (Powell, 2009; Rajuan, Beijaard & Verloop, 2008; Ruohotie-Lyhty & Moate, 2016; Turnbull, 2005).

A study by Overbaugh and Lu (2008) was conducted to determine if a short-term professional development course contributed to a change in self-efficacy and implementation of the covered strategies. A total of 377 teachers (58 males, 319 females, 33% urban schools, 49% suburban schools, 18% rural schools, age ranging from under 25 to older than 50, 45% elementary school teachers) participated in the study. The mixed-methods study measured self-efficacy of the participants before and after the training while conducting interviews to establish a better understanding of participant experiences.

The researchers used self-created 17-item *Self-Efficacy survey* and a semi-structured interview to measure and record teacher responses. All 377 teachers were administered three self-efficacy surveys (before, after, further after) while only 51 voluntarily participated in the interview. A one-way repeated measures ANOVA was

conducted to analyze the relationship between self-efficacy levels and professional development. A one-way ANCOVA was conducted to examine professional development effects based on demographic information. Interviews were recorded, transcribed, analyzed using NVivo, and coded to determine codes, themes and patterns.

The findings of the study indicated increased levels of self-efficacy throughout the process. Also, the increased level of self-efficacy was sustained months after the program had taken place. No significant difference in reported levels was found across demographic variables. Interviews with the participants confirmed the survey results as teachers expressed a positive effect on competency and beliefs in integrating new strategies and instruction.

Another study by Locke et al. (2013) was conducted to investigate the impact of a professional development program on teacher self-efficacy in terms of writing and teaching writing. The study reported on five high school teachers (all female, three English teachers, one History teacher, one Chemistry teacher, range of teaching experience four - 20 years) who participated in *Teachers as writers: Transforming professional identity and the classroom picture*. This was a two-year professional development designed to address Bandura's (1997) four sources of self-efficacy (mastery experiences, physiological and emotional states, vicarious experiences, and social persuasion). Each teacher completed a two-part self-efficacy questionnaire at the onset and conclusion of the program and participated in open-ended question interviews 15 months into the program. The researchers created the open-ended questions to engage the respondents in themes related to the self-perception questionnaire.

The self-efficacy questionnaire first asked about confidence as a writer. The questions asked about confidence as a fiction writer, confidence as a non-fiction writer, confidence as a poetry writer, and then several questions about confidence as an essay

writer. The pre- and post-questionnaires revealed that teachers improved their self-efficacy over the course of the program. Common themes that came from the interviews suggested that the participants felt an improved understanding of writing, being a writer, and an increased level of competence in genres that were not related to their professional field.

Next, the second part of the self-efficacy questionnaire related to the teachers' confidence of teaching writing. The questions all dealt with confidence in different areas of the writing process. At the conclusion of the professional development program, all but one of the teachers again reported increases in self-efficacy for each question. The interviews revealed that ongoing professional development facilitated changes in several aspects of writing implementation in the classroom. Reported changes from the development program included expanding possibilities for assignments, writing with students, changes in writing practices, emphasis on writing to learn, integration of real-world tasks, and attitude adjustments with regard to providing feedback. Each teacher commented on their connections, some positively and some negatively, with the four sources of self-efficacy in relation to their self-efficacy as writers and teachers of writing.

Peer Coaching

Peer coaching support has been positively linked to teacher retention, teaching efficacy and identity formation (Andrews, Gilbert, & Martin, 2012; Rajuan et al., 2008). According to Mesler, Parise, and Spillane (2010), collaboration with other teachers has resulted in the most significant change in teacher practices after professional development. They suggested professional development that incorporates an emphasis on discussion with colleagues yields greater change in teachers' practices (Mesler et al., 2010). These discussions have been crucial to teacher development because they help progress relationships and deepen our understanding of ourselves (Coombs & Goodwin,

2013). However, factors such as colleagues with differing teaching views have impeded implementation of new strategies (Attard, 2007).

Peer coaching has referred to teachers working in collaboration utilizing personal reflection to grow as professionals through sharing ideas and honing skills (Robbins, 1991). Working with a peer coach has helped teachers gain valuable information that supports their learning from more formal professional development formats (Ball & Cohen, 1996). Therefore, coaching has developed into a key support strategy for new teachers (Ulvik & Sunde, 2010). A positive experience with a peer coach supports new teachers' sense of acceptance and improves efficacy (Fenwick, 2011). Several studies have been conducted to examine the effects of peer coaching on classroom teachers (Donegan, Ostrosky, & Fowler, 2000; Kohler, McCullough-Crilley, & Shearer, 1997; Murray et al., 2009). These studies have identified both positive and negative aspects of peer coaching models.

Donegan et al. (2000) discussed two models of peer coaching in their study. The expert model involves an expert teacher working with a less trained peer while the reciprocal model involves teachers working together to jointly grow skills. The researchers stated that selecting the correct model for individual staff members has been the first step in establishing peer coaching practices. Next, developing positive relationships, adapting coaching programs to teacher needs, and creating schedules for implementation of the program are the steps to establish guidelines for successful peer coaching. Once these guidelines are in place, peer coaching can reduce teacher isolation, encourage collaboration, help support student needs, and encourage reflective practices.

The study reviewed several possible positive outcomes of peer coaching. Potential benefits included increased self-efficacy, a reflection process that facilitates growth and change, joint planning, goal setting, and sharing of instructional strategies

between peers. However, possible barriers to successful peer coaching were also identified through the study. Time constraints, observation difficulties, differing philosophies among peers, and possible resistance to change current practices were all seen as potential barriers to successful peer coaching.

A study conducted by Bengo (2016) examined different elements of peer coaching that help new teachers with the implementation of instructional practices. The researcher found that a coach's credentials matter to some new teachers. The findings also indicated that a coach displaying in depth content knowledge led to more effective coaching even though some teachers need to be convinced certain instructional strategies work for students. This led to the need for job-embedded demonstrations of new instructional strategies. Teachers interviewed during the study reported that coaching was beneficial to their growth. They indicated that having resources readily available contributed to effective coaching. Participating teachers also identified the need for time to establish trust with coaches to appreciate the support they were receiving.

Another study by Kohler et al. (1997) was designed and conducted to investigate teacher change, acclimation of instructional methods, measure implementation, and processes used in instructional practices through a peer coaching professional development model. Four elementary teachers (three with >18 years' experience, one with two years' experience) voluntarily participated in the study that incorporated peer coaching from a retired teacher with 32 years of elementary teaching experience. The teachers took part in an in-service training that outlined the goals of an integrated instructional approach designed to accomplish six functions: review and check work, present new content, provide guided practice, administer ongoing feedback, engage independent practice, and conduct several forms of assessment.

The researchers gathered data by observing four experimental measures throughout the process. The measures observed were organization and conduct of integrated activities, instructional processes of the teacher and students, focus of coaching interactions, and addressing teacher satisfactions and concerns with the new instructional approach. Findings from the study showed that aspects of each lesson specifically addressed with the peer coach were given more attention in the form of refining and improvement. Also, implementation of professional development strategies, like those conveyed during the peer coaching sessions, were able to be formally monitored and sustained over a period of time under appropriate conditions.

These studies conveyed several important aspects related to peer coaching models. Establishing guidelines for the type of peer coaching implementation has been important to ensure optimal outcomes (Donegan et al., 2000). The potential positive outcomes appear to outweigh the potential negative barriers perceived by teachers. Each of the positive outcomes identified, mentioned or would lead to an increase in teacher self-efficacy.

Teachers Perceptions

Teachers who have been active participants in their professional development have stayed current on educational reform and gain a stronger understanding of their roles as educators. Teacher perceptions of their experiences have often been influenced by their emotions. They have often felt that education has conflicting messages about its most important aspects (Kennedy, 2016).

A recent study by Gilles et al. (2013) discussed a comprehensive form of peer coaching that involved teacher support as an individualized form of professional development. The researchers examined what new teachers perceived as valuable and effective about peer coaching by utilizing grounded theory based on survey results.

Survey responses revealed that new teachers were mostly positive about their peer coaches. One elementary teacher reported that having a peer coach was “like having a second brain/hands/feet/eyes” (Gilles et al., 2013, p. 80). Approximately 96% of the 264 respondents used positive statements when describing their experiences. They felt emotionally supported while also benefiting pedagogically. Teachers also perceived that advice, the ability to collaboratively plan, and extra time afforded due to coaching were all beneficial components of peer coaching.

In a similar study, Andrews et al. (2012) found that new teachers valued the opportunity to collaborate with another professional. These new teachers placed value in having an experienced peer coach for several reasons. The reasons included receiving feedback not attached to an evaluation and the ability to have ongoing dialogue with more experienced professionals.

Recently, Stevens et al. (2013) conducted a study to investigate self-efficacy growth in relation to professional development. The purpose of the study was to compare the reported self-efficacy of teachers with differing levels of experience. Each teacher participated in a multi-year professional development program (West Texas Middle School Math Partnership – WTMSMP) that had run for two years. The researchers examined patterns in terms of gains as self-efficacy, reported levels of self-efficacy, and increases throughout participation.

A total of 65 teachers (54 female, 10 male, one non-reported, mean years of teaching experience = 10.46, experience ranging from <1 to 32 years) began the program. After the first year, four participants had left the program and three others failed to complete portions of the program resulting in 58 final participants reporting data. The participants were divided into two groups based on academic background criteria consisting of specific college mathematics courses completed. No statistical difference

was significant with regard to years of experience between the two groups but the group with more collegiate courses completed, reported a slightly higher initial self-efficacy.

Each participant was administered the *Mathematical Knowledge for Teaching* (MKT) scale (Hill, Schilling, & Ball, 2004; Schilling & Hill, 2007) to assess their mathematical knowledge before the program began. In addition, the *Teachers' Sense of Efficacy Scale* (TSES) (Tschannen-Moran & Hoy, 2001) was administered four times throughout the program to measure changes in self-efficacy. TSES scores were analyzed using SPSS 18 to evaluate patterns in gains, reported levels, and increases of self-efficacy reported by teachers. The teachers with less mathematical background reported higher levels of self-efficacy at the beginning of the program but achieved lower scores from the MKT scale. The findings stated that teachers with differing mathematical backgrounds did not have similar growth patterns of self-efficacy. Teachers with more background reported higher gains in self-efficacy throughout the program. However, the researchers suggest that aspect may be attributed to the fact that teachers with less background initially reported higher levels of self-efficacy. All teachers reported an increase in self-efficacy over the course of the program.

Gabriele and Joram (2007) implemented a study to investigate sources of efficacy, specifically by evaluating criteria used to evaluate one's own teaching effectiveness, for mathematics teachers changing teaching practices. The study sought to compare differences how teachers evaluate success of lessons and their evidence to support their claims based on experience. Ten early elementary teachers (all female, all years of experience >10, five with over five years in development program, five with less than five years in development program, low and middle-range socioeconomic status teachers) participated in a teacher development program in the Midwestern U.S. that was designed to shift teachers into reform-based teaching in mathematics and become reflective of their

practices. Reform-based teaching requires an emphasis on student thinking and learning over rigid methods of instruction as lecture while involving students in decisions that impact their learning process.

Teachers were observed teaching newly learned reform-based lessons and interviewed immediately upon their conclusion. The researchers conducted and transcribed a talk-aloud reflection with semi-structured questions to have teachers reflect upon the lesson with minimal prompting. Next, the transcripts were coded using a verbal analysis. Answers to reflective questions were broken into several categories established after analyzing the reflective responses. The emerging categories identified by the teachers were lesson goals and outcomes, pedagogical behaviors, student comprehension, student thinking, student affect, student conduct, and change over time.

Results showed that veterans possessed a higher self-efficacy than the newcomers participating in the program. During reflections, veteran teachers were discussing specific instances showcasing student thinking as opposed to newcomers. Veterans and newcomers expressed differences in events that were deemed most pertinent for success in a lesson. Reported success from veterans was linked to the depth of student thinking; whereas, newcomers were more dependent upon the achievement of lesson goals and objectives. This shows that the formation of self-efficacy differs among teachers with different backgrounds. The researchers reported that teachers used different criteria when establishing a sense of effectiveness.

Many different strategies are communicated to teachers through effective professional development and several factors contribute to their implementation. Without accountability, teachers may not be implementing new strategies. According to Darling-Hammond and Richardson (2009), most teacher professional development sessions consist of one-day workshops that provide tools but have required the teacher to

implement the tools to fit their teaching needs. Many educators also have felt a lack of support to implement new strategies.

Challenges

Coaching cannot become beneficial without quality mentoring (Ulvik & Sunde, 2013). Peer coaching has been a positive experience but may include challenges and limitations for the coach and mentee (Wang, Odell, & Schwille, 2008). These challenges have influenced new teachers' ideas about the profession and their potential of success (Coombs & Goodwin, 2013). Studies have been conducted to examine potential challenges of peer coaching professional development.

Smith (2011) conducted a study that revealed several potential limitations and challenges encountered by teachers participating in peer coaching. The challenges were reported by both new teachers receiving peer coaching and the veteran teachers providing the coaching. Different challenges reported included feeling overwhelmed by the teaching profession and all its nuances, feelings of isolation within a campus, difficulty responding to all student needs, and issues of ethicality.

Klein and Riordan (2009) published a study that explored how teachers expressed professional development experiences and how that translated into implementation in classroom settings. Eight New York City teachers (male and female, age ranging from 23 – 35, various subject areas) from the Expeditionary Learning Schools Outward Bound (ELS) organization participated in the study. Expeditionary Learning Schools Outward Bound places an emphasis on continual professional development (Killion, 1999) that aims at teacher growth and assisted implementation. Teachers engaged in 20 professional development sessions, four interviews, and multiple classroom observations over the course of a year.

After collecting data, the researchers found a range of the levels of implementation among those in the study. Participant implementation was labeled as no implementation/rejection, token implementation, mistaken implementation, direct implementation, tinkering, or crafting and jiggering. Each category presented explanations as to the level of implementation or lack thereof. A lack of student ability was a difficulty experienced by a participant that reported no implementation. The teacher indicated that the strategies learned during professional development were useful but would cause failure for students because they did not possess the cognitive skills to accomplish objectives and meet district criteria for standardized testing.

Token implementation was defined as a teacher displaying knowledge of concepts from professional development sessions that did not align with their classroom practices. Teachers identified under this category could describe aspects of the professional development but compensated for implementation by simply using the language necessary to communicate their knowledge of the program. This led to teachers conducting instruction with little conviction of implementing goals correctly. Mistaken implementation described teaching practices that distorted elements from the program. Teachers had the intention of adapting program aspects to meet the needs of their students but subsequently changed objectives and goals unknowingly. This type of implementation has been improved with clearly defined expectations and ongoing support from administrators or trainers. However, if a teacher has been unclear about specific strategies conveyed during professional development sessions, it might lead to mistaken implementation methods. Direct implementation, tinkering, crafting and jiggering referred to more successful forms of implementation with differing levels of positive variance.

Interviews with the teachers revealed that five significant influences on professional development implementation existed. The elements were level of engagement, content area beliefs, content expertise, assessment needs, and differentiation based on experience of the teacher. Teacher engagement and excitement about the professional development strategies directly impacted their motivation to implement. The researchers found that content beliefs about curriculum needs and testing, specifically in mathematics, contributed to the amount and degree of implementation. Content knowledge was a factor as teachers felt the need to discuss implementation strategies and their connection to curriculum design with others teaching the same content. Assessment needs dictated by districts also influenced implementation because of time constraints and the need to cover large amounts of content. Differentiating professional development opportunities for teachers was identified as a way to challenge teachers with different styles and levels of implementation. Therefore, schools need to be active in monitoring and reflecting upon professional development methods and implementation in order to best serve their staff and students.

A study by Hong and Vargas (2015) was conducted to examine how teachers' identities and perceptions are changed through professional development centered on inquiry-based learning and implementation. The researchers looked at the concepts of teacher identity and beliefs as continually changing entities that are influenced by professional development and social interactions. They investigated teachers' perceptions and beliefs about a new form of instruction and how they relate to the ability to implement new strategies in their classrooms.

The participants in this qualitative study consisted of 12 teachers (five female, seven male, experience ranging from one to five years, age ranging from 23 – 40) from the Southeastern United States. Each teacher participated in semi-structured interviews

lasting between 45 and 90 minutes that were conducted in a face-to-face setting. Interviews were recorded and transcribed for accuracy, then analyzed and coded to produce common themes. One theme discovered was an issue with the implementation of new instructional methods. Through the analysis of the interviews, researchers determined that some of the reasons for difficulty in implementation stemmed from a lack of understanding from teachers. The teachers' views and understanding of the new instructional methods led to misguided implementation practices.

The study then continued by further examining sources of difficulty for implementation. The interviews revealed common sources of difficulty to be school support and emotional experiences. School support was believed to hinder implementation because it made teachers feel potentially restricted in their ability to facilitate the learning process. Teachers felt schools challenged their autonomy by forcing new mandates that limited creativity, the ability to connect with students, and weakened their motivation and self-efficacy. The emotional experiences mainly focused on stress and frustration. The participants in the study felt a negative impact on classroom management from the new instructional methods that seemed rushed. Several interviews cited the wide gap in achievement levels creating behavior issues. Not being able to sufficiently address all students' individual needs due to time constraints and a more student-learned based instructional model led to frustration and stress attributed to students' off-task behaviors.

Therefore, the findings show that teachers were attempting to implement new methods but were met with multiple barriers. Understanding concepts and implementing them are influenced by outside factors such as lack of time, classroom dynamics, and school environment. Difficulties with implementation due to outside source factors has

been a major contributor to developing a negative sense of teacher identity and self-efficacy.

Summary of the Findings

Recent literature has shown effective forms of peer coaching and professional development help to prepare proficient teachers with higher levels of teacher self-efficacy. The opportunity to engage in professional development has allowed teachers to fulfill the need to acquire new knowledge, skills, methods, and strengthen their understanding of curriculum content (Loucks-Horsley et al., 2003). Trainings conducted by content area experts have resulted in the most significantly impactful professional development (Jaquith, Mindich, & Chung Wei, 2010). Teachers' self-efficacy plays a role in their development. Effective peer coaching may facilitate growth while operating the continually developing educational world. Multiple studies revealed that quality professional development impacts teachers' self-efficacy regardless of experience (Gabriel & Joram, 2007; Locke et al., 2013; Overbaugh & Lu, 2008; Stevens et al., 2013). Challenges exist that have been detrimental to growth. Lack of accountability or support have created unfavorable working environments that have limited potential growth. Studies have also shown that the level of implementation, lack of knowledge, time restrictions, classroom environment, and school support may all hinder strategy implementation from professional development (Hong & Vargas, 2015; Klein & Riorden, 2009; Kohler, Anthony, & Steighner, 2001).

Theoretical Framework

This research study was based on the social cognitive theory that teachers who participate in peer coaching sessions possess positive, or increased, self-efficacy and are more likely to successfully and consistently implement newly learned strategies, specifically in elementary mathematics. Bandura (1986) claimed that perceived self-

efficacy beliefs influence motivation, a sense of comfort, and individual accomplishment. Increasing one's perception of their teacher self-efficacy through professional development is possible if sources of efficacy are addressed (Garet et al., 2001). Campbell et al. (2014) highlight that teacher beliefs about mathematical teaching and learning have differed. Therefore, Glaser and Strauss' (1967) grounded theory was used as the basis for constructing and conducting semi-structured interviews designed to allow teachers to elaborate, validate, and analyze differing methods used in peer coaching sessions.

Conclusion

Recent literature has discussed the potential impact professional development, specifically peer coaching, has had on teacher self-efficacy. This chapter discussed the findings of studies in regards to professional development, teacher self-efficacy, teacher identity, peer coaching, teacher perceptions, and challenges faced by teachers that have embarked in peer coaching models. The research provided insight to what others have found and the potential link between peer coaching and its influence on teacher self-efficacy. Chapter III reports the methodology for this study.

CHAPTER III

METHODOLOGY

The purpose of this mixed-methods study was to determine if teacher self-efficacy was influenced by peer coaching in elementary mathematics. Survey and interview data were collected from a purposeful sample of first year elementary mathematics teachers within a large, suburban school district located in southeast Texas. Quantitative data were collected using the *Teachers' Sense of Efficacy Scale* (TSES), while the qualitative data were gathered from semi-structured interview responses. Data were analyzed using frequencies, percentages, a paired t-test, and an inductive coding process. This chapter presents an overview of the research problem, operationalization of theoretical constructs, research purpose, research questions, hypotheses, research design, population and sampling selection, instrumentation, data collection procedures, data analysis, ethical considerations, and limitations of the study.

Overview of the Research Problem

Throughout their careers, teachers participate in professional development to grow and learn strategies to improve instructional methods designed to benefit students (Loucks-Horsley et al., 2003). Being actively engaged in the professional development process has been essential to forming a professional identity (Coldron & Smith, 1999). However, many teachers have felt that professional development has offered little motivation or incentive to change their current teaching practices (Darling-Hammond & Richardson, 2009). It may be difficult for teachers to alter their methods of teaching and adapt to a shift in instruction without a change in their sense of who they are as a teacher (Hong & Vargas, 2105).

Teacher self-efficacy may be influenced by professional development (Duran et al., 2009; Locke et al., 2013; Overbaugh & Lu, 2008; Stevens et al., 2013). The formation of teacher identity and self-efficacy rely on meaningful professional development for teachers. The formation of a professional identity is facilitated through ongoing professional development that teachers connect to their teaching (Beijaard et al., 2004). Peer coaching professional development involves the collaboration of teachers reflecting for the purpose of growing as professionals (Robbins, 1991). Peer coaching can lead to increased levels of self-efficacy for elementary mathematics teachers.

Operationalization of Theoretical Constructs

This study consisted of two constructs: (a) teacher self-efficacy and (b) peer coaching. A teacher's perception of their ability to be effective in a classroom setting is referred to as teacher self-efficacy. It pertains to the belief that all students are capable of learning (Tschannen-Moran & Hoy, 2001). This construct was measured using the *Teachers' Sense of Efficacy Scale* (TSES). Peer coaching is defined as teachers collaboratively utilizing self-reflection to grow professionally as educators (Robbins, 1991). Peer coaching influence was measured through responses to semi-structured interviews.

Research Purpose and Questions

The purpose of this study was to determine if teacher self-efficacy was influenced by peer coaching in elementary mathematics. This study addressed the following research questions:

Quantitative Research Questions

1. Is there a statistically significant mean difference in teacher self-efficacy from pre-to post-peer coaching?

2. What are participant perceptions of their teacher self-efficacy pre- and post-peer coaching?

Qualitative Research Questions

3. What challenges are teachers experiencing with peer coaching?
4. What are teachers' perceptions of factors that influence their teacher self-efficacy?

Research Design

For this study, the researcher used a sequential mixed-methods research design to examine the influence of peer coaching on teacher self-efficacy. The design included two phases: first, a quantitative phase and second, a qualitative phase. The study design allowed for a more thorough investigation by following up the quantitative portion of the study with a qualitative phase that looked for emergent themes that may otherwise be overlooked or not captured in quantitative data. A purposeful sample of first year 1st-5th grade mathematics teachers participating in the district peer coaching program employed in a large suburban school district in southeast Texas were solicited to provide responses to the *Teachers' Sense of Efficacy Scale* (TSES) and participate in semi-structured interviews used to gather additional information about peer coaching as professional development. Quantitative data were analyzed using frequencies, percentages, and a paired t-test, while the qualitative data were analyzed using an inductive coding process.

Population and Sample

For this study, the population consisted of 1st-5th grade teachers in a large suburban, public school district in southeast Texas. The district serves over 73,000 students and employs over 4,500 teachers through 75 elementary and secondary campuses. Of the 75 campuses in this district, 46 are elementary campuses. Table 3.1 displays the student population of the school district and provides the demographic

information for the previous 2015-2016 school year. The campuses for this study were elementary schools with kindergarten through fifth grade mathematics teachers. Table 3.2 displays the staff population of the school district and provides the demographic information for the previous 2015-2016 school year. Data from the state's education agency 2015-2016 school report card indicated the campuses house professional staff members certified to teach mathematics. A purposeful sample of first year elementary (1st-5th grade) mathematics teachers receiving peer coaching were solicited to participate in this study. The participating district requires peer coaching to first year teachers that are newly employed. Requirements to be a peer coach include a minimum of three years teaching experience, a recommendation from a principal, a recommendation from a peer, and completion of initial mentor training. This study only included those teachers who were in their first year of their teaching profession.

Table 3.1

Participating School District Student Population and Demographics

	Student (n)	Percentage (%)
Total Students	73,377	100.0
African American	19,754	26.9
Hispanic	19,672	26.8
White	13,956	19.0
Asian	17,214	23.5
American Indian/Alaska Native	550	0.8
Native Hawaiian/Pacific Islander	235	0.3
Two or More Races	1,996	2.7

Table 3.2

Participating School District Teacher Population and Demographics

	Staff (n)	Percentage (%)
Total Teachers	4,504	51.0
African American	1,284	28.5
Hispanic	617	13.7
White	2,252	50.0
Asian	243	5.4
Two or More Races	95	2.1
Elementary Teachers (Grades 1-5)	1,745	39.5

Instrumentation

The *Teachers' Sense of Efficacy Scale* (TSES) is based on Bandura's (1997) teacher self-efficacy scale and was used to determine teaching self-efficacy (Tschannen-Moran & Hoy, 2001). A group of eight graduate students with teaching experience participated in a seminar with the researchers to develop the scale. The resulting 52-item scale consisted of Bandura items and items generated to describe additional significant teaching tasks the scale was lacking. The new scale was piloted over three separate studies during the developmental phase. The 52-item scale was reduced to 32-items for the first study and then 18-items consisting of three subscales for the second pilot study. Finally, during the third pilot study, 18 new items were developed, tested and manipulated into a 24-question long form and a 12-question short form.

A total of 801 teachers completed the scale over the three studies. In the third study, 410 surveys were completed by preservice and in-service teachers enrolled at three universities. A majority of the participants were identified as European Americans (81.0%). The in-service teachers ranged from one to 29 years of experience (mean experience = 8.2 years) and were between the ages of 21 and 57 (mean age = 34.8 years old). The 24-question long form instrument consists of three subscales (efficacy in student engagement, efficacy in instructional strategies, and efficacy in classroom

management) rated using a 9-point Likert scale (1 = Nothing, 3 = Very Little, 5 = Some Influence, 7 = Quite A Bit, and 9 = A Great Deal). Table 3.3 aligns the subscales with their corresponding survey items. Composite scores can range from 24 to 216; the larger the composite score the higher the teacher self-efficacy. The Cronbach's alpha reliability coefficients for this study were 0.94 for the entire instrument, 0.87 for student engagement, 0.91 for instruction strategies, and .90 for classroom management (see Table 3.4). Litwin (1995) stated that Cronbach's alpha reliability coefficients of .70 or greater are generally accepted as having good reliability.

Table 3.3

<i>Subscale TSES Categories and Corresponding Items</i>	
Long Form	Items
Efficacy in Student Engagement	1, 2, 4, 6, 9, 12, 14, 22
Efficacy in Instructional Strategies	7, 10, 11, 17, 18, 20, 23, 24
Efficacy in Classroom Management	3, 5, 8, 13, 15, 16, 19, 21

Table 3.4

<i>Long Form Reliabilities and Cronbach's Alpha</i>			
	Mean Score	Standard Deviation	Cronbach's Alpha
TSES	7.1	.94	.94
Efficacy in Student Engagement	7.3	1.1	.87
Efficacy in Instructional Strategies	7.3	1.1	.91
Efficacy in Classroom Management	6.7	1.1	.90

Data Collection Procedures

The researcher gained approval from the Committee for the Protection of Human Subjects (CPHS) at the University of Houston-Clear Lake (UHCL) and the Internal Review Board (IRB) of the participating school district before collecting data. The researcher contacted campus principals through phone conversations and emails to discuss the purpose of the study and the process for collecting teacher survey responses. Next, after communicating with campus principals, the researcher emailed teachers to explain the purpose of the study and the process for data collection. At that time, the researcher also solicited teachers new to the profession as volunteers to take part in one-on-one interviews for the qualitative component of this study.

After obtaining teacher email addresses from campus websites, an email was sent to all teachers explaining directions for how to complete the instrument, a timeframe for completing the instrument, assurance that participation was voluntary, and assurance that all identities would remain confidential. The email also contained the researcher's contact information should questions arise from the participants. Each participant provided consent to participate by accessing the SurveyMonkey link and completing the instrument. Individual first through fifth grade teachers were asked to complete *Teachers' Sense of Efficacy Scale* (TSES) to measure their self-efficacy before and after their four-month peer coaching time period. The sample of participants were asked to complete the survey at the same time. Appendix A includes a survey cover letter that was emailed to teachers. The researcher then contacted peer coaching participants willing to participate in one-on-one interviews through email and set up appointments to complete the interviews. Interview participants were required to sign informal consent forms agreeing to have information from the sessions used in this study (see Appendix B).

For the qualitative data, the researcher conducted two 30-minute semi-structured interviews with each participating teacher ($n = 7$). An interview script was used in order to gather the information necessary to identify challenges and teacher perceptions of the factors that influence their self-efficacy (See Appendix C – Interview Protocol). Interview data from the one-on-one interview protocol were recorded with permission, transcribed by the researcher, color coded, and analyzed to determine emergent themes within participant responses. All data collected was stored electronically on the researcher's password protected computer hard drive and an external hard drive and was password protected. The results of the study are kept for five years before destruction.

Data Analysis

Quantitative

All quantitative data were analyzed using IBM SPSS. To answer research question one, a paired t-test was conducted to determine if there was a statistically significant mean difference in teachers' self-efficacy prior to and following peer coaching. All variables were of continuous measurement. Research question two was addressed by calculating frequencies and percentages to determine teacher perceptions of the teacher self-efficacy pre-and post-peer coaching. A significance value of .05 was used for this study.

Qualitative

The researcher utilized grounded theory designed by Glaser and Strauss (1967). A grounded theory approach allowed for exploration and constant comparison of the experiences of teachers receiving peer coaching. This approach allowed for the creation of new theory using emergent data without the influence of any of the researcher's preconceived biases. According to Charmaz (2014), the goal of grounded theory is to create a theory with several key features: (a) the theory is practical and useful for

participants, (b) it explains the process in the context of participants' views, and (c) it provides a description of the way participants interpret reality around the process being examined.

To answer research questions three and four, qualitative data were gathered from one-on-one interview questions. The responses were recorded, transcribed by the researcher, and color-coded to determine emerging themes using open and axial coding. Open coding established substantive codes while axial coding utilized the theoretical codes to create connections to the substantive codes (Creswell, 2013). The data were categorized by major themes. Obtaining this additional data allowed the researcher to more deeply examine the constructs of this study. The interview questions were designed to provide understanding of the patterns emerging pertaining to the challenges and teacher perceptions of factors that influence their self-efficacy. As themes emerged, they were organized into categories and a narrative description of the findings was presented in a detailed discussion of participant responses. This information was used in addition to the findings from the quantitative data to provide more in-depth understanding of the challenges faced during peer coaching professional development and factors that may cause self-efficacy to change.

Validity

In this study, the researcher spent a period of four months during the academic year collecting data through semi-structured interviews. This process of triangulation provided time to gain a well-rounded perspective of the peer coaching professional development model over a large portion of the school year and provided opportunity for multiple interactions with the participants to develop insight pertaining to each specific culture. The researcher personally conducted all interviews to ensure reliability.

The researcher piloted semi-structured interviews and questions to check the validity of the protocols. Transcribing was also completed throughout the data collection process by the researcher. Piloting interviews allowed the researcher to examine and refine the questions to ensure they would elicit information the researcher sought for this study (Yin, 2003). Interview question validity was checked by piloting the protocols with research colleagues, university professors, and teachers in positions similar to those to be solicited for the study. All interviews were recorded digitally and transcribed following each session. The researcher took precautions to ensure the accuracy of all qualitative data collected during the study (Creswell, 2002). Participants verified the accuracy of the researcher's summarized perspective through member checking.

Privacy and Ethical Considerations

The researcher gained approval from the CPHS at UHCL and the IRB of the participating school district before collecting data. Once approval was granted, the researcher emailed the survey link to all participants with a notice stating that by participating in the survey, they were giving consent to participate in the study. The email outlined the guidelines of the study, including the purpose of the study, instructions about how to complete the instrument, a statement that participation was voluntary, and how participants, and the names of their campus were protected.

Given there were open-ended responses, the possibility of subjective bias was addressed by using peer review. During the coding phase, the researcher safeguarded against unsupported and subjective interpretation as themes emerged. Once the study was completed, the faculty sponsor maintained a copy of the data. During and after the study, the researcher secured the data in two locations: The researcher's computer hard drive and on an external hard drive. The results of the study are kept for five years before destruction.

In an effort to receive honest responses from participants on the survey instrumentation, participants' identities remained confidential. The campuses were given pseudonyms. Participants submitting open-ended responses were given false identities chosen by the researcher. This measure helped to alleviate any potential negative side effects as a result of the study being conducted on a particular campus. Lastly, given that the instrument was derived from a pre-existing survey, proper acknowledgement was given to the authors.

Limitations of the Study

This research design has a few limitations. First, the *Teachers' Sense of Efficacy Scale* (TSES) is a self-reporting instrument that may be dishonest. Teachers may report a social desirability bias (Lee, 2009), such that participants tend to describe their behavior as better than they actually are, which may affect the reliability of the data. Therefore, the researcher was unable to ensure the absolute accuracy of teacher responses. Second, the size of the study was a limitation. This means that generalization of the findings may be limited. Third, the low response rate to the survey could be an issue. Fourth, the interview questions could potentially be a limitation if participants were not comfortable being honest with their responses. The results may be most beneficial for school districts with similar professional development structures. Finally, the time period of the study may be a potential limitation. The short period of time to conduct the study may not yield significant impacts or findings.

Conclusion

This research study determined if teacher self-efficacy was influenced by peer coaching professional development in elementary mathematics. This chapter discussed the study's research problem, operationalization of theoretical constructs, purpose, questions, design, population, sample, instrumentation, data collection procedures, and

data analysis procedures. The data provided insight about teacher self-efficacy and its correlation to peer coaching professional development. Chapter IV reports the results of the study.

CHAPTER IV

RESULTS

The purpose of this study was to determine if teacher self-efficacy is influenced by peer coaching in elementary mathematics. This chapter presents the results of the quantitative and qualitative data analysis of this study. Survey and interview results were analyzed by comparing teacher self-efficacy from the beginning and conclusion of this study. This chapter begins by presenting a detailed description of the participant's demographic characteristics followed by instrument reliability and data analysis for each of the four research questions. The chapter concludes with a summary of the findings.

Participant Demographics

During the fall of 2017, elementary teachers working in a large suburban school district in southeast Texas were sent an email soliciting help to access mathematics teachers and mathematics teachers participating in a peer coaching professional development model. Although 150 teachers were qualified for participation, only 27 completed the survey. All of the teachers that participated in the study were first year to the profession teachers, female, and taught elementary mathematics. Sixty-three percent ($n = 17$) of the respondents reported to be White or Caucasian with Asian or Pacific Islander and Black or African American making up the next largest groups at 14.8% ($n = 4$) each. Table 4.1 displays participant demographics regarding gender, race/ethnicity, subject taught, years of teaching, and grade level.

Table 4.1

Participants Demographics: Gender, Race/Ethnicity, Subject Matter, and Years Teaching

	Frequency (n)	Percentage (%)
1. Gender		
Female	27	100.0
2. Race/Ethnicity		
Asian or Pacific Islander	4	14.8
Black or African American	4	14.8
Hispanic	1	3.7
White or Caucasian	17	63.0
Multiple Ethnicities	1	3.7
3. Subject Matter		
Mathematics	27	100.0
4. Years Teaching		
First Year	27	100.0
1-3 years completed	0	0.0
4-10 years completed	0	0.0
Over 10 years completed	0	0.0

Instrument Reliability

Cronbach's alphas were calculated to assess the reliability or internal consistency of the TSES and its three subscales. Table 4.2 provides the Cronbach's alpha coefficient for this study and the reliability coefficients reported from Tschannen-Moran and Hoy's (2001) and this study. According to Fraenkel and Wallen (2006), acceptable reliability coefficients are greater than .70.

Table 4.2

Reliability Coefficients for TSES

	Tschannen-Moran & Hoy (2001)	Cahill (2018)
TSES	.94	.93
1. Efficacy in Student Engagement	.87	.88
2. Efficacy in Instructional Strategies	.91	.85
3. Efficacy in Classroom Management	.90	.78

Research Question One

Research question one, *Is there a statistically significant mean difference in teacher self-efficacy from pre- to post-peer coaching?*, was answered by conducting a two-tailed paired t-test to determine if there was a statistically significant mean difference in teachers' self-efficacy prior to and following peer coaching. Table 4.3 provides the results of the paired t-test regarding peer coaching and its influence on teacher self-efficacy. Results of the paired t-test indicate there was not a statistically significant mean difference between teacher's pre- and post-teacher self-efficacy, $t(26) = -1.323, p = .197$. However, receiving peer coaching did lead to higher teacher self-efficacy ($M = 177.4, SD = 16.86$) compared to prior to receiving any coaching ($M = 171.7, SD = 24.19$).

Table 4.3

Paired t-test Teacher Self-Efficacy Pre- and Post-Peer Coaching

	N	M	SD	t-value	df	p-value
Pre-Scores	27	171.7	24.19	-1.323	26	.197
Post-Scores	27	177.4	16.86			

*Statistically significant ($p < .05$)

Research Question Two

Research question two, *What are participant perceptions of their teacher self-efficacy pre- and post-peer coaching?*, was answered by conducting frequencies and percentages for participant responses to each of the TSES items. Tables 4.4, 4.5, and 4.6 provide participant perceptions for teacher self-efficacy pre- and post-mentoring for each of the TSES subscales: (a) Efficacy in Student Engagement, (b) Efficacy in Instructional Strategies, and (c) Efficacy in Classroom Management.

Efficacy in Student Engagement

The frequency/percentage of individual participant responses to the TSES survey instrument are shown in Table 4.4 grouped by teacher self-efficacy in relation to student engagement. All of the survey questions related to student engagement displayed an increase in teacher self-efficacy after the period of peer coaching with the exception of “How much can you do to improve the understanding of a student who is failing?” The results from that question remained similar to pre-coaching. Four of the items (item# 1, 2, 4, 9) displayed large gains in teacher self-efficacy after peer coaching had taken place. Item one showed that teacher responses increased from 68% to 89% feeling they had achieved between more than *Some Influence* to *A Great Deal* in getting through to their most difficult students. Item two responses indicated teacher self-efficacy ranging from

Quite a Bit to *A Great Deal* increased from 67% to over 96% in terms of inspiring critical thinking. Items four and nine indicated teacher self-efficacy related to motivation and valued learning both increased after peer coaching. Teachers felt they had increased self-efficacy for student motivation from 74% to 89% ranging from more than *Some Influence* to *A Great Deal*. The ability to instill value in learning increased from 70% reporting a range of *Quite a Bit* to *A Great Deal* to 89% after peer coaching occurred. Based on the significantly higher scores on the survey instrument, these results seem to indicate that peer coaching tends to increase teacher self-efficacy in relation to student engagement.

Table 4.4

Student Engagement: Teacher Self-Efficacy Pre- and Post-Peer Coaching

Survey Item		Nothing	Nothing/Very Little	Very Little	Very Little/Some Influence	Some Influence	Some Influence/Quite a Bit	Quite a Bit	Quite a Bit/A Great Deal	A Great Deal
1. How much can you get through to the most difficult students?	Pre	0.0 (n = 0)	0.0 (n = 0)	11.1 (n = 3)	0.0 (n = 0)	22.2 (n = 6)	11.1 (n = 3)	37.0 (n = 10)	11.1 (n = 3)	7.4 (n = 2)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	7.4 (n = 2)	22.2 (n = 6)	44.4 (n = 12)	11.1 (n = 3)	11.1 (n = 3)
2. How much can you do to help your students think critically?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	18.5 (n = 5)	14.8 (n = 4)	33.3 (n = 9)	18.5 (n = 5)	14.8 (n = 4)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	0.0 (n = 0)	48.1 (n = 13)	29.6 (n = 8)	18.5 (n = 5)
4. How much can you do to motivate students who show low interest in school work?	Pre	0.0 (n = 0)	0.0 (n = 0)	7.4 (n = 2)	3.7 (n = 1)	14.8 (n = 4)	11.1 (n = 3)	33.3 (n = 9)	18.5 (n = 5)	11.1 (n = 3)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	11.1 (n = 3)	25.9 (n = 8)	22.2 (n = 6)	29.6 (n = 8)	11.1 (n = 3)

6. How much can you do to get students to believe they can do well in school work?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	7.4 (n = 2)	22.2 (n = 6)	40.7 (n = 11)	25.9 (n = 7)
	Post	0.0 (n = 0)	0.0 (n = 0)	40.7 (n = 11)	25.9 (n = 7)	33.3 (n = 9)				
9. How much can you do to help your students value learning?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	11.1 (n = 3)	18.5 (n = 5)	25.9 (n = 7)	22.2 (n = 6)	22.2 (n = 6)
	Post	0.0 (n = 0)	11.1 (n = 3)	40.7 (n = 11)	14.8 (n = 4)	33.3 (n = 9)				
12. How much can you do to foster student creativity?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	14.8 (n = 4)	14.8 (n = 4)	25.9 (n = 7)	29.6 (n = 8)	14.8 (n = 4)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	14.8 (n = 4)	40.7 (n = 11)	25.9 (n = 7)	14.8 (n = 4)
14. How much can you do to improve the understanding of a student who is failing?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	11.1 (n = 3)	18.5 (n = 5)	37.0 (n = 10)	22.2 (n = 6)	7.4 (n = 2)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.8 (n = 1)	30.8 (n = 8)	26.9 (n = 7)	26.9 (n = 7)	11.5 (n = 3)

22. How much can you assist families in helping their children do well in school?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	11.1 (n = 3)	3.7 (n = 1)	25.9 (n = 7)	25.9 (n = 7)	11.1 (n = 3)	22.2 (n = 6)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	11.1 (n = 3)	7.4 (n = 2)	44.4 (n = 12)	18.5 (n = 5)	18.5 (n = 5)

Efficacy in Instructional Strategies

Table 4.5 shows the frequency/percentage of individual participant responses to the TSES survey instrument grouped by teacher self-efficacy in instructional strategies. Respondents reported significant increased teacher self-efficacy on three items from this subscale (item# 7, 23, 24). Item 7 focused on providing responses to difficult questions from students. Teacher self-efficacy increased from 70% to 96% reporting between *Quite a Bit* to *A Great Deal*. Teachers also reported an increased teacher self-efficacy from 63% to 85% ranging from *Quite a Bit* to *A Great Deal* when referring to the ability to implement alternative strategies for students. After peer coaching was complete, teachers felt they could provide appropriate challenges for very capable students at an increased level going from 82% to 93% falling between *Quite a Bit* to *A Great Deal*. Higher levels of teacher self-efficacy related to instructional strategies have been somewhat attributed to peer coaching.

Table 4.5

Instructional Strategies: Teacher Self-Efficacy Pre- and Post-Peer Coaching

Survey Item		Nothing	Nothing/Very Little	Very Little	Very Little/Some Influence	Some Influence	Some Influence/Quite a Bit	Quite a Bit	Quite a Bit/A Great Deal	A Great Deal
7. How well can you respond to difficult questions from your students?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	25.9 (n = 7)	29.6 (n = 8)	33.3 (n = 9)	7.4 (n = 2)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	29.6 (n = 8)	48.1 (n = 13)	18.5 (n = 5)
10. How much can you gauge student comprehension of what you have taught?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	14.8 (n = 4)	37.0 (n = 10)	29.6 (n = 8)	18.5 (n = 5)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	7.4 (n = 2)	40.7 (n = 11)	37.0 (n = 10)	14.8 (n = 4)
11. To what extent can you craft good questions for your students?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	22.2 (n = 6)	25.9 (n = 7)	25.9 (n = 7)	25.9 (n = 7)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	7.7 (n = 2)	34.6 (n = 9)	42.3 (n = 11)	15.4 (n = 4)

17. How much can you adjust your lessons to the proper level for individual students?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	29.6 (n = 8)	29.6 (n = 8)	25.9 (n = 7)	11.1 (n = 3)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	4.0 (n = 1)	24.0 (n = 6)	40.0 (n = 10)	20.0 (n = 5)	12.0 (n = 3)
18. How much can you use a variety of assessment strategies?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	11.1 (n = 3)	22.2 (n = 6)	18.5 (n = 5)	37.0 (n = 10)	11.1 (n = 3)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	11.1 (n = 3)	51.9 (n = 14)	14.8 (n = 4)	18.5 (n = 5)
20. To what extent can you provide an alternative explanation or example when a student is confused?	Pre	0.0 (n = 0)	22.2 (n = 6)	29.6 (n = 8)	29.6 (n = 8)	18.5 (n = 5)				
	Post	0.0 (n = 0)	3.8 (n = 1)	46.2 (n = 12)	30.8 (n = 8)	19.2 (n = 5)				
23. How well can you implement alternative strategies in your classroom?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	7.4 (n = 2)	25.9 (n = 7)	25.9 (n = 7)	25.9 (n = 7)	11.1 (n = 3)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	11.1 (n = 3)	44.4 (n = 12)	25.9 (n = 7)	14.8 (n = 4)

24. How well can you provide appropriate challenges for very capable students?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	3.7 (n = 1)	11.1 (n = 3)	55.6 (n = 15)	18.5 (n = 5)	7.4 (n = 2)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	3.7 (n = 1)	48.1 (n = 13)	33.3 (n = 9)	11.1 (n = 3)

Efficacy in Classroom Management

Individual participant responses for TSES items grouped into classroom management were calculated into frequencies and percentages displayed in Table 4.6. Four of the items (item# 3, 5, 15, 19) were marked higher by teachers after receiving peer coaching. The questions showing the largest gains by teachers focused on controlling disruptive behaviors, exhibiting clear expectations for student behavior, calming disruptive students and limiting problem students from ruining a lesson. Teacher self-efficacy about controlling disruptive behaviors increased from 78% to 96% when ranging from above *Some Influence* to *A Great Deal*. After participating in peer coaching sessions, 100% of the teachers, up from 81%, rated their ability to make their expectations clear between *Quite a Bit* to *A Great Deal*. The most substantial reported growth dealt with calming disruptive students with an increase from 53% to 89% ranging from *Quite a Bit* to *A Great Deal*. An increase from 59% to 81% of teachers marked their capacity to keep students from ruining an entire lesson from *Quite a Bit* to *A Great Deal*. The results seem to justify that peer coaching led to improved teacher self-efficacy in several categories of classroom management.

Table 4.6

Classroom Management: Teacher Self-Efficacy Pre- and Post-Peer Coaching

Survey Item		Nothing	Nothing/Very Little	Very Little	Very Little/Some Influence	Some Influence	Some Influence/Quite a Bit	Quite a Bit	Quite a Bit/A Great Deal	A Great Deal
3. How much can you do to control disruptive behavior in the classroom?	Pre	0.0 (n = 0)	0.0 (n = 0)	7.4 (n = 2)	3.7 (n = 1)	11.1 (n = 3)	11.1 (n = 3)	18.5 (n = 5)	25.9 (n = 7)	22.2 (n = 6)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	0.0 (n = 0)	18.5 (n = 5)	25.9 (n = 7)	29.6 (n = 8)	22.2 (n = 6)
5. To what extent can you make your expectations clear about student behavior?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	14.8 (n = 4)	18.5 (n = 5)	18.5 (n = 5)	44.4 (n = 12)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	18.5 (n = 5)	25.9 (n = 7)	55.6 (n = 15)
8. How well can you establish routines to keep activities running smoothly?	Pre	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	7.4 (n = 2)	25.9 (n = 7)	25.9 (n = 7)	40.7 (n = 11)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	23.1 (n = 6)	42.3 (n = 11)	34.6 (n = 9)

13. How much can you do to get children to follow classroom rules?	Pre	0.0 (n = 0)	18.5 (n = 5)	22.2 (n = 6)	40.7 (n = 11)	18.5 (n = 5)				
	Post	0.0 (n = 0)	0.0 (n = 0)	44.4 (n = 12)	37.0 (n = 10)	18.5 (n = 5)				
15. How much can you do to calm a student who is disruptive or noisy?	Pre	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	3.7 (n = 1)	3.7 (n = 1)	25.9 (n = 7)	33.3 (n = 9)	7.4 (n = 2)	12.2 (n = 6)
	Post	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	0.0 (n = 0)	7.4 (n = 2)	3.7 (n = 1)	51.9 (n = 14)	29.6 (n = 8)	7.4 (n = 2)
16. How well can you establish a classroom management system with each group of students?	Pre	0.0 (n = 0)	11.1 (n = 3)	37.0 (n = 10)	18.5 (n = 5)	33.3 (n = 9)				
	Post	0.0 (n = 0)	4.0 (n = 1)	36.0 (n = 9)	36.0 (n = 9)	24.0 (n = 6)				
19. How well can you keep a few problem students from ruining an entire lesson?	Pre	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	0.0 (n = 0)	11.1 (n = 3)	25.9 (n = 7)	18.5 (n = 5)	25.9 (n = 7)	14.8 (n = 4)
	Post	0.0 (n = 0)	18.5 (n = 5)	44.4 (n = 12)	29.6 (n = 8)	7.4 (n = 2)				

21. How well can you respond to defiant students?	Pre	0.0 (n = 0)	0.0 (n = 0)	3.7 (n = 1)	3.7 (n = 1)	14.8 (n = 4)	14.8 (n = 4)	37.0 (n = 10)	11.1 (n = 3)	14.8 (n = 4)
	Post	0.0 (n = 0)	26.9 (n = 7)	42.3 (n = 11)	23.1 (n = 6)	7.7 (n = 2)				

Research Question Three

Research question three, *What challenges are teachers experiencing with peer coaching?*, was answered by utilizing grounded theory to determine emerging themes through an open and axial coding process analyzing interview responses of the participants. Only statements from survey-responding participants were included in the study. Key themes and patterns were identified and organized into meaningful pieces of information pertaining to the study. Seven female participants were individually interviewed to provide responses to this question. One participant taught 2nd grade, two taught 3rd grade, two taught 4th grade, and two taught 5th grade. All of the interview participants were first year elementary mathematics teachers participating in the peer coaching program designed by their school district. The qualitative analysis identified three major themes: (a) Topic of Discussion, (b) Lack of Protocol, and (c) Time Constraints.

Topic of Discussion

The peer coaching model used in this district recommends, but does not specifically require, a substantial amount of interaction between coaches and mentees. Peer coaching in the district requires those serving as a coach to continually discuss specific domain clusters throughout the school year. Peer coaches are supposed to focus on: (a) planning for a learner-centered instruction, (b) a classroom environment that promotes equity, excellence and learning, (c) instruction and communication, and (d) professional development and communication. Table 4.10 outlines the required topics of discussion for coaches and mentees.

Figure 4.1

Topics of Discussion Framework

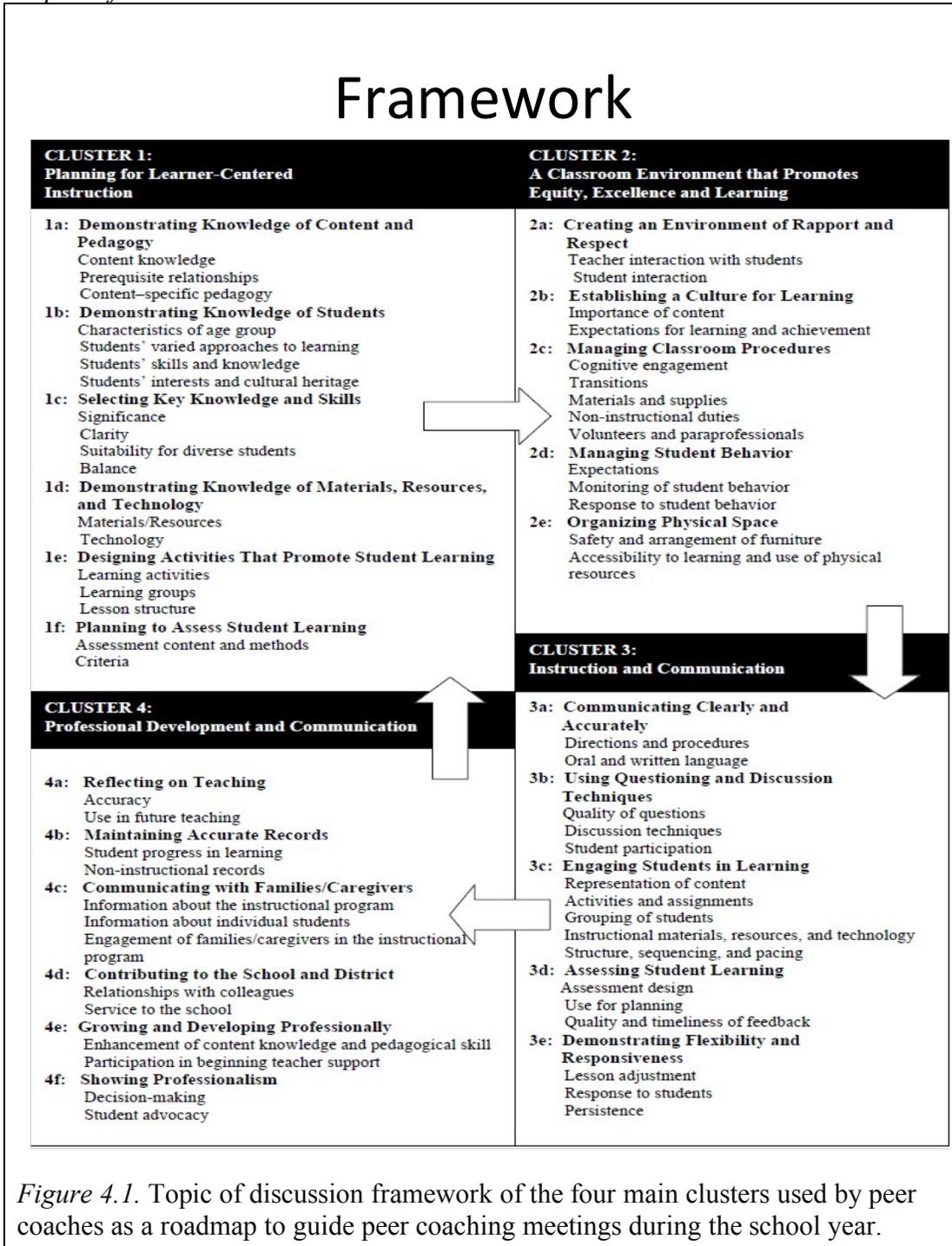


Figure 4.1. Topic of discussion framework of the four main clusters used by peer coaches as a roadmap to guide peer coaching meetings during the school year.

Several participants shared their thoughts on the specific required discussion topics.

Susan, a fourth-grade teacher shared,

I think she has a question list to follow at times... We just touch base to see if I need any kind of support and we go over different things we need to cover on our list. There are different things each month that we go over together. This month we have been talking about my students and what I know about them...I guess that sometimes our 'required' topics of discussion can seem a little off base for what's actually going on in the classroom. She tries to let me know ahead of time if there is a specific topic we need to address like classroom management or pacing but I don't always need help in those areas. We tend to go towards what I feel I need help or support with and focus on those areas. The topics have been helpful but they seem to be in no order and just randomly assigned.

Angela, a fifth-grade mathematics and science teacher, stated,

There are times when we discuss the topics and he kind of just nods along with everything and I can't tell if he's really taking it all in or just overwhelmed and doesn't care. And at the end of the day it doesn't seem like there is anyone who is checking on us or knows what's happening... We don't really discuss much in terms of teaching other than covering what we are supposed to... I think that mentors should be made to have a schedule of meetings with us. Setting up a solid meeting schedule with less specific questions or topics. I don't really mean less specific but maybe give us the topic but let us choose how to discuss it. That way we would still be covering what the district wants but I could make it more personal for me and actually learn from it.

Diane, a fifth-grade teacher, said, “We start with the district topics because they aren’t extremely specific to my class. That doesn’t take very long though because the questions are pretty vague.”

Julia, a second-grade teacher, shared,

We have a different topic every month to focus on in the classroom. So we will talk about behavior, planning and things like that but nothing super specific. It’s kind of generic questions and then that’s pretty much it. Sometimes I feel that our meetings are monotonous because we talk about the same things.

These participants felt that they were required to address certain topics repeatedly instead of discussing topics directly impacting their teaching. They expressed that constantly discussing the domain clusters was helpful at times but did not allow for more important topics and issues to be the forefront of the peer mentoring sessions. The peer mentees communicated that specific cluster domain questions did not always address the challenges they were encountering on a daily basis because they were too broad and restricted them from being specific to their classrooms and questions.

Lack of Protocol

Another theme expressed and displayed by interview participants was a lack of defined protocol for their peer coaching sessions. According to the peer coaching model utilized for this program, certain requirements are to be fulfilled by the coach and mentee pair during identified time periods. Different requirements include posting reflection discussion answers online, recording portions of lessons taught by the mentee, and periodic meetings with an administrative liaison. However, several of the interview participants conveyed that they followed no specific protocol for their meetings and at times it was detrimental. Interview participants shared how a lack of protocol was not

beneficial in some cases, helpful at other times but a challenge they faced. The absence of protocol proved unhelpful in these experiences.

Angela again shared,

Well we don't really have one. Are we supposed to? Both times we met in my room when he sought me out and we talked about what was on his mentor packet. Things about classroom management and planning but it was very basic and didn't really help with my kids. Neither meeting was longer than 10 minutes...I think we should be meeting at least once a week. We don't have a set schedule of times we are supposed to meet. I thought having a mentor meant someone that I would meet with and discuss things I need help with or questions I might have. But that's not what's happened. We have only met twice.

Maria, a third-grade teacher, contributed, "It's very impromptu, it's nothing pretty formal."

Julia disclosed, "We basically just talk about whatever and then address whatever the district has us scheduled for. I know she has taught math and science for a while now and I'm assuming that's why we were put together."

While the lack of a protocol was beneficial during these experiences, Gabby, a first year third grade teacher, disclosed,

We don't follow a specific protocol for our meetings. My mentor and I are partners so we meet, talk and discuss daily about anything I need help with or want to know more about. It's usually in her classroom but we have met in here (Gabby's classroom). But we don't really schedule a lot, it's more of I need your help or input about this, what should I do?

Diane felt,

We get that done (referring to district assigned discussion topics) and then we talk about anything else I have questions about. He's helped me out with a lot of things: organizing the flow of my room, using stations, discipline logs, problem students. He offers some great advice on how to change what I'm doing to be more effective and stay on top of everything. After that we wrap things up and always leave the door open for more questions and whatnot.

Participants shared that a lack of protocol for coaching meetings was a challenge that proved to be negative for some while positive for others. They communicated that not having a protocol can lead to a frustrating experience leading to feeling unsupported by their coach or informal settings that do not have a focus on challenges they were encountering. Others felt the informal meetings helped to address issues they were experiencing and led to better organization to streamline the job into a manageable process.

Time Constraints

The peer coaching model used in this district requires a substantial amount of interaction between coaches and mentees without providing a lot of opportunity to engage with one another. This theme was identified in 85.7% ($n = 6$) of participant interview responses. The following responses from participant interviews illustrate this theme.

Susan revealed that, "She comes into my class periodically to observe me and offer advice but I know ahead of time almost always. She tells me when she has time to come in."

Denise, a fourth-grade teacher, shared,

I would like to see her teach more. She has observed me once for a longer time but otherwise it's always a quick glimpse into what's happening over here. I

haven't really been able to watch her do the things we've discussed and I would like to. I know it's tough because we have the same schedule so we need a sub or coverage or whatever but I think that would be nice.

Angela added,

We don't have a set schedule of times we are supposed to meet. I thought having a mentor meant someone that I would meet with and discuss things I need help with or questions I might have. But that's not what's happened. We have only met twice, once at the beginning of the school year and only once since we've been back... Neither meeting was longer than 10 minutes... He is very busy with different things around the school so we don't really interact a ton... Again, I know he's busy but then why are you a mentor?

Diane reiterated,

He (the mentor) has been really flexible and makes himself available to me as much as he can. It's difficult at times because we have different breaks and schedules so most of our official meetings happen after school when we are both free together... You don't really get any exposure to working with another teacher that's done this before after student teaching. Me and my mentor meet almost every day but it's almost always after things have happened and I feel bad asking a lot of questions sometimes because I know it can be a lot. He has come in and watched me once for like an hour but can't be in here every day because he's teaching too. So sometimes I think of a question about something I did or a way a kid reacted or things like that, and then by the next time I see him I don't remember all of my questions. It would be nice if it was possible for more observations so I could ask questions when it's happening and not wait... I would like to see him teach more. It's different talking through things and seeing them

in action so I would like to see some of the things he does in his room. I've gotten in there a couple times but it's never for long because our breaks are short and go by fast. Finding a way to see him teach for a whole day would be amazing.

Julia said,

It would be nice for her to see me teach more so she would know what's happening. I would love to get to see her teach because I feel like she has such a good handle on everything that it would be interesting to watch a day with her. But it's too hard with our schedules, I'd have to take a day off... I don't think they can do anything about seeing other teachers teach so nothing really. I guess they'd have to get subs and it would cost a lot and people would have to rearrange their entire schedules.

All but one of the participants expressed the desire for more time with their peer coach. Opportunities for more observation time and immediate feedback were mentioned during the interviews. Schedule conflicts and limited required observations led each participant to feel constrained by their own availability.

Research Question Four

Research question four, *What are teachers' perceptions of factors that influence their teacher self-efficacy?* was also answered by utilizing grounded theory to determine emerging themes through an open and axial coding process analyzing interview responses of the participants. The statements included in the study were from participants who responded to the survey and interview questions. The qualitative analysis identified three major themes: (a) Advice and Support, (b) Reflection, and (c) Honesty.

Advice and Support

Across participants, advice and support from coaches emerged as a common theme that influenced teacher self-efficacy. A total of 85.7% ($n = 6$) of the interview participants reported positive advice and support from their coaches as a decisive benefit impacting their teacher self-efficacy. Denise, Gabby, Susan, Maria, Diane, and Julia shared their experiences pertaining to their coaches.

Denise felt,

She has really taken the time to make me feel like a friend and not a burden...Getting advice on things that I could improve or do differently. She never really tells me I'm doing something wrong but tells me a way I could change things or how she might handle the situation differently... I think it would be a lot harder to try and do everything as a new teacher without the support I get from her.... She has helped me so much with so many little things and big things that I can't even begin... I would say having someone with experience to give you support and advice is huge. My experience last year and this year are way different. Going from 3 days a week to a full week with lesson planning, teaching, grading, getting a hold of parents, newsletters, and the million other things that come up on campus was a lot. She has really helped me get a hold on things and prioritize what needs to be done and when. Being able to ask her questions whenever has helped a great deal...I can't imagine starting this year and going through this without her there.

Susan shared,

Our conversations have been helpful most of the time to show me different things I can try to help out challenging students or just students that need the extra time with me...It's almost like having a friend to help you out and keep you from

making mistakes constantly. Especially with the way this year began. The changes in schedule and starting and stopping because of the hurricane were difficult. She was always there to help with any question no matter how silly it might seem now...I also love seeing and hearing about the different teaching techniques she uses from time to time. I try to take what she tells me and avoid the pitfalls but strive for the achievement and successes...Having someone I can come to for advice that is in my own grade level is the most beneficial...It was nice getting positive and negative feedback over something she's actually witnessing. That was when she really offered me some great advice about my stations and how to get the most out of them with my students... Personally, I feel more confident in my ability to teach knowing that I have so much support around me...Having that support and the chance to talk to her whenever are really helpful...The peer mentoring program is one of the reasons I chose to have a job in this district. I think it's nice having someone who is very experienced to walk with you every step of the way. Being able to discuss observations or things I notice in class have made a big difference in how my year is progressing.

Gabby revealed,

I have a great relationship with my mentor teacher. She has helped me since day one and is always there if I need anything from her... She has shared a wealth of knowledge and information with me so far. Having her right next door makes it easy to ask her even small questions quick. She has been very clear and up front with me about things she would do differently and why. But just having someone to talk to that has gone through, and is going through similar things, is helpful because she has the experience... She is so supportive... She is very positive, patient and always gives me positive feedback. I think as a first year teacher, or

any for that matter, it can be easy to be hard on yourself. I always try to do things perfect and get it right the first time but it's different with students. They need so many different things and have so many needs that doing everything perfect the first time isn't realistic. I think that her positive encouragement and feedback tells me that I am doing the right things most of the time. She makes me feel appreciated for small things that seem like they'd usually go unnoticed... She makes me feel like I can do things even when the job is throwing 500 things at you at once... Her advice and support are priceless... Her feedback and constant accessibility are so helpful and I would feel lost without her support.

Maria contributed,

It's been a positive, more supportive and helpful... I think this job is very emotionally draining. And there are some days you feel like "oh my goodness nothing worked." And with what I just did. And then you can go to your mentor and I think that they kind of, like you know, shed light but you know you could be working for your first year or 30 years in and it still happens. I think that's its more of like just having that emotional and kind of mental support that gets you through.

Diane communicated,

He checks in with me to make sure I know what needs to be done and if I need any help keeping up with all the responsibilities... I'm learning so much that we didn't get to really experience for long student teaching. He always pushes "starting with the end in mind" and it makes way more sense to plan that way. So now the way I approach my plans and how I will use the student work to makes decisions about going forward and if my students learned the objectives they need... Having an extra set of eyes that I don't feel are judging me or tied to

administrators is a huge relief...My mentor has literally been a God send. He makes sure I'm where I'm supposed to be and helps me with just about everything. If he wasn't my mentor this year would be going very differently I'm sure.

Julia added,

Well our talks help me out a lot. She taught second grade for a while too so she's done what I'm doing before. So, I can ask her about how she did it and tell her what I did and talk through some of the kinks...I was teaching addition with a group of my lowest students and it was just not working. They weren't getting it and were not able to work the manipulatives to figure out these simple problems. So I was getting frustrated, not with them but with myself for not being able to really help them. I found her after school and told her about what happened and we went back to my room and she had me actually show her what I was doing with the kids. We talked through a couple of ways that might work better using the same materials but just approaching it from a different direction. So, I tried it again the next day with the same group and it made a difference. I mean there wasn't a sudden great understanding of adding but the students began to get the process and find solutions that worked. But sitting with her and working through the issues was something I hadn't done before. It was a great experience for me because I learned how to change some things and that I had a mentor willing to help me out in any way... She helps me out so much that I don't think I'd make it without her. Coming in this year as a new person I don't know what I would have done without someone to lean on. Especially at the beginning. So much goes into starting the year that I wouldn't have thought about so it was great having that

help. It's like having a second teacher to watch over you and correct your mistakes.”

Six of the seven participants felt their teacher self-efficacy has been positively influenced through numerous interactions with their coaches that provided advice and support. The advice and support included specific portions of lessons, teaching methods, classroom management, organization, and general wisdom stemming from experience. The peer mentees indicated they were positively influenced by their peer coaches.

Reflection

The interview participants communicated that the ability to reflect upon their teaching with their coach was a major influence on their teacher self-efficacy. Taking time for serious thought and consideration of different aspects of the teaching profession was determined to be the most influential facet of this peer coaching program. The responses below illustrate the expression of this theme.

Susan conveyed,

I feel that I had a great college education, and have been taught many different strategies on how I can be an effective teacher. She not only reflects with me of various strategies I haven't used in a while, but also knowing when to just trust my gut and do what is best for my students... She has also done a great job of sharing things that have failed in her classroom as well and what and how she learned from them.

Diane said,

It's strange because I start looking at how I teach more after we talk. When I got to observe him for a few minutes I found myself thinking about what I was doing to make sure all of these things were happening too and I have tweaked a ton in my class that have helped. Going over lessons for this week and this month and

finding the highlights and what didn't really work. I get to pick his brain and change things up for the next day or next lesson and I feel more prepared for when things don't necessarily go the way I thought they would.

Gabby shared, "Our conversations let me see things from a different point of view that I might not have noticed before."

Julia claimed,

I think it has been a good influence. I change things up after we talk or start to think about how I can do things differently and better for next year. Talking about what's happening and things I like and don't like has helped me to change how I teach I guess. I still plan pretty much the same because we do that as a team but it more of the way I actually teach. I don't know how to say it right but just how I do things in my class after seeing how certain lessons go... The reflecting with someone who has gone through what I'm doing let me really see that I'm not doing this alone and have a good support system here at school... Definitely talking through good and bad things that happened throughout the week. It can be draining when you feel like nothing works. So having her there makes things better and she's helped me to see that even with her experience she still feels like things don't always go perfect either... She's helped me grow as a teacher and really start thinking about my teaching and what I do in class rather than just planning out the curriculum.

Five of the responding participants felt that reflecting with the coach on experiences impacted their teacher self-efficacy in a positive way. Despite any challenges they faced with the coaching program, taking time to consider what they had done and what that means for their teaching in the future and potential growth was beneficial. The peer

coaching structure created by the district created a positive experience designed to promote improvement in teacher self-efficacy for these respondents.

Honesty

The third theme that presented itself was honesty. Teachers expressed a high level of confidence in their ability to be honest with their coaches and receive honesty in return. Honesty proved to be positively influencing their teacher self-efficacy. The honesty was beneficial for the respondents in several instances but not all. They shared different experiences highlighting situations they were able to confidently be honest with the coach.

Susan shared,

She is very honest with me, even when it is something that might not be easy to address...I think that being able to talk to her closely without worrying that I will sound dumb or look bad has helped a lot...I know that if I have an issue with someone on our team, I can tell her and know with full confidence that she will keep the news to herself and give me advice on how to handle the situation.

Diane stated,

I feel, and maybe this is just because of his personality, but I feel like he does a really good job of being very realistic about what this job entails and very upfront about the highs and the lows of what it is actually like working in an elementary school campus...My mentor doesn't really pull any shots. He's very honest, in a helpful way, about what needs to get done and different ways we can make it happen for our students...That level of honesty we have is probably the best part. I can say things in confidence, even if I feel a bit embarrassed or like I'm showing I'm inept, and I know he's going to keep it between us and not get me in trouble or anything. Having that is awesome.

However, one teacher shared how honesty could be detrimental to their teacher self-efficacy.

Angela shared, “Sometimes I can’t tell if he is being completely honest but I think it’s just because he doesn’t want me to feel like he’s a bad teacher.”

The participants shared how their level of honesty with their individual coaches influenced their teacher self-efficacy. Some teachers had a positive experience with their coaches in terms of honesty while one teacher found it to have a negative influence. Establishing an honest method of communication can contribute to an increased teacher self-efficacy while not building that trust can lead to negative consequences for first year teachers.

Summary of the Findings

Quantitative analysis demonstrated there was not a statistically significant mean difference between the pre- and post-teacher self-efficacy of those receiving peer coaching. This would suggest that peer coaching did not necessarily influence teacher self-efficacy for these elementary mathematics teachers. However, quantitative analysis also revealed that teacher self-efficacy did improve in certain areas pertaining to efficacy in student engagement, instructional strategies, and classroom management. Participant reported increased levels of teacher self-efficacy related to student engagement regarding reaching difficult students, encouraging critical thinking, motivation and supporting valued learning. Instructional strategy categories with improved teacher self-efficacy included the ability to respond to difficult questions, implement alternative strategies and providing students with appropriate challenges. Teacher self-efficacy in classroom management increased in terms of controlling disruptive behaviors, clearly communicating expectations, calming students and hindering behavior issues from

derailing a lesson. Therefore, even though teacher self-efficacy as a whole did not show significant growth, there were specific areas where teachers reported gains.

Qualitative analysis illustrated the challenges teachers are facing during peer coaching and their perceptions of what causes teacher self-efficacy to change. Participants felt that assigned topics of discussion, a lack of coaching meeting protocol, and varied time constraints to be the most prevalent challenges of this peer coaching model. The challenges were not necessarily labelled as negative challenges detrimental to teacher growth but more as things that could potentially hinder the opportunity for extending learning and development. The participants shared their thoughts on how these factors could be a nuisance and could be altered to make the peer coaching process more of a success in their eyes. These challenges are aspects of the peer coaching model that the district may look to investigate and alter in order to maximize the benefits of the program.

Several potential factors that would positively and negatively influence teacher self-efficacy were identified by first year teachers with coaches. These factors included advice and support from coaches, time for reflection, and a level of honesty in communication between coach and mentee. These factors correlate with a study conducted by Coombs and Goodwin (2013). The study discussed the importance of dialogue and its role in teacher development. The ability to discuss different elements of the profession while receiving feedback was identified as crucial to a peer coaching relationship. Overall, all but one of the seven interview participants expressed an elevated level of teacher self-efficacy since they began the peer coaching model for this district.

Interview responses were in alignment with the survey data when addressing the challenges and factors that influence teacher self-efficacy. Participant interview answers

suggested that adjusting station work, including teaching in a small group, provided students with more rigorous and challenging assignments aligned with their learning intentions and success criteria thus enhancing student engagement and instructional strategies. Gains in teacher self-efficacy reported on the surveys were echoed in interview responses referring to observation and reflection leading to changes in teaching practices that contributed to improved classroom management processes.

Conclusion

This research study determined that teacher self-efficacy overall was not significantly influenced by peer coaching. However, peer coaching was shown to have compelling influence on specific areas of teacher self-efficacy in relation to student engagement, instructional strategies and classroom management. This chapter discussed the study's participant demographics, instrument reliability and results of the quantitative and qualitative research questions. The data provided triangulated insight about peer coaching and its influence on teacher self-efficacy of elementary mathematics teachers. Chapter V summarizes the study, implications, and recommendations for future research.

CHAPTER V

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this study was to determine the influence of peer coaching in elementary mathematics on teacher self-efficacy. This study was completed during the fall of 2017. A large, suburban school district in southeast Texas provided 27 elementary mathematics teachers, in their first year to the profession, participating in peer coaching for professional development. Although nearly 150 teachers were qualified for participation, a total of 27 participated in this study. Teachers were solicited to complete the survey instruments and participate in interviews. All of the participants were female and the majority were Caucasian. This is consistent with teacher demographics reported in the participating district (see Table 3.2). Paired t-test, frequencies, percentages and grounded theory utilizing open and axial coding were used to analyze the data collected. This chapter presents a summary of the findings, implications, and recommendations for practice and future research.

Summary

The research questions addressed whether or not peer coaching influenced teacher self-efficacy. Research Question One focused on teacher self-efficacy as a whole and asked if there was a statistically significant mean difference from pre- to post-peer coaching. Quantitative analysis demonstrated an increase in teacher self-efficacy but that there was not a significant difference between pre- and post-peer coaching teacher self-efficacy. Interestingly, these results differ from other research that demonstrated a positive correlation between teacher self-efficacy and peer coaching (Locke et al., 2013; Stevens et al., 2013). An additional study by Overbaugh and Lu (2008) revealed that short-term professional development similar to this peer coaching model may lead to

increased levels of self-efficacy but that was not the case in this study when referring to teacher self-efficacy in general.

Research Question Two asked about participants perceptions of their teacher self-efficacy pre- and post-peer coaching. Quantitative analysis demonstrated that specific aspects of teacher self-efficacy in student engagement, instructional strategies, and classroom management improved significantly after peer coaching. These results support previous research corroborating the link between increased teacher self-efficacy and peer coaching (Duran et al., 2009; Locke et al., 2013). Although teacher self-efficacy as a whole did not show significant difference after peer coaching, it was evident through survey responses that teachers felt certain aspects were directly improved after coaching. Emotionally investing in students and focusing on motivation, critical thought, rigorous challenges, and controlling classroom atmosphere during peer coaching led to increased teacher self-efficacy. These results support previous research establishing emotional connection through reflection as a positive influence on teacher self-efficacy (Cross & Hong, 2009). This would explain the focus of peer coaching discussions leading to changes in teaching practices that increased teacher self-efficacy for these first year to the profession mathematics teachers.

Research Question Three asked about the challenges these new teachers were facing with their peer coaching. A total of seven participants were interviewed and responded to semi-structured questions about the issues they encountered throughout the process. Qualitative analysis illustrated that participant responses could be classified into three major themes: (a) topic of discussion, (b) lack of protocol, and (c) time constraints. Participant responses illuminated difficulties that arose and could be a hindrance to the benefits peer coaching has to offer. The challenges were identified as limiting teacher

growth but more as a roadblock that may prevent maximizing the advantages a peer coach can provide for teachers new to the profession.

Research Question Four asked about teachers' perceptions of the different factors influencing their teacher self-efficacy. The seven participants responded to interview questions geared towards finding what factors the teachers felt impacted their teacher self-efficacy in both positive and negative forms. Qualitative analysis demonstrated the responses could be categorized into three major themes: (a) advice and support, (b) reflection, and (c) honesty. Interview feedback shed light on what teachers were perceiving as the most beneficial aspects of this peer coaching design. The three major themes all proved to be positive influences of the first year professional teacher self-efficacies.

In exploring the themes of topic of discussion for peer coaching meetings, teachers expressed why they identified these themes as creating frustration. The teachers demonstrated the indisputable need for professional development in the form of peer coaching discussed in prior research (Scott, 2015). Participant responses seemed to highlight a sense of frustration with this peer coaching model based on the required topics of discussion passed on from the district. Studies have shown that teachers have desired collaboration with other teachers to engage in meaningful change (Mesler et al., 2010). However, when they are required to discuss topics they do not feel are relevant to their teaching and do not impact their style, the discussion seemed to be pointless at times. They expressed an understanding of why there is a framework in place but indicated they would rather have the ability to focus on discussions more essential to their development (Coombs & Goodwin, 2013). Topics not represented within the framework of required discussion connect to the quantitative data in the form of survey items not showing

increases in teacher self-efficacy because they were not addressed. This supports the claims that forced and prescribed discussions did not help teachers grow professionally.

A lack of peer coaching meeting protocol demonstrated a mixed reaction among the participants of this study. Some interview responses conveyed the lack of formal protocol as detrimental while others felt it was helpful at times. Certain answers pointed once again to the topics of discussion as a reason they may feel unsupported by their coaches at times. Similar to previous studies, the benefits perceived by the teachers new to the profession largely depended on the qualities of their coach (Bengo, 2016; Gilles et al., 2013). A coach's ability to teach their mentee about certain topics and stray from the prescribed discussions led to several participants feeling better prepared for different aspects of the profession such as organization and effective preparation for instruction. However, a lack of feeling peer support from a coach who seems to be going through the motions can lead to negative emotional responses, feelings of isolation, and higher rates of attrition (Andrews et al., 2012; McDonald, in press; Shoffner, 2009). Most of the teachers seemed to understand the lack of a defined protocol for meetings and overlooked the importance in favor of asking for help about any areas of concern.

Time constraints was the most prevalent challenge identified by the interview participants. Most of the teacher participants revealed that a lack of time to interact with their peer coach proved difficult for many reasons. This sentiment was echoed in several previous studies (Bengo, 2016; Garet et al., 2001; Hong & Vargas, 2015; McDonald, in press; Murray et al., 2009). The teachers expressed their desire to observe and be observed more in order to facilitate a constant stream of feedback they could utilize to engage changes in their teaching practices to be more effective (Rinke, Mawhinney, & Park, 2014). They displayed an understanding of why the number of observations they would like was unrealistic but also pinpointed the significant amount of influence seeing

a veteran teacher or getting first-hand feedback could provide. A limited number of required observations could prove to be detrimental to new teacher growth if not supported properly.

Constructive advice and support from peer coaches was identified as a major theme that had a positive influence on teacher self-efficacy during this study. Nearly all of the interview participants expressed a beneficial impact that receiving advice and support had on their overall teacher self-efficacy (Gilles et al., 2013). This coincides directly with research conducted by Guskey (2002, 2003). Continued engagement in peer coaching and consistent advice can have a significant impact on teacher effectiveness and emphatically influence their teacher self-efficacy. Collaborating with peer coaches that had experience in teaching mathematics also proved to be helpful as they were able to connect their background knowledge to the advice and support they offered their mentees (Darling-Hammond & Richardson, 2009; Henson, 2001). This background knowledge made the support more authentic for the teachers new to the profession because it was coming from a genuine source of experience. The importance of discussion and encouraging new teachers to constantly strive for improvement through advice and support is imperative during peer coaching.

When the teachers interviewed discussed the influence reflection had on their teacher self-efficacy it was evident that this theme was extremely valuable for their growth. A critical aspect of successful peer coaching is the reflection process. Several researchers claim that reflection is the core of adult learning and leads to changes in practice, a sense of empowerment and autonomy (Illeris, 2007; Ingersoll & Strong, 2011; Kolb, 1984; Moon, 2004; Wood, Jilk, & Paine, 2012). Reflecting with peer coaches led to uncovering obstacles that were previously unknown and prompted change for the mentees (Mälkki & Lindblom-Ylänne, 2011). Reflection also helped these teachers new

to the profession to become cognizant of their own limitations and biases (Wang, 2012). Being aware of these shortcomings contributed to positive changes in their practice. Understanding these limitations and biases requires utilizing self-reflected feelings to improve ourselves. Reflective practices also provide opportunity to critically question and examine our needs and values (Cranton & Carusetta, 2004). Teachers engaged in peer coaching together and embarking upon self-reflection may gain a better understanding of themselves and what motivates their learning goals. The interview responses triangulated with survey data suggest that reflection led to increased teacher self-efficacy in several areas of student engagement, instructional strategies, and classroom management.

Teachers perceived that honesty also contributed as a positive influential aspect of peer coaching. Having the ability to feel confident in having honest communication with their peer coaches led to increased levels of teacher self-efficacy. However, some of the responses indicated that extreme honesty had a detrimental impact on their teacher self-efficacy because they felt it was some form of pity for the amount of support the mentees felt was necessary. These results correlated with previous research and aligned with the quantitative survey data (Gilles et al., 2013). Honesty about realistic expectations and the requirements of a teaching job for those new to the profession led to changes in teaching practices and enhanced the teaching experience leading to higher degrees of teacher self-efficacy.

Implications

As the results from this study are further explored, several questions remain about the influence peer coaching may have on teacher self-efficacy. The perceptions of teachers new to the profession play a significant role in the effectiveness of peer coaching. Determining and establishing an effective protocol that maximizes the benefits

for teachers new to the profession is imperative. In particular, devising a system that requires peer coaches to meet with their mentees multiple times a week would prove to be valuable in various ways.

Having a protocol in place that increases collaboration between the district's veteran peer coaches and new teachers would lead to stronger relationships and a greater likelihood of teachers not feeling left behind without support. Requiring documentation of all meetings and a submission log with signatures from both parties would improve accountability for both and address the frequency issues while providing evidence of the peer coaching sessions. Creating a plan that allows for consistent support would equip new teachers with a peer coaching experience that inspires confidence and innovation. This could include administrators arranging for non-classroom teachers, such as mathematics and reading specialists, to teach lessons in peer coach and mentee classrooms. This opens the door for more informal and constructive observation opportunities that proved in this study most important to teachers new to the profession. Utilizing a peer coach to the fullest extent and developing a meeting protocol that is directly targeted at the needs of new teachers can lead to significant gains in teacher self-efficacy and not limit the gains teachers experience.

This established protocol for peer coaching sessions would open the possibility for the district to incorporate dialogue journals for their teachers new to the profession. Coombs and Goodwin (2013) discussed using journals as a tool to enhance the reflection process. If the district is set on incorporating their framework detailing topics of discussion, a dialogue journal would be a way to augment their peer coaching meetings. This is a strategy common to several teacher preparation programs and therefore it would not necessarily be something new for many of the incoming teachers (Coombs & Goodwin, 2013). This process would produce documentation and information for the

district about the areas of peer coaching contributing to their teachers' growth in teacher self-efficacy and alert them to details of the program that may not be working. This type of data would be utilized to inform future decisions and supplements for the peer coaching program.

Journaling would also provide an opportunity to link the topics of discussion to current research. This would be a useful tool that could potentially benefit both the peer coach and new teachers. Staying current on educational reform and innovative methods would create leaders on these elementary campuses (Hong & Vargas, 2015). In addition to improving teacher self-efficacy, the teachers receiving peer coaching would learn vital aspects of their professional responsibilities, improve instructional methods, establish goals, and ultimately lead to improving student achievement. Intertwining journaling for reflection, current research, and continued peer coaching for professional development would be a way to record new teachers' journeys and create a vision of effective implementation of strategies from peer coaching sessions (Guskey, 2002; Loucks-Horsley et al., 2003). The district could hold a peer coach and new teacher professional development session at the conclusion of the school year to allow these educators to share their stories and connect with more colleagues. An encounter of this magnitude would allow for establishing a network for teacher support to continue development of teacher self-efficacy beyond the first year to the profession.

Additionally, there has been opportunity for the district to build the relationship between peer coaches and teachers new to the profession before the hiring has even been decided. The district could enable campuses to identify potential peer coaches when positions become open to fill. This would allow peer coaches to undergo training and be informed of the district's goals and the responsibilities of the position (Hobson, Ashby, Malderez & Tomlinson, 2009). These identified peer coaches could also be a part of the

hiring process for the open positions. Having a selected peer coach as a part of the interview process would initiate the relationship between the peer coach and new teacher from their initial experience on campus.

Aligning peer coaches with areas of their expertise and experience would be an effective approach to ensuring coach and new teacher pairings could expand the possibilities of teacher self-efficacy growth. Beginning a relationship with a peer coach from the moment a new teacher walks into their new school would build stronger bonds and a sense of safety and familiarity mitigating stress associated with beginning a teaching career. Establishing influence with regard to school environment and the ability to adapt has been crucial to new teacher development (Ulvik & Sunde, 2013). Linking teachers new to the profession to their peer coach from their initial school experience allows an immediate immersion into the school environment that would improve teacher self-efficacy and confidence before they ever begin to teach and potentially impact student achievement. Policy makers should play a role by providing support to these coaching initiatives. This support can be provided through funding and mandates for the school district to make the initiatives constant and uniform across all schools.

Throughout the study it became evident that teacher self-efficacy was increasing in participants but that more time was needed to demonstrate significant difference in the findings. This became evident when triangulating the qualitative data sets of the interviews. Continued peer coaching over the course of an entire academic school year has been imperative (Blank & de las Alas, 2009). The coaching needs to be consistent and constant. Implementing the peer coaching sessions for an elongated period of time would produce the most benefits for teachers new to the profession. Although the district only allots one year for teachers to have a peer coach, relationships with peer coaches should continue beyond the first year of teaching. Holding the peer coaching and new

teacher meeting at the end of the first year would allow teachers not only to maintain contact with their peer coach but with other teachers at the same phase of their career. This would promote idea sharing across the district establishing a continual form of peer coaching beyond the model employed. This could be enforced by policy makers and supported with extra funding and grants.

The instrumentation used in this study had areas of weakness that could be modified to improve the data being collected. There are currently nine points on the *Teachers' Sense of Efficacy Scale* (TSES) designed by Tschannen-Moran and Hoy (2001). However, eliminating the four points that combine ratings (2 = Nothing/Very Little, 4 = Very Little/Some Influence, 6 = Some Influence/Quite A Bit, 8 = Quite A Bit/A Great Deal) would allow for teachers to more accurately describe their current level of teacher self-efficacy for each item. Cutting down to five major points (1 = Nothing, 2 = Very Little, 3 = Some Influence, 4 = Quite A Bit, and 5 = A Great Deal) would demonstrate more effective analysis for teacher responses creating more significant results.

Despite the limitations of this study, the findings have considerable implications and can inform professional development and peer coaching models for school districts. Teachers receiving peer coaching exhibit growth in teacher self-efficacy. Stevens et al. (2013) found that teachers with more experience exhibit higher teacher self-efficacy and this have been utilized to determine peer coaching pairings for maximized benefits to teachers new to the profession, the district, and most importantly the students. Making small changes to the peer coaching model of this district would lead to more effectively addressing the challenges new teachers are facing with peer coaching while simultaneously providing an experience capable of molding new leaders with ever increasing levels of teacher self-efficacy.

Recommendations for Future Research

Several recommendations are suggested for future research. Despite the limited sample size, the results from this study provide insight into the challenges and influences first year teachers experience while receiving peer coaching. The first recommendation is to develop future studies that present and expand replication of the study to collected data at the beginning of a school year when peer coaching starts and compare it with data from those same teachers at the conclusion of the school year when their peer coaching term expires. This would provide the district with a more complete view of how peer coaching influences elementary mathematics teachers. The data pool could also be expanded to include all teachers new to the profession; thereby, creating a comparison across subject matter that could illuminate areas of need for all future incoming first-year teachers. This would allow for the district to create more individualized peer coaching frameworks designed to improve teacher self-efficacy in all content areas. Expanding the participant pool would also allow the study to be replicated in larger school districts and provide additional data to validate the findings of this study.

A second recommendation for how this data could be used in future studies would be to continue monitoring teacher self-efficacy for a second and third year of teaching. This would establish an identifiable pattern that further demonstrates the influence of peer coaching on teacher self-efficacy and lead to revamping the current model to ensure teachers continue to show growth. Continued assessment of the effectiveness of peer coaching past its implementation would establish a more comprehensive view of the benefits this model provides and create the potential to link peer coaching, teacher self-efficacy, and student achievement in content areas subject to state assessments.

A final recommendation would be to increase the number of participants for the qualitative portion of the study. Gaining access to more teachers receiving peer coaching

could help to identify more challenges and influential data detailing what causes teacher self-efficacy to increase. Districts could use this data to assess modifications needed for the program with regard to structure, accountability, and effectiveness.

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APPENDIX A
SURVEY COVER LETTER

Dear Teacher:

I am a doctoral student at the University of Houston Clear-Lake and I am conducting a survey on teacher self-efficacy. I have designed a study to investigate the influence of peer coaching on teacher self-efficacy of **first year elementary mathematics teachers**.

The data collected from the surveys will only be used for educational and/or publication purposes so you will not be identified by name. Your participation as a survey respondent is entirely voluntary. The individual responses will be kept confidential, but all responses will be compiled, summarized and shared with the University of Houston Clear-Lake for the purposes of program improvement. I am asking that you complete one survey now and another in December. **If you choose to participate, please click on the link and complete the survey.**

<https://www.surveymonkey.com/r/TeacherSESurvey>

There are no benefits and no penalties for choosing or declining to participate, and you may withdraw any time during the study without consequences and your data will not be included. Your willingness to participate in this study is implied if you proceed with completing the survey. You may keep this cover letter for your records.

Please try to answer all the questions because answering each response will make the survey most useful. This survey will take approximately 5-15 minutes to complete. Included in the survey is a request for interview, if you are interested and/or willing to participate in this portion of the study, please reply directly to my email listed below. No obvious undue risks will be endured and you may stop your participation at any time. In addition, you will also not benefit directly from your participation in the study, but your participation will help the researcher better understand the influence of peer coaching in elementary mathematics.

Sincerely,

Joseph Cahill

Doctoral Student

Educational Leadership

APPENDIX B

INFORMED CONSENT FORM

Informed Consent to Participate in Research

You are being asked to participate in the research project described below. Your participation in this study is entirely voluntary and you may refuse to participate, or you may decide to stop your participation at any time. Should you refuse to participate in the study or should you withdraw your consent and stop participation in the study, your decision will involve no penalty or loss of benefits to which you may be otherwise entitled. You are being asked to read the information below carefully, and ask questions about anything you don't understand before deciding whether or not to participate.

Title: The Influence of Peer Coaching on Teacher Self-Efficacy in Elementary Mathematics

PURPOSE OF THE STUDY

The purpose of this research is to determine if teacher self-efficacy is influenced by peer coaching professional development in elementary mathematics.

PROCEDURES

The research procedures are as follows: First, you will answer 24 survey questions in order to establish your initial self-efficacy. Next, you will participate in your peer coaching professional development sessions. Twice during this process we will meet for a 30 minute interview session. Finally, you will complete a final survey to determine any influence of peer coaching on your self-efficacy.

EXPECTED DURATION

The total anticipated time commitment will be approximately four months.

RISKS OF PARTICIPATION

There are no anticipated risks associated with participation in this project.

BENEFITS TO THE SUBJECT

There is no direct benefit received from your participation in this study, but your participation will help the investigator(s) better understand the influence that peer coaching has on a teachers' self-efficacy.

CONFIDENTIALITY OF RECORDS

Every effort will be made to maintain the confidentiality of your study records. The data collected from the study will be used for educational and publication purposes, however, you will not be identified by name. For federal audit purposes, the participant's documentation for this research project will be maintained and safeguarded by the Joseph Cahill for a minimum of five years after completion of the study. After that time, the participant's documentation may be destroyed.

FINANCIAL COMPENSATION

There is no financial compensation to be offered for participation in the study.

INVESTIGATOR'S RIGHT TO WITHDRAW PARTICIPANT

The investigator has the right to withdraw you from this study at any time.

CONTACT INFORMATION FOR QUESTIONS OR PROBLEMS

If you have additional questions during the course of this study about the research or any related problem, you may contact the Student Researcher, Joseph Cahill, at phone number 716-713-8149 or by email at joseph.cahill@fortbendis.com. The Faculty Sponsor Denise McDonald, Eh.D., may be contacted at phone number 281-283-3544 or by email at mcdonald@uhcl.edu.

SIGNATURES:

Your signature below acknowledges your voluntary participation in this research project. Such participation does not release the investigator(s), institution(s), sponsor(s) or granting agency(ies) from their professional and ethical responsibility to you. By signing the form, you are not waiving any of your legal rights.

The purpose of this study, procedures to be followed, and explanation of risks or benefits have been explained to you. You have been allowed to ask questions and your questions have been answered to your satisfaction. You have been told who to contact if you have additional questions. You have read this consent form and voluntarily agree to participate as a subject in this study. You are free to withdraw your consent at any time by contacting the Principal Investigator or Student Researcher/Faculty Sponsor. You will be given a copy of the consent form you have signed.

Subject's printed name: _____

Signature of Subject: _____

Date: _____

Using language that is understandable and appropriate, I have discussed this project and the items listed above with the subject.

Printed name and title: _____

Signature of Person Obtaining Consent: _____

Date: _____

THE UNIVERSITY OF HOUSTON-CLEAR LAKE (UHCL) COMMITTEE FOR PROTECTION OF HUMAN SUBJECTS HAS REVIEWED AND APPROVED THIS PROJECT. ANY QUESTIONS REGARDING YOUR RIGHTS AS A RESEARCH SUBJECT MAY BE ADDRESSED TO THE UHCL COMMITTEE FOR THE PROTECTION OF HUMAN SUBJECTS (281-283-3015). ALL RESEARCH PROJECTS THAT ARE CARRIED OUT BY INVESTIGATORS AT UHCL ARE GOVERNED BY REQUIREMENTS OF THE UNIVERSITY AND THE FEDERAL GOVERNMENT. (FEDERALWIDE ASSURANCE # FWA00004068)

APPENDIX C
INTERVIEW PROTOCOL

Teacher Interview Guide

1. What is your understanding of how a peer coaching session should take place?
2. What is the protocol for your peer coaching meetings?
3. Can you describe your relationship with your peer coach?
4. How, if in any way, has peer coaching influenced your teaching practices?
5. How, if in any way, has peer coaching impacted the way you view your teaching?
6. What do you find to be the most beneficial aspect of peer coaching?
7. Can you provide an example of a particular peer coaching session that was beneficial for you, or not beneficial for you?
8. What do you feel, if any, are the major assets of peer coaching?
9. What do you feel, if any, are the major weaknesses of peer coaching?
10. What, if any, are the requirements for becoming a peer coach on your campus?
11. What are your overall perceptions of the peer coaching program?
12. What, if any, areas do you feel could be addressed to improve the peer coaching program?