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Collaborative Lesson Study: A Qualitative Case Study of Elementary Teachers' Professional Learning Experience

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Collaborative Lesson Study: A Qualitative Case Study of Elementary Teachers' Professional Learning Experience

by
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Dedication

In Memory of My Beloved Sister-in-Law, Sharon S. DeVera

This dedication page I have reserved to thank those who have contributed to my success. First, I thank God for shining His grace, favor, and blessings over me. I know without a doubt that my educational pathway has come through fruition because I believe, all good things come from Him.

While attending college in pursuit of my bachelor's degree many years ago, I remembered when times were tough, my father would advise me that having an education is something that no one can ever take away. These inspiring words come alive when the feeling of accomplishing my goals is a battle too difficult and not worth the fight. My father was trying to persuade me to not give up on my ambitions. He expressed that the decisions I make in college would set the path for my future. In heeding to his advice, I have learned to set goals, set high expectations, persevere, and make every effort to avoid temptations that lead to getting sidetracked or taking a detour.

To my mom and dad, your support, sacrifices, and unconditional love has given me the fuel to rise and succeed in life. I am most grateful and honored to be your favorite and only daughter. To all my wonderful relatives and trusted friends who have placed seeds of encouragement to persevere and instill confidence that I can; I did it!

And last but definitely not least or forgotten, Gordon Harmon (my soulmate) and Jaime Harmon (my gift from God), words cannot express how you have made my life full of joy, love, and laughter. I love you both so much! Thank you for always being there whenever I needed a listening ear, and especially, as my personal executive editor. Though there are seven original wonders in the world, there is no greater wonder that has taken my breath away than sharing the special memories we have created together. After all, you are both truly… my OHANA!

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To my dearest participants (pseudonyms):

Sapphire, Betty, Karen, Yolanda, Evelyn, and Kat

I literally could not have done this research without all of you and I cannot thank you enough! I wholeheartedly enjoyed and appreciated your focus, commitment, and fortitude. Your boldness and willingness to demonstrate what it takes to be a high-performing quality teacher is contagious. Let your voices spark inspiration for our readers to become active change agents… because our students deserve it!

Abstract

Teacher collaboration practices in schools have impacted how teachers work together to prevent professional isolation. The mandate of collaborative practices has resulted in some teachers expressing frustration and a lack of benefit from their current experiences. The purpose of this qualitative case study, conducted in the Southeast region of the United States, was to determine if lesson study provided a more meaningful collaborative approach during focused group sessions. Using New London Group's (1996) designs of meaning concept encapsulated in the Pedagogy of Multiliteracies Theoretical Framework to gauge the relevance of lesson study, I sought to explore a deeper understanding of the attitudes and perceptions of elementary educators practicing this method. The participants in this study, the kindergarten collaboration team, consisted of three kindergarten teachers, one special education teacher, one media specialist teacher, and one technology specialist teacher. The individuals' teaching experience ranged from 17 to 30 years. Data collected included field notes, focus group reflections of team lesson observations, transcriptions from semi-structured individual interviews, and a focus group interview. The overarching research question that drove this study was: What were the attitudes and perceptions of elementary educators towards practicing lesson study and its influence on the quality of teaching? Findings from this investigation revealed that participants going through the lesson study were appreciative from acquiring a unique collaborative experience. A new team dynamic, introspective analyses, and transformation of teacher learning contributed to a meaningful collaborative process. Furthermore, maximizing colleagues' skillsets, preparation, and learning-by-doing heightened the quality of instructional math practices.

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Chapter I: Introduction

Stigler and Hiebert (1999) declared:

> … teachers must be the primary driving force behind change. They are best positioned to understand the problems that students face and to generate possible solutions… They are the gatekeepers of the classrooms in which teaching and learning take place… They are, necessarily, the solution to the problem of improving teaching (pp. 135-136).

Background of the Problem

In today's educational workforce, teacher collaboration has replaced working in isolation, and this school-based collective practice, which means to draw support from each other, is now mandated (Ostovar-Nameghi & Sheikhahmadi, 2016; Vangrieken et al., 2015). Vangrieken et al. described teacher collaboration as a group's mutual shared decision-making interaction to undertake a joint task. In countries where high educational performance is standard, effective teacher collaboration contributed to high-quality professional learning because "teachers collaborate to a high extent with excellent results as a consequence" (Vangrieken et al., 2015, p. 17). Even when support structures are in place, teachers still need to be convinced to collaborate because, without buy-in, the aftermath results in superficial collaboration (Canonigo, 2016). Thus, the benefits of having meaningful collaboration, such as increased student outcomes, innovative pedagogies, self-efficacy, and high-quality professional learning, are lost (Yuan & Zhang, 2016).

High-quality professional learning is collaborative, focused, job-embedded, continuous, and gives teachers the autonomy to take responsibility in developing a growth mindset (Darling-Hammond et al., 2017; Labone & Long, 2016). According to Labone and Long (2016), the level of professional learning attained impacts the quality of student learning. In 1983, a Nation at

Risk: The Imperative for Educational Reform was a report completed by the National Commission on Excellence in Education that revealed the United States (US) educational system was in jeopardy due to the quality of education being substantially inadequate (Morrison, 2015; U. S. National Commission on Excellence, 1983). Lawmakers believed that the nation's security and power were vulnerable due to low student achievement scores compared to other countries. This awareness resulted in a demand for high-quality learning for teachers and students (Morrison, 2015; U. S. National Commission on Excellence, 1983).

In 2013, the National Assessment of Educational Progress (NAEP) reported that 58% of the nation's fourth graders and 62% of the nation's eighth graders performed under proficiency level in mathematics (NCES, 2013). In 2015, math deficiency continued to accumulate as the NAEP reported evidence that showed 60% of fourth graders and 67% of eighth graders fell below proficiency level (NCES, 2015, 2016). In 2017, no statistically significant differences were found when the 2015 NAEP math assessment results were compared to the 2017 NAEP math scores (NCES, 2017). Results from the 2019 NAEP reported that the average fourth-grade math scores increased by one point, and eighth-grade math scores declined by one point in comparison to the 2017 NAEP assessment (NCES, 2019). Overall, NAEP math results from 2013 through 2019 confirmed that lower performing students in both grades have not made any significant progress (NCES, 2019).

Additional data to consider are the results from the 2012, 2015, and 2018 Programme for International Student Assessment (PISA). These scores showed that the US performed below ideal standards in comparison to other nations (Kastberg et al., 2016; OECD, 2012, 2016, 2019). The TIMSS assessment results also validated that the US had maintained this marginal performance trend for over twenty years (Mullis et al., 2016; Provasnik et al., 2016). A point to

highlight is the TIMSS report also indicated that high performing nations excelled in applying critical thinking skills to solve math word problems, and Japan was amongst the top-scoring math performers (Nieuwoudt, 2015). These substantiated reports from the NAEP, TIMSS, and PISA indicated that the US has a proficiency gap of students performing in mathematics.

In the mid-1990s, the first administered Trends in International Mathematics and Science Study (TIMSS) assessment results showed that the US ranked below average amongst participating international countries (Mullis et al., 2016). Results of the data compelled researchers in 1995 to conduct a video study and investigate how instructional math practices were taught in the US, Germany, and Japan (Stigler et al., 1999). In their study, Stigler et al. (1999), examined 81 video recordings of randomly selected classrooms of eighth-grade teachers teaching math across the United States. Simultaneously as part of the same exploratory research study, researchers randomly selected 150 classes and videotaped eighth-grade teachers teaching math in Japan and Germany (Stigler et al., 1999). After comparing teaching methods between the three countries, the researchers found that Japan's method of teaching math used a more conceptual-based approach rather than a procedural-based approach.

The TIMSS video study contributed to the publishing of *The Teaching Gap*, which supported Japan's professional development model as an effective framework for enhancing the quality of teacher learning (Akiba & Wilkinson, 2016; Bocala, 2015; Stigler & Hiebert, 1999). This publication received national attention and helped raise interest in Japan's method of teaching math (Akiba & Wilkinson, 2016; Fujii, 2016; Huang & Shimizu, 2016; Wake et al., 2016). Japan's developmental approach to improving the quality of teachers' professional learning is known as *lesson study*. This present study explores a deeper understanding of how lesson study may impact the quality of professional learning.

To minimize student learning gaps and advance learning in elementary mathematics, a focus on improving professional learning for teachers is needed. Learning gaps occur when the students' current levels of understanding are not where their expected grade-level performance should be based on the Common Core State Standards (Youn, 2016). The presence of learning gaps in math is an indicator that deficiencies in these skills exist (Mullis et al., 2016). Consequently, teachers have to be fluid in their ability to match their practices with the educational needs of students. Effective practices that build math proficiency skills in exercising cognitive thinking are not evident in many classrooms (Kang, 2016).

In contrast to the US, Japan's optimal level of performance on international assessments for over two decades has influenced other nations to examine how math is taught and how Japanese teaching methods can be utilized to advance student outcomes (Inprasitha, 2015; Lomibao, 2016). The lesson study approach, rooted in Japan, is a professional development method of teacher collaboration that gained the attention of other countries because of the benefits of improving teacher quality and the correlation to student achievement in mathematics (Bocala, 2015; Huang & Shimizu, 2016; Mokhele, 2017; Takahashi & McDougal, 2016). The lesson study approach, also known as "jugyou kenkyuu," has four main sequential stages: (a) identifying school math goals and conducting small group research planning; (b) implementing lessons with live team observations; (c) post-lesson discourse; and (d) reflection (Collet, 2019; Fujii, 2016). Huang and Shimizu (2016) cautioned that modifying the application of the main components of the lesson study approach can compromise the effectiveness and authenticity of this method.

Researchers from other countries discovered the positive effects that the lesson study approach had on the professional developmental growth of teachers. According to Canonigo

(2016) and Gero (2015), teacher buy-in, building relationships, a collegial atmosphere, and implementing and sharing best practices were some of the benefits attributed to the implementation of lesson study. Furthermore, Gero (2015) contended that the caliber of the lesson was associated with increased student outcomes. Lesson study was an international phenomenon that was successfully conducted in China (Cravens & Wang, 2017; Huang & Han, 2015), Greece (Kanellopoulou & Darra, 2018), Hong Kong (Zhang, 2015), Netherlands (Coenders & Verhoef, 2019), Philippines (Gutierez, 2015; Lomibao, 2016), South Africa (Mokhele, 2017), and the United Kingdom (Warwick et al., 2016). Teachers who participated in lesson study not only improved their teaching, but they increased student learning in math as well.

Statement of the Problem

Professional learning through teacher collaboration is the structured method used by my school system to support and include teachers in the decision-making process for advancing teacher effectiveness and student learning. Teacher collaboration, also known as *focused collaboration*, is a system-wide mandate that has been in place for less than five years, and the school structures are set up for professional discourse to be conducted weekly. To note, teacher collaboration will be used interchangeably with the term *focus group* or *professional collaboration* throughout this literature review. Although teachers are given decision-making opportunities through focused collaboration, there is still a need for professional learning with peers to be more meaningful.

The issue surrounding focused collaboration in my school system is that I often heard colleagues comment about their dissatisfaction when they had to attend grade level focused collaboration sessions. Interestingly, I also have a network of colleagues teaching overseas with

the same education agency, and they, too, have expressed the same feelings about focused collaboration. These negative comments are rarely voiced when the administration is present. My education agency does not allow for personal identification information published and therefore, real names have been extracted from the personal communication citations below.

Since the start of the focused collaboration initiative, numerous teachers have expressed to me their dissatisfaction with attending these sessions. One primary grade level teacher captured the overall perspectives of dissatisfied teachers when she stated, “We use the focused collaboration stages for the topic of discussions from the district; however, to be honest, we have good debates, but it doesn’t seem to fit our grade level” (Teacher A, personal communication, June 1, 2020). Another teacher described the focused collaboration as being “prescriptive and not meaningful” (Teacher B, personal communication, May 7, 2020). This teacher was referring to the focused collaboration templates, which included a set of general questions that needed to be filled out during or after each session.

These teacher statements were in line with a superintendent’s comment when he stated, “The schools are always looking for a professional development model that works. It’s also much easier when teachers are willing to participate...Teachers observing other classrooms have always been encouraged to expand teacher learning” (Superintendent 1, personal communication, June 4, 2019). The superintendent further explained that the administrative system encourages teachers to observe other teachers to learn from one another; however, very few, if any, take advantage of this opportunity. During a faculty meeting, another superintendent pointed out that math problem-solving is an area in which the students need to improve, because the education agency trend data showed scores are low and quality teachers are needed to produce effective results (Superintendent 2, personal communication, August 2, 2019).

Research literature has supported these views. Researchers claimed that general topics are not constructive in building a conceptual understanding of pedagogical content knowledge (Cravens & Wang, 2017; Shulman, 1986). Rather, Cravens and Wang stated that "… professional development is best delivered when embedded in the teacher's specific subject area" (p. 307). The lack of authenticity in teachers' professional development resulted in decreased motivation for improving teaching practices (Mokhele, 2017). Some teachers have distinctly expressed that they do not desire to waste their time learning something insignificant and unproductive (Cravens & Wang, 2017; Holcomb, 2017; Joram et al., 2019). Educational researchers have contended that the search for a successful, productive, systematic professional learning model in schools has been in demand for decades (Cravens & Wang, 2017; Korthagen, 2017). Cravens and Wang (2017) argued that the urgency for teachers to become active leaders in promoting effective instructional leadership models in school systems is crucial to preventing surface level professional learning.

What has led me to this investigation is two-fold. First, what professional development model exists that can make collaboration more meaningful, and second, can this model be applied to develop instructional practices in teaching math? In searching the literature to help find a solution to how professional collaboration can be more meaningful to teachers, I discovered the lesson study model. The lesson study model involves the following components: a small group of teachers working together to identify a common problem, collaboratively planning a lesson, observing this plan in action as a team, reflecting on the findings, revising a common lesson plan, reteaching, and reflecting again (Collet, 2019).

My rationale behind choosing Collet's (2019) adaptation of lesson study derives from my interest in the reflective conversations occurring after the team conducts observations of their

joint lesson in real-time. Face-to-face team observations allow teachers opportunities to view various angles and in-the-moment cues (Collet, 2019) of students engaging in mathematical tasks. Because of this observational component, the reteach stage would serve as additional preparation to "see with new eyes" (Collet, 2019, p. 70) so that teachers can further develop a visual understanding of student challenges or strengths during their learning process (Mon et al., 2016). These direct experiences that enrich reflective team conversations (Lewis et al., 2019) make this qualitative research meaningfully relevant to current collaborative practices because Collet's lesson study stages align with my educational agency's teacher evaluation elements and support the focused collaboration mandate designed to target improving teacher quality. In contrast to Collet's lesson study adaptation, other versions elected to view the reteaching phase as an option (Buchard & Martin, 2017; Fujii, 2016). Yet another lesson study version emphasized precedence over observing the teacher instead of the learners and claimed that one lesson study cycle could be accomplished on a condensed schedule versus an extended plan with similar results (Gero, 2015).

The setting of this study was initially planned to be conducted with my grade-level team. Unfortunately, an unexpected turn of events surfaced: the global pandemic COVID-19 outbreak. In March 2020, businesses and schools in the US shut down, which affected normal routine operations. People were quarantined at home, and the Centers for Disease Control and Prevention recommended social distancing of six feet (NCIRD, 2020). Simultaneously, schools went into remote learning instruction, whereby teachers virtually taught students from a distant place (Vegas, 2020; Winthrop, 2020).

How did this plague affect the course of this qualitative study? In planning for the upcoming school year while the global pandemic was still on the rise, my education agency

offered interested qualified teachers, who were medically sensitive, the opportunity to teach in the Virtual K-12 School to minimize their risk of COVID-19 exposure. The schools pivoted from in-person learning to online virtual education. The change to remote instruction and increased virtual school student enrollment caused teaching positions to shift to support the virtual school.

As a result of the realignment, I had a newly assigned group of second-grade teachers. This change required starting over and building a collaborative group foundation. Due to the newness of my grade level team who was just beginning the work to build rapport, the teachers' willingness to participate in my upcoming study was noncommittal nor guaranteed. They have also voiced their aspirations to immediately transfer and teach at another duty location when or if presented with the opportunity. In my quest to think of a solution to finding a willing and reliable collaborative group, a thought surfaced: Would it be possible to have other colleagues from a different grade level and whom I have an existing rapport with at my school participate in this study? If the participants were willing, collaboration for this study could be accomplished in person or virtually for participants who request to collaborate online due to underlying health concerns or conditions stemming from COVID-19 circumstances. Because my colleagues are all part of the same education agency that serves military-connected students and are held to the exact collaboration requirements, the study would be relevant for this potential group of teachers willing to help me investigate the research questions under study.

By way of background, I have been teaching at the location where the current study will take place since 2005. I have a past teaching history with some of the prospective study participants. For these reasons, I desired to collaborate with a network of military-connected colleagues at my school to build and sustain authentic working relationships. Having diverse perspectives can produce fresh, innovative ideas and techniques useful in problem-solving,

supporting, and helping one another to promote growth mindsets vital to professional teaching and learning (Darling-Hammond, 2017). Such characteristics are invaluable to the investigation of this qualitative study.

Upon reflecting on the first superintendent's statements, I recalled a time when I took a graduate course assignment. I was tasked to observe my students during a 45-minute math block. The assignment was to take detailed notes of all the learners doing their math task after I had given them instructions. During the task, I noticed that I gravitated to one or two groups of students that showed more engagement and spent less time with those who had fewer discussions. I envisioned the valuable feedback of having a team observe the same lesson and all of the students rather than just an individual's more narrow perspective. So, for developmental learning purposes from my standpoint, I wanted to understand the extent to which team observations during the lesson study process provided valuable feedback to improve the quality of teaching practices.

Purpose of the Study

The purpose of this qualitative study was to understand the attitudes and perceptions of elementary educators practicing lesson study and its influence on their professional practice teaching math. Since I have experience teaching in the participating military-connected school, I have a vested interest in conducting this study with colleagues. The mandate of collaborative practice has resulted in some teachers expressing frustration and a lack of benefit from their current experiences. As a result, I wanted to implement lesson study as the method of focused collaboration to determine if it would be more meaningful to the teachers. This investigation of lesson study may prove significant to the field of elementary mathematics education because there is a need to examine how this method may enhance teacher quality (Barber, 2018;

Lomibao, 2016). Specifically, this research contributed to the body of knowledge by investigating if the lesson study approach was useful in helping educators who are unfamiliar with the lesson study model examine and improve math instruction in an elementary school setting.

Research Question

This qualitative study aimed to answer the overarching research question: What were the attitudes and perceptions of elementary educators towards practicing lesson study and its influence on the quality of teaching?

The sub-questions are as follows:

a) What were the teachers' initial and post impressions of a complete lesson study cycle, and the reasons for their impressions?
b) What were teachers' perspectives towards practicing lesson study and its influence on improving the focused collaboration process?
c) What were teachers' perspectives towards practicing lesson study and its influence on math instruction?

Theoretical Framework

The Pedagogy of Multiliteracies Framework that supports my research topic originates from the New London Group's (1996) design concept of how construction and application of new knowledge is the product of transformation. The power of transformed practice consists of applying purposeful choices to design learning experiences that engage individuals in developing new knowledge (New London Group, 1996). The New London Group expressed that such authentic experiences produce meaningful learning. Meaningful learning is conceptualized when *Available Designs*, available resources coalescing with reflective experiences through social

interactions, are utilized in the *Designing* process. The *Designing* process involves creating a plan for a specific purpose. Such action produces *The Redesigned*, an innovative blueprint. The researchers claimed that "through their co-engagement in Designing, people transform their relations with each other, and so transform themselves" (New London Group, 1996, p. 76). In essence, *The Redesigned* is an iterative process of taking one's knowledge and applying this understanding towards another context to transform resources into a redesigned practice (New London Group, 1996).

I perceived this theory of transformed practice as relevant to this research because, in the context of lesson study, collaboration and co-planning transform working relationships and the work itself. Through this collaborative process, new experiences provide a context for constructing new learning for the individual teacher as well as a collective group of educators. Collaboration, conversations, creating lessons, observations, reflection, and feedback help develop new meaning and simultaneously remake the individual teacher to become a more effective educator. Together, teachers become active agents that create meaningful resources. Available Designs, Designing, and The Redesigned are designs of meaning that framed this qualitative study.

Methodology Overview

A qualitative case study design involves studying a complex phenomenon in context. The specifics related to this case study research design are discussed in detail further in this chapter. Coalescing information from different sources will accomplish triangulation (Creswell & Plano Clark, 2017). Triangulation through the use of various data sources along with methods of data collection and analysis will improve the credibility and trustworthiness of the study (Creswell & Plano Clark, 2017; Yin, 2018). This fusion process corroborates findings and tests the validity of

the study. Analysis of the qualitative data determined if the lesson study model influenced the participating teachers' perspectives about the quality of their teaching. Through this synthesis, a deeper conception of the phenomena under study emerged. The current study focused on a single complete cycle of the lesson study process. Figure 1 provides an example of an approximate duration and description of implementing the lesson study process.

Figure 1

Performance Management and Appraisal Program (PMAP) and Collaborative Lesson Study (CLS) Alignment Chart

			One Cycle of Lesson Study
PMAP (5 Elements)	**Collaborative Lesson Study** (CLS)	**Approximate Duration**	**Description**
Mastering Content and Curriculum	*CLS Stage 1 Study	2-3 weeks	• Includes preparation – establishing norms, Lesson Study information and commitment expectations, etc. • Team studies area of instruction they want to improve • Research theme will focus on math, study standards, curriculum materials, resources, and conduct research on topic
Instructional Planning and Strategies	*CLS Stage 2 Plan	2 weeks	• Plan research lesson Design flow of instruction
Managing for Effective Learning	*CLS Stage 3 Observe Teaching	1 week	• Volunteer team member teaches team lesson • Schedule a day within this duration - One instructional math block
Monitoring and Assessing Student Achievement	*CLS Stage 4 Reflect	1-2 weeks	• Discuss observation findings Consolidate learning
*Promoting Diversity and Equity	*CLS Stage 5 ReVision	1 week	• Tweak the lesson; what worked, what did not work
	*CLS Stage 6 Reteach	1 week	• Another volunteer team member teaches revised lesson to a different class • Schedule a day within this duration - One instructional math block
	~ CLS Stage 4 repeated - Reflect	1 week	• Discuss observation findings Consolidate learning • Reteach and Reflect process will take approximately 1-2 weeks

(Collet, 2019)

The participants and I work for the same education agency. I am a primary elementary teacher stationed in the southeastern United States and the participants consisted of a willing and reliable team of teachers that service military-connected students at my school. I assumed the role of facilitator and observer during math collaborations. The participants had the autonomy to collaboratively make all decisions that involve the course of their work during the lesson study. I guided the team throughout the collaborative lesson study process in person or virtually via Microsoft Teams.

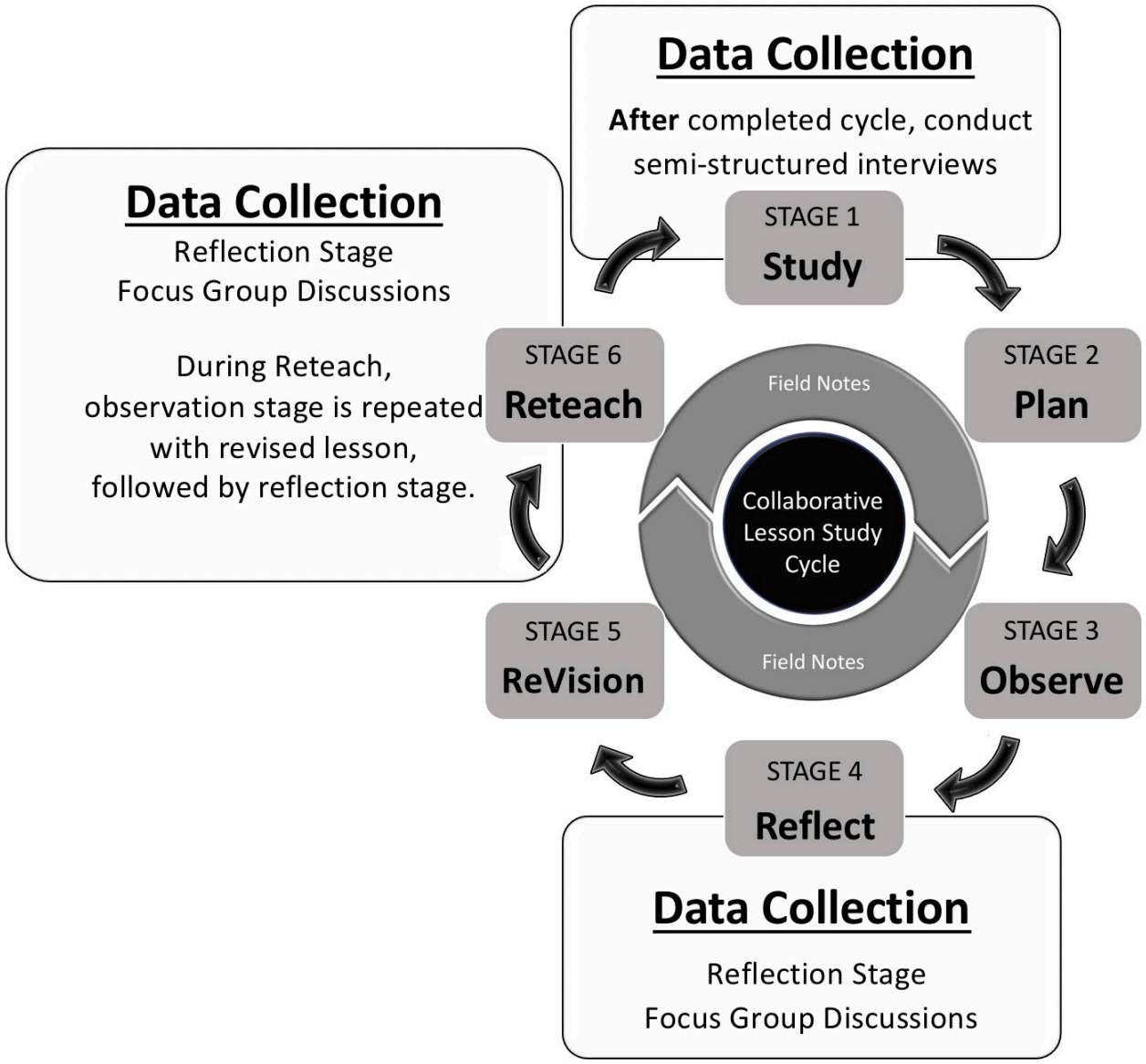
The lesson study participants contributed their perspectives by documenting notes during live observations and shared findings during the focused collaboration reflection stages (Collet, 2019). Audio recorded and transcribed focus group discussions during the reflective stages were given to participants to check for accuracy. These data were analyzed to determine the impact of collaborative discussions from team observations in planning future designs. After the completion of one lesson study cycle (as shown in Figure 2), I interviewed participants individually and collectively; the interviews were recorded and transcribed. I used the semi-structured individual interview and semi-structured focus group interview protocols to conduct the inquiries. The verbatim transcriptions were vetted by participants to ensure accuracy of their intent. Finally, the interview data were analyzed to determine if lesson study had any influences on their professional practices.

Setting

The lesson study participants at Eagle Pride Elementary (pseudonym) included the kindergarten collaboration team at this site which serves military-connected students. The focus group sessions are clustered by grade-level teams and have other specialist teachers or staff. The number of participants for this empirical investigation was six. Eagle Pride Elementary (EPE)

Figure 2

Collaborative Lesson Study Cycle (Collet, 2019): Data Collection



has over 300 primary military-connected students in grades ranging from prekindergarten through fifth. There are approximately 20 teachers, not including the special area educators teaching art, physical education, and music. Additionally, EPE has support staff that provide services for students who qualify for special education with resources in speech, English Language Learner, Gifted Education, hearing impaired, occupational therapist, physical

therapist, school psychologist, instructional support for reading, and instructional support for math. There is also a full-time nurse at the school site.

In addition to annual professional development trainings held at EPE, focused group collaboration sessions are built-in the school schedule throughout the week for teachers to work in partnership. The school faculty meets at least four times per week before the start of school or during planning period for 45 minutes to attend collaborative sessions. These sessions include predetermined topics set by the administration or teachers involving a core subject such as math. For example, predetermined topics may consist of the group answering a set of critical questions to improve math literacy. Another example may include teacher discussions on types of practical activities used in math learning centers and what the teacher will do if students are still not meeting a specific grade level skill. This directive is in addition to weekly staff meetings held after school on Tuesdays for an hour and thirty minutes. During focused group collaboration sessions, the teams review norms and previous collaboration minutes, work through items on the agenda, and plan for the next steps before the collaboration meeting concludes. The enabling collaborative structures set in place at EPE provide a perfect opportunity to conduct lesson study, an authentic teacher-led professional development, because teachers are given the time and space to hold collaboration meetings within the duty day. The diverse group of participants and their perspectives brought valuable insights into understanding how lesson study influenced teachers' perspectives of their professional practice.

The stages of collaborative lesson study align and support teacher evaluation elements extrapolated from the Defense Civilian Personnel Advisory Service (DCPAS) to promote high-quality teacher learning (Figure 1). The Performance Management and Appraisal Program (PMAP) consists of five elements that target high-quality teaching standards. In a school context,

these elements include mastering content and curriculum, instructional planning and strategies, managing for effective learning, monitoring and assessing student achievement, and promoting diversity and equity (DCPAS, 2016). The quality of teaching at EPE is determined by annual teacher evaluations facilitated by the administration to gauge the effectiveness of classroom practices. During the interviews, educators practicing lesson study described their attitudes and perceptions towards the quality of their teaching aligned with PMAP elements.

Research Design

This research was conducted using a qualitative case study design. Creswell and Plano Clark (2017) describe the phenomenon in a qualitative study as the concept being explored, and for this study, the kindergarten collaboration team of teachers' implementation of lesson study and their perceptions and attitudes of how it influenced their teaching was the concept being investigated. A qualitative case study design was appropriate for this empirical investigation because the focus of this research was a bounded system. Creswell and Plano Clark portray a bounded system as investigating a single case to gain a more profound understanding of the targeted concept. Furthermore, Yin (2018) explained that a single case study involves a small group of people, which offers multiple perspectives that may contribute to helping make sense of meaning towards the phenomenon.

Triangulation is a technique used as a repetitive process of check, verify, test, confirm, and then, repeat steps to analyze and contrast various data (Creswell & Plano Clark, 2017; Yin, 2018). This method of cross-checking helps identify any inconsistencies by comparing data outcomes. This triangulated approach validates study findings of the research design and informs readers that rigor has been applied to the methodical process of data collection and analysis (Creswell & Plano Clark, 2017; Durksen et al., 2017; Labone & Long, 2016; Mohan et al., 2017;

Ostovar-Nameghi & Sheikhahmadi, 2016; Yin, 2018).

Participants

The kindergarten collaboration team was the participants in this study, and the individuals' teaching experience ranged from 17 to 30 years. This focus group consisted of three kindergarten teachers, one special education teacher, one media specialist teacher, and one technology specialist teacher. All female participants hold a Master's degree. Most participants have been working at the school for at least four years. The names of the participants and the school have pseudonyms to safeguard privacy.

Before initiating the lesson study process, I informed participants that involvement in being part of the lesson study team is noncompulsory. Additionally, I notified participants that a consent form to participate in the study needed to be signed in advance. According to Creswell and Poth (2018), a proper consent form includes a notice stating that they can choose to opt out of participating in the study. Participants must be given ample information about the research, participant expectations, and the consent process, in order to make informed decisions when deciding to take part in the study (Rashid et al., 2019). Participants must give consent, sign permission to use data collected for conducting the study, and be mindful that their participation to gather or provide input is voluntary and may cease anytime at their discretion (Appendix A). Should any participant later decide to opt out of the research study but would like to remain in the lesson study team may do so without penalty and by communicating this request to the researcher. Once equipped with training, the participants established team roles using the focus group protocol and proceeded to implementing lesson study (Appendix B).

As the researcher, I obtained prior approval from the university's Institutional Review Board (IRB) and the school district of the targeted participants before commencing data

collection. Participants need to be informed of IRB and school district approval (Creswell & Poth, 2018; Davis & Lachlan, 2017). The lesson study team must be made up of at least three members and should not exceed six to ensure the quality and contribution of focus group discussions (Collet, 2019; Kanellopoulou & Darra, 2018; Takahashi & McDougal, 2016; Wake et al., 2016).

Instrumentation

The instrumentation for this study consisted of researcher field notes, an observation template, focus group reflection of observations form, individual and focus group interview protocols. I used field notes to reflect upon and document observations of participants implementing the lesson study process. Another key instrument is an observation template (Appendix C) that was given to the participants to help them record what they saw, heard, and further explained the significance of their observations during Stage 3. The participants watched the students' performance of the planned activity and listened for insight on areas for improvement. Afterwards, the feedback's relevance was addressed when the participants contemplated "Why does it matter?", which is where they described if and how it connected to the learning objectives. The three prompts on the observation template served as a reminder of what topics to reflect on and organize what the participants recorded.

The completed observation templates were brought to the team meeting and discussed in Stage 4: Reflect. The designated scribe used the Focus Group Reflection of Observations Form (Appendix D) as the team consolidated their observations and documented notes, key takeaways, and action items established during collaboration. Audio recordings during the sessions assisted in ensuring accuracy of document analysis of the meeting minutes and the scribe's interpretation of the reflections. There was no video recording option during the study.

Additional tools that I utilized to gather data came from semi-structured individual and focus group interview protocols. According to Plano Clark and Creswell (2014), refinement steps in developing the interview protocol adds to the quality of data findings in a qualitative study. The procedure that was used for developing reliable interview protocols is known as the Interview Protocol Refinement (IPR) model (Castillo-Montoya, 2016). The IPR consisted of aligning research questions to interview protocols, composing inquiry-based conversations, receiving interview protocol feedback, and if attainable, pilot testing. Yeong et al. (2018) confirmed that "the IPR framework helps to ensure the credibility of the refinement process" (p. 2710). Castillo-Montoya (2016) stipulated that interview protocol feedback becomes more significant when pilot testing is not obtainable due to circumstances such as researchers not having access to participants or enough finances and time to conduct the piloting stage. For this current study, the individual and group interview protocols went through the IPR process. As the researcher, I conducted the interviews.

The individual interview protocol (Appendix E) consisted of five questions and two embedded probes to promote more in-depth discourse. Interview question one focused on participant experiences in practicing lesson study. Question two asked the participants to discuss their attitudes and perceptions of how lesson study contributed to the quality of their teaching practices in relation to the PMAP elements. Question three focused on participant attitudes and perceptions of the influence of lesson study, if any, on working relationships. Questions four and five invited open-ended responses that gave participants opportunities of free expression to voice other feelings or insights they may have about practicing lesson study. This semi-structured interview of each lesson study team member took approximately 30 minutes to complete.

The focus group interview protocol (Appendix F) consisted of four questions and one

embedded probe to encourage rich discourse. Focus group interview question one focused on the participants' initial impressions of lesson study and the reasons for their impressions. Focus group interview question two asked the participants to describe how practicing lesson study may have an influence on improving focused collaboration. Question three asked the participants to describe any influences that lesson study may have on math instruction. Lastly, question four involved an open-ended response that gave participants opportunities to express true feelings and opinions without limitation.

Data Collection Procedures

Data were collected from field notes, focus group reflection of team lesson observations, transcriptions from the individual and focus group interviews. As the researcher, I attended focus group meetings in person or when requested, virtually through Microsoft Teams. There was a webcam with microphone capabilities attached to view the entire collaboration room and to clearly hear all the participants. The room used for collaboration had a digital board and reliable internet connection. Before implementing the study, participants were informed that assigned pseudonyms would mask their identities to ensure privacy protection. Three years after the study is completed, I will destroy all data by cross-cut shredding to expunge transcriptions or physical documents. All electronic data will be eliminated through appropriate data deletion methods (Secure Erase) so that data retrieval cannot be restored or recovered.

Researcher field notes included my reflective thoughts and observations of the lesson study process in action. According to Creswell and Poth (2018) and Phillippi and Lauderdale (2017), field notes help the researcher make sense of the phenomenon under study because feelings, thoughts, and visual observations are documented in preparation for data analysis. Field notes that are electronically stored were password protected and have a backed-up copy. Written

field notes were secured in a locked file cabinet, and I have exclusive access to these files.

Data were collected during the focus group discussions of team lesson observations. There were two sets of reflection stage minutes gathered for document analysis. One set of focus group minutes was from reflection discussions about the first lesson observation. The second set of focus group reflection minutes was collected after the reteach stage.

When the team conducted focus group sessions, there was a designated timekeeper, scribe, and discussion facilitator. Team norms were reviewed before the start of each meeting. During the focus group discussions, participant engagement is expected and monitored by the scribe, who will take discussion notes using the Focus Group Reflection of Observations Form (Appendix D). The central topic for this reflection session is based on Collet's (2019) suggestion to focus on what the participants saw and heard during the group's observation lesson in action and why they perceived it as significant. Collaborative reflections of observation data provided insights and areas of opportunities to improve instructional practices.

The lesson study team decided on specific dates and times to collaborate and where to hold meetings. I reminded participants that their identity was kept confidential to ensure privacy, and voluntary withdrawal of the study at any time was honored. Minutes taken by the scribe during this session were made visible on the digital board, and participants reviewed the minutes to ensure accuracy. Additionally, this specific focus group session was audio recorded with prior consent, and I shared a copy of the transcriptions with the participants to authenticate responses.

Data collection procedures for semi-structured individual interview (Appendix E) and focus group interview protocols (Appendix F) followed similar guidelines. The interviews consisted of audio recordings and transcriptions of responses. Individual and focus group interviews with the lesson study team members were conducted after completing one lesson

study cycle. A designated room located within the participating school and chosen by the lesson study team provided privacy and a safe environment free of outside interruptions. Participants were reminded that the responses did not contain identifying information that disclosed their identity. Furthermore, the accumulated data and findings of the study were coded with aliases to safeguard participant identification. I stored data in a locked file cabinet, and electronic data were password protected in a secure device. I have sole access to the data files.

Participants were given the preference to conduct the interviews in person or online via Microsoft Teams. Participants were able to see me in person or on the monitor and digital board to optimize interaction. Participants were also reminded that their participation was strictly voluntary, and they had the option to not continue with the interviews or study at any time. Each interview session began and concluded with me acknowledging and thanking the participants for their vital contribution to the study. I reminded participants that the interviews were going to be audio recorded and transcribed. If necessary, I repeated the interview questions to ensure clarity. Transcriptions of all audio recordings were shared with the participants. This procedure allowed the participants to verify the accuracy of the data. Therefore, this open process gave the participants the opportunity to add or delete any comments and assisted in ensuring that the interview is valid.

Data Analysis

The act of coding, according to Saldana (2016), "*is* analysis" (p. 9). A three-step inductive coding process (Williams & Moser, 2019) was conducted in this qualitative data analysis. I used the three-step coding process to transform data into useful information. The first step was open coding, which involved identifying concepts from single words or phrases (Williams & Moser, 2019). This initial step was used to build categories. Merriam and Tisdell

(2016) described open coding as labeling grocery store items to prepare for grouping. Using the data from focus group minutes solely regarding lesson study observation reflections, transcriptions from the individual and focus group interviews, and researcher field notes, I generated patterns pertaining to the research question by identifying words, phrases, key concepts, and sorted them into codes. According to Creswell and Plano Clark (2017), the qualitative researcher performs a comprehensive review by reading the data transcriptions and notes multiple times to get a broad view of the overall study.

The next step was axial coding to identify emergent codes and establish common themes (Williams & Moser, 2019). This second step consists of categorizing data from the open codes. Once I got a clearer understanding of the coded data from the open codes, I then organized these codes into themes or looked for common patterns to draw further connections that reflect answers to my research question.

The concluding step was selective coding. After categorizing the codes, my next move was to refine codes. This iterative comprehensive process entails recoding and recategorizing the data from the previous step, axial coding (Williams & Moser, 2019). When data were sifted and assembled through the three-step coding procedure, significant themes were established from the extracted information and synthesized to help me construct meanings, determined what was relevant, what still needed further investigation, and reported the findings in a succinct and explicit manner. Researchers must follow a systematic procedure to ensure the validity and reliability of the coding process (Williams & Moser, 2019).

According to Saldana (2016), a researcher's analytic lens depends on the type of filter and angle of how such experiences from the researcher are perceived. Saldana further explained that questions asked, responses received, and other information gathered are filtered through the

researcher's level of expertise and degree of personal connection with the participants and, as a result, affect how data are coded. As the researcher captured multidimensional perspectives of the phenomenon under study, answers to the research question emerged. I used my teaching experience in interpreting the participants' perspectives of the lesson study process and how this method connected to the quality of their teaching. My relationship with the participants invited open communication and discernment to detect confusion while learning the lesson study approach.

Delimitations and Limitations

Restricting the sample to only one school and one grade level contributed to the delimitations of this current study. Additionally, the non-random sample has an established bond of trust and a history of teamwork. The participants' healthy team dynamic is not guaranteed for every school or grade level; therefore, the results of a team with incompatible members that utilize lesson study may differ from this research. This study does not consider factors, such as the level of comfortability to voice ideas and sense of support for change, that may affect the success of collaborating.

Limitations of this qualitative study included the findings being bound to this small group of participants in a specific geographical location. Therefore, the findings cannot be generalized towards other groups or populations. To increase generalizability, further research or replication of this study in another geographical location is recommended. Another limitation to this study is the lack of consistent subjective feedback. Self-reported measures on teacher attitudes and perceptions of lesson study are recorded for only one lesson study cycle, possibly influenced by the current state of an optimistic or pessimistic mindset. I also recommend further research to examine multiple cycles to verify the accuracy of perspectives towards lesson study. Despite the

limitations of this research design, the findings of this research can provide useful information for future studies.

Definition of Terms

Available Designs: "Found and findable resources for meaning: culture, context and purpose-specific patterns and conventions of meaning making" (New London Group, 1996, p. 12).

Bounded system: A single case investigated to gain insights on how people deal with a specific issue or topic (Creswell & Plano Clark, 2017).

Collaboration: Group meetings where teachers discuss and share ideas, concerns, lesson objectives or materials (Yuan & Zhang, 2016). Collaboration is termed as the highest partnership level involving deep and complex communication to achieve common, agreed upon goals (Harmon, 2017).

Collaborative culture: Organizational learning established through knowledge sharing (Mahendra, 2018).

Content knowledge: Having deep understanding of the required subject taught or learned in school (Gul, 2015; Shulman, 1986).

Designing: "The act of meaning: work performed on/with Available Designs in representing the world or other's representations of it, to oneself or others" (New London Group, 1996, p. 12).

Performance Management and Appraisal Program (*PMAP*): In a school setting, there are five teacher performance evaluation elements: mastering content and curriculum; instructional planning and strategies; managing for effective learning; monitoring and assessing student achievement; and promoting diversity and equity (DCPAS, 2016).

Jugyo kengyuu: Jugyo means lesson and kengyuu means study (Lomibao, 2016; Takahashi & McDougal, 2016).

Lesson study: An effective professional development teacher framework rooted from Japan that has been sustained for over a century (Takahashi & McDougal, 2016).

Pedagogical content knowledge: Having mastery or strong background knowledge over the subject content and able to teach this content in an effective manner that is understandable to the students (Demirdoen, 2016; Gul, 2015; Pella, 2015; Shulman, 1986).

Pedagogy knowledge: Possessing deep understanding about how strategies, techniques, and methods of teaching is used in the classroom setting (Demirdoen, 2016; Gul, 2015; Pella, 2015; Shulman, 1986).

Professional Learning Community: Working and learning together in a sustained collaborative endeavor to achieve a common goal (Chauraya & Brodie, 2018; Won, 2017).

Self-efficacy: The confident belief that the execution of action or skill contributes to success (Bandura, 1997).

Teacher isolation: "A teacher independently working with curriculum materials" (Regan, 2016, p. 113).

Teacher learning: "… learning is seen as a change or development in knowledge, resources or understanding that have the potential to lead to professional behavioral change" (Vrikki et al., 2017, p. 2).

The Redesigned: "The world transformed, in the form of new Available Designs, or the meaning designer who, through the very act of Designing, has transformed themselves (learning)" (New London Group, 1996, p. 12).

Significance of the Study

This study provided insight into understanding elementary educators' attitudes and perceptions of the lesson study process and how it influenced the quality of teaching

effectiveness using a qualitative lens. This study added to the existing body of knowledge from Gero's (2015) research that suggested further investigation is needed to determine the effects lesson study has on teaching and student learning. According to Shuilleabhain (2016), lesson study's success was dependent on the teacher's willingness to start this teacher-led school-based model. Bocala (2015) recommended that further studies were needed to determine if lesson study is a suitable professional development model for learning more about teacher collaboration, pedagogy, and content. Thus, the need to provide more meaningful focused collaboration propelled the investigation of this research. Therefore, this current study investigated elementary educators' attitudes and perceptions of the impact implementing lesson study had on their professional practice. The findings of this research advanced understanding towards possibly encouraging, sustaining, or adapting the practice of the lesson study method to other US education systems and countries, including military-connected schools worldwide.

Summary

Annual low math scores in the United States has led to investigating possible pathways for improving teacher practice and student learning. Teacher frustration over mandated collaborative initiatives has resulted in the lack of meaningful focus collaboration. This research intended to examine an effective method of professional collaboration that leads to a continuous transformation of practice towards enriching the quality of teaching. The initiation of this qualitative study served to examine the attitudes and perceptions of elementary teachers practicing lesson study to determine the impact for all participants. The collective efforts of a targeted approach to analyze and sharpen the quality of teaching are essential to maximizing student outcomes.

Chapter II: Literature Review

Collaboration is one of the critical components to sustaining teacher quality in high-performing schools (Darling-Hammond et al., 2017; Mora-Ruano et al., 2019; Vangrieken et al., 2015); yet, this best practice intended to provide meaningful results permeating into instructional classroom techniques has not been, according to Vangrieken et al. (2015), a smooth and consistent task. Focus group collaboration in the educational realm involves a cluster of educators working towards a common goal in finding solutions to a specific task (Cravens et al., 2017; Misra et al., 2017). The team objective of this collaborative approach is to promote a collegial environment in which the group imparts and builds on shared ideas in accomplishing a task or a higher goal that an individual cannot undertake as a stand-alone professional practice (Mohan et al., 2017; Vangrieken et al., 2015; Vrikki et al., 2017). When teachers exchange work experiences through conversations with colleagues, teacher knowledge increases during this reflective action (Mohan et al., 2017; Postholm, 2018; Yuan & Zhang, 2016). The challenge with this collaborative practice is that it is not easily sustainable (Postholm, 2018) because, according to Vangrieken et al. (2015), barriers such as mistrust, participation, resistance, miscommunication, absence of explicit team goals and individual roles, lack of commitment, and insufficient time adds to the perception of teacher collaboration to be meaningless.

According to researchers, contrived collegiality is a potential hindering factor that leads to apprehensive feelings towards professional collaboration resulting in idle mindsets (Canonigo, 2016; Vangrieken et al., 2015). Darling-Hammond et al. (2017) argued that to impact the student achievement gap, productive actions, time-consuming efforts, and rigorous routine practices that are concentrated on helping students succeed are necessary. Darling-Hammond et al. explained that high-quality teachers are the invaluable outcomes of authentic professional learning fostered

through deep-level collaborative groups committed to becoming action-oriented problem-solvers. Similarly, Mora-Ruano et al. (2019) and Vangrieken et al. (2015) claimed that when teacher collaboration flourished, student performance positively correlated with this professional growth. Hence, overcoming or preventing obstacles to focus group collaboration is critical, because there is an imperative need to improve teaching mathematics. In particular, low proficiency math scores in the United States (US) has been a perpetual dilemma, and there is a demand to find a solution (NCES, 2015; NCES, 2017; NCES, 2019; OECD, 2016).

An alternative aspect to consider is the news of US employers who acknowledged that workers lack problem-solving and social skills (Abadzi, 2016). The difference between the supply of people who acquire or can generate specific skills needed for employment and the absence of individuals who possess these skills is referred to as the "skills gap" (Christo-Baker et al., 2017, p. 10). Christo-Baker et al. (2017) highlighted that collaboration, critical thinking, and communication skills are distinctive indicators of workers who can persevere in a perpetually changing global environment. Nevertheless, discussions during collaborative working groups cannot fully serve as an antidote to achieve educational goals; constant quality effort, meaningful planning, and focused actions are also essential to progressing forward (Darling-Hammond et al., 2017; Mohan et al., 2017; Postholm, 2018; Vangrieken et al., 2015; Yuan & Zhang, 2016), such factors are present in lesson study.

The theoretical framework that supports lesson study derives from New London Group's (1996) design concept, Pedagogy of Multiliteracies. The purpose of this literature review is to understand the collaborative lesson study process aligned with PMAP elements to improve teacher quality and how this process builds authentic professional and continuous learning, transforms teachers into active researchers, and to utilize this approach for assessment purposes

to track student learning. Empirical evidence from other countries also supports this valuable professional development approach to cultivate content knowledge and pedagogical practices that promote active student learning. The concept of lesson study is fairly straightforward, however, this method is, by nature, very complex because the process demands participant commitment, trust, teamwork, and the willingness to take risks and experience setbacks (Canonigo, 2016; Collet, 2019; Fujii, 2016; Shingphachanh, 2018; Takahashi & McDougal, 2016).

Theoretical Framework: Pedagogy of Multiliteracies

Transformed Practice, stemming from the New London Group's (1996) Pedagogy of Multiliteracies Framework, consists of three designs of meaning components that frame this qualitative study: Available Designs, Designing, and The Redesigned. According to Hattie et al. (2017), the transformation of learning does not happen automatically, nor is the process instantaneous. Collaborative activities must have a clear, meaningful purpose so that learning is internalized when the process of engagement is activated (Hattie et al., 2017). The New London Group's (1996) concept of transformed practice results from constructive learning and productivity.

Available Designs

Available Designs are the resources accessible for meaning (New London Group, 1996). According to the New London Group, resources come in various forms consisting of meaning-making systems such as experiences, activities, materials, texts, and conversations constructed as design components. In reference to lesson study, the resources represented in Available Designs are used by the practicing designer (teacher) to design (create) something new, The Redesigned.

This continuous cycle of Designing is a transformative practice that helps teachers

become relevant to further learning, equipping them to understand and cope with the diverse backgrounds and experiences that 21st century learners bring to the classroom (Boche, 2014; Cope & Kalantzis, 2009; Garcia et al., 2018; Hong & Hua, 2020; Kalantzis et al., 2016; New London Group, 1996). According to Hong and Hua (2020), teachers need to continuously improve their knowledge to design educational activities that engage students in applying critical thinking skills. Furthermore, the designer needs to know the subject matter content before imparting knowledge to students (Hong & Hua, 2020; Kalantzis et al., 2016). For example, teachers lacking digital literacy skills will need to learn these skillsets to teach students how to use these platforms and address learning needs (Hong & Hua, 2020).

Lesson study embraces changes made in which trial and failure are expected so that the lesson study team can learn from the encounters and plan accordingly (Collet, 2019; Fujii, 2016; Hanford, 2015; Yuan & Zhang, 2016). Teacher quality in instructional delivery may be developed during collaborations through focused discussions on analyzing student thinking and reasoning. When teachers are given opportunities to practice identifying student learning needs, they can reflect on their teaching and make improvements (Chauraya & Brodie, 2018; Cope & Kalantzis, 2009; Kalantzis et al., 2016). Researchers emphasized that lesson study is not about creating and observing an impeccable team lesson plan (Collet, 2019; Takahashi & McDougal, 2016). Rather, they claimed that lesson study is about collaboratively discovering solutions to a focused problem which comes from creating a joint lesson product and anticipating adjustments to suit the needs of a diverse group of students (Collet, 2109; Hanford, 2015; Takahashi & McDougal, 2016).

Designing

Designing is the action taken by the designer in utilizing available resources to produce

meaning (New London Group, 1996). The New London Group (1996) claimed that teachers are designers of learning. Teachers are transformation agents tasked to design authentic learning experiences to prepare students with skillsets suitable to be civic-life ready in our global society (Boche, 2014; Kalantzis et al., 2016).

Leander and Boldt (2012) described a painter using colors as a metaphor to illustrate the meaning of designs. To explain, Available Designs represent a variety of distinct colors. A color combined with another color metamorphoses into a different color. When colors are juxtaposed, the possibilities of creating contemporary blends are endless (Leander & Boldt, 2012). In lesson study, teachers can collaboratively juxtapose Available Designs and visualize innovative designs to Redesign. According to the New London Group (1996), the designer selectively chooses from Available Designs to achieve intentional outcomes.

The Redesigned

The Redesigned is the creation of an Available Design constructed, not emulated, as a *new* design (New London Group, 1996). The designs created must have a purpose, a specific function (Boche, 2014; Cope & Kalantzis, 2009; Kalantzis et al., 2016). Through active participation, the new design and designers are transformed in the process (Cope & Kalantzis, 2009; Kalantzis et al., 2016; New London Group, 1996). According to the researchers, this transformation movement constructs new learning.

Transformed practice is embedded throughout the whole lesson study process because goal setting, team planning, participatory public lessons, post-lesson discussions, and reflections continuously evolve. The New London Group (1996) asserted that "the outcome of Designing is a new meaning, something through which meaning-makers remake themselves" (p. 76). Thus, the moment designing takes place, transformation happens, and through perpetual operations,

this iterative cycle regenerates (Cope & Kalantzis, 2009; Kalantzis et al., 2016; New London Group, 1996).

The Collaborative Lesson Study Process

The lesson study method has been utilized in Japan for over a century and has been shown to sustain highly effective teachers that produce positive student outcomes in this country (Huang & Shimizu, 2016; Lewis & Perry, 2017; Regan et al., 2016; Takahashi & McDougal, 2016). Lesson study is a form of professional development distinctive from the traditional method of professional learning practiced in the US (Fujii, 2016; Hall, 2014; Lewis & Perry, 2017; Mokhele, 2017). For example, the traditional professional development in most US school systems involves a top-down decision-making approach whereby teachers sit in a meeting or workshop session for a predetermined amount of time, typically for a couple of hours (Trust et al., 2016). During this period, teachers are expected to listen to a presenter on a given topic and become passive learners (Trust et al., 2016). This type of professional development lacks depth (Trust et al., 2016) and a methodical process to transfer professional learning into operational tactics that can be used in daily classroom routines (Bocala, 2015). In contrast, lesson study is a teacher-led, job-embedded, systematic process organized by a small group team or teams composed of at least three members in each group (Akiba & Wilkinson, 2016; Collet, 2019; Kanellopoulou & Darra, 2018; Takahashi & McDougal, 2016; Wake et al., 2016; Warwick et al., 2016).

The objective of lesson study is for the team to focus on identifying a prevalent area of weakness, set learning goals, and work collaboratively towards developing appropriate solutions to impact learning gaps (Fujii, 2016; Lewis et al., 2019; Takahashi & McDougal, 2016). When utilized in a systematic approach, the lesson study method enabled teachers to examine and

discuss data from evidence gathered during the live team observations (Collet, 2019; Takahashi & McDougal, 2016). The teachers' collaborative experiences provided opportunities to test, examine, and improve the effectiveness of the group's joint research lessons, which boosted teacher self-efficacy and presented them with opportunities to improve their practice (Collet, 2019; Lewis et al., 2019; Takahashi & McDougal, 2016).

According to Collet (2019) and Takahashi and McDougal (2016), the essential purpose of the lesson study approach was not to present a flawless lesson plan; instead, the lesson study approach was designed to help teachers acquire new insights and approaches that improved their instruction and increased students' critical thinking skills in math (Akiba & Wilkinson, 2016; Huang & Shimizu, 2016). Once a lesson study cycle is completed, the process is repeated with a new goal. One cycle of an authentic lesson study takes a few weeks to complete because ample time is needed for the team to plan, research, execute a consensus lesson, observe, analyze, collaborate, revise, and reflect (Collet, 2019; Fujii, 2016).

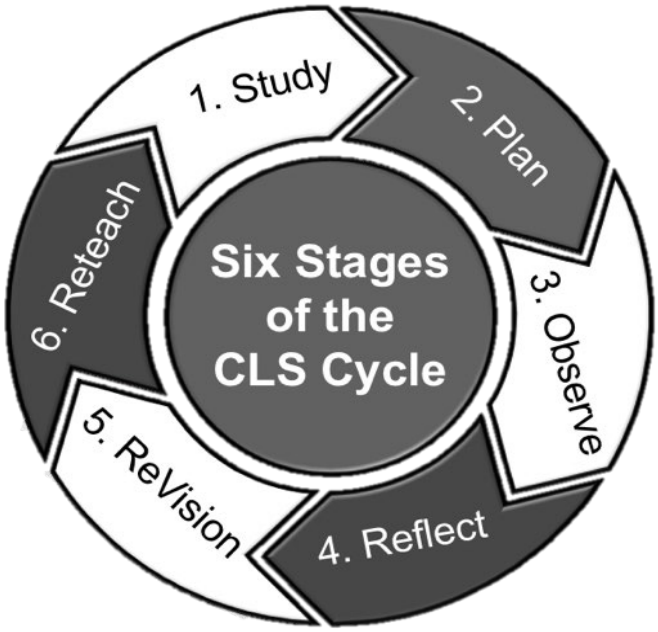
Some educators have claimed that a lesson study cycle could be accomplished within less than a week (Gero, 2015). In contrast, educators that have successfully implemented lesson study oppose this assertion, arguing that the method should not be a swift process (Collet, 2019; Fujii, 2016; Takahashi & McDougal, 2016). Intentionally targeting one lesson and delving deeper into the subject matter content is lesson study's notion of cultivating teachers' professional practice in a meaningful and productive way (Collet, 2019; Lewis et al., 2019; Takahashi & McDougal, 2016). Couros (2015) noted that concentrating on less is essentially doing more because "having a laser-like focus on a few things allows us to go deep and push our thinking, while creating new ideas to move forward" (p. 165). According to Darling-Hammond et al. (2017), sustained professional development focused on one concept fosters more profound transformational effects

on the quality of teaching and student outcomes. Furthermore, the substance of self-confidence in implementing innovative, collaborative practices is a product of teacher learning (Darling-Hammond et al., 2017).

Although there are various adaptations of lesson study (Barber, 2018; Gero, 2015; Huang & Shimizu, 2016; Regan et al., 2016), Collet (2019) affirmed that the core elements consist of goal setting, research lesson planning, real-time observations of lesson, post-lesson discussion, and reflection. Takahashi and McDougal (2016) strongly emphasized that live team observations should not be substituted with video recordings which could compromise the authenticity of the lesson study process. The collaborative lesson study process (Figure 3) used for this study is based on Collet's (2019) adaptation. Collet's adaptation of lesson study allows teachers to improve the team's initial collective lesson through the revision phase. Additionally, Collet's reteaching period is another essential part of the collaborative process that separates this model from other versions of lesson study. This method does not focus on observing the volunteer teacher but instead watching students engaging in the team's planned activity. Furthermore, Collet's revision and reteaching phases make this lesson study adaptation unique to this investigation because having two public lesson experiences within the cycle doubles the contribution of having rich and meaningful team dialogs focused on a common topic. Simultaneously, doubling the direct experiences may sharpen teachers' keen observation skills through job-embedded training. The whole process of the lesson study cycle is not rushed and uses time to facilitate the growth of collaborative learning (Collet, 2019).

Figure 3

Collaborative Lesson Study Process (Collet, 2019, p. 5).



Stage One: Study

The team first needs to decide on a focus of study. Studying the educational needs of students by analyzing work samples, assessment data, or reviewing the curriculum materials supports the formation of critical questions that help teachers determine a focus of study (Collet, 2019; Fujii, 2016; Kanellopoulou & Darra, 2018; Lewis et al., 2019). Collective ideas garnered from available resources such as curriculum guides, professional literature, and any information that can be utilized to benefit what will work in the classroom should be considered (Collet, 2019). The focus of the lesson is not to come up with something original, creative, or to create the perfect plan. The intent of the study phase is to brainstorm ideas collaboratively, research, problem-solve, and act on what methods may work best for a teacher's current students (Collet, 2019; Takahashi & McDougal, 2016). When the focus of study is determined, goal setting is the next planning step that moves through an inquiry process (Fujii, 2016).

During goal setting, teachers investigate a question that examines an instructional approach with consideration for grade-level standards and the current state of students' performance (Fujii, 2016; Lewis et al., 2019). Essentially, the lesson study group operates as a planning team tasked to first focus on a skill of greatest need and then set attainable goals. Fujii clarified that the focus or theme of the research lesson centers around an identified question or essential questions developed to address mathematical gaps and students' long-term goals that will inform the planning of next steps. Couros (2015) supported this claim and declared, "school should not be a place where answers go to die, but questions come to life" (p. 188). An enriched school environment sets the tone to spark inquisitive thinking for both teachers and students (Darling-Hammond et al., 2017).

Collaborative lesson study Stage One is in alignment with PMAP Element 1: Mastering Content and Curriculum, which specifies that teachers should design and implement lessons and instructional strategies that are developmentally appropriate and conducive to student learning. Furthermore, PMAP Element 1 stipulates that learning goals and activities provide engaging opportunities for students to exercise higher-order thinking skills (DCPAS, 2016).

Stage Two: Plan

Once the lesson study team sets the goals, lesson planning commences as the participants bring their ideas together to develop a detailed plan that aligns with specific content standards (Collet, 2019; Fujii, 2016; Kanellopoulou & Darra, 2018). As a preliminary step, effective teachers translate their curriculum standards into simple student friendly terms that are easily understood by the learners (Hattie et al., 2017). Since the lesson planning stage was the focus of Fujii's (2016) investigation, lesson planning meetings were observed by the researcher; transcribed field notes were documented and used as data. Fujii recounted that collaborative

discussions on how smoothly the procedure of the lesson research plan will flow consumed many hours of research preparation.

According to Barber (2018), teachers exploring curriculum materials and research articles related to a targeted goal generated collective knowledge amongst the team. These experiences gave participants opportunities to elaborate or explain, ask questions, and reflect on open conversations. Fujii (2016) also noted that there was no practice trial of the instructional activity performed; before the approved team lesson is implemented in the classroom, the teacher does not practice teaching the lesson with students or participants beforehand. Rather, during the lesson planning stage, solutions to problems of practice are predicted (Collet, 2019; Fujii, 2016; Kanellopoulou & Darra, 2018; Lewis & Perry, 2017). In doing so, teachers collaboratively prepared to help guide students in incorporating critical thinking solutions for mathematical tasks (Barber, 2018; Takahashi & McDougal, 2016).

According to Yuan and Zhang (2016), teachers have to cultivate their craft of collaboratively working together to enhance their listening, communication, and reflection skills. The end goal of honing these collaborative learning skills is to work towards innovative solutions (Collet, 2019; Yuan & Zhang, 2016). Collet (2019) suggested that implementing approaches that allow students to make their thinking explicit would support the lesson study team during the next stage: the observation phase.

Collaborative lesson study Stage Two is in alignment with PMAP Element 2: Instructional Planning and Strategies, which specifies that teachers should utilize effective instructional strategies and best practices to support student learning. Furthermore, PMAP Element 2 stipulates that teachers should utilize research-based instructional approaches to develop authentic student learning appropriate to subject matter content (DCPAS, 2016).

Stage Three: Observe

After the planning phase is completed, the lesson study team moves on to the observation stage of the collaborative lesson study process. According to Collet (2019), the observation stage is where collaborative lesson planning action is publicly put into practice. The heart of lesson study is during the field-testing period, during which the team's research lesson comes to fruition in the classroom (Collet, 2019; Fujii, 2016). During this phase, the volunteer teacher implements the lesson while the team members gather data by conducting real-time observations focused on student learning, engagement, and thinking (Barber, 2018; Collet, 2019; Fujii, 2016; Lomibao, 2016; Takahashi & McDougal, 2016). The lesson study team's observation data is strictly focused on the students rather than the teacher (Collet, 2019; Fujii, 2016; Takahashi & McDougal, 2016). The public lesson activity encourages students to develop higher-order thinking skills, activate mathematical discourse, and promote a stimulating learning atmosphere; students have opportunities to analyze problem-solving approaches and activate metacognitive abilities during rigorous mathematical activities (Akiba & Wilkinson, 2016; Lewis et al., 2019; Lomibao, 2016).

Collaborative lesson study Stage Three is in alignment with PMAP Element 3: Managing for Effective Learning, which specifies that teachers should maintain a healthy classroom environment that promotes positive student behavior. Furthermore, PMAP Element 3 stipulates that teachers should maximize the use of materials and resources by collaborating with colleagues, support specialists, and members of the professional learning community as appropriate (DCPAS, 2016).

Stage Four: Reflect

The reflection stage contributes to rich discussions when the team gathers to examine

observation notes and share evidence of student thinking demonstrated during the public lesson. The lesson study team will evaluate the effectiveness of the planned lesson as they reflect on what the students were doing, saying, and writing during the observation phase (Collet, 2019). Lomibao (2016) acknowledged that sharing recorded reflections about student outcomes from the team's lesson in action and the research that supported the activity contributed to meaningful knowledge. This essential feature of lesson study prompted additional collaborative planning by participants examining other ways to improve the math task based on student responses (Barber, 2018; Fujii, 2016; Kanellopoulou & Darra, 2018; Lewis et al., 2019).

Stage Five: ReVision

During the ReVision stage, teachers evaluate data gathered through the observation phase and explore ways to alter or improve the team's focused study lesson. Collet (2019) noted that "the combination of knowing and doing creates powerful learning" (p. 59). According to Collet, tweaking the lesson during the ReVision phase expands the team's instructional views, because the process allows for adjustments to be made from collective insights, making learning for both teachers and students more purposeful. Although the team's lesson is not commonly retaught when conducting a lesson study cycle in Japan (Fujii, 2016; Zhang, 2015), advantages to conducting this step include gaining more authentic experiences into identifying methods that are successful and taking note of ineffective practices (Collet, 2019; Kanellopoulou & Darra, 2018).

Collaborative lesson study Stage Four and Stage Five are in alignment with PMAP Element 4: Monitoring and Assessing Student Achievement, which specifies that teachers should use data from a variety of tools to evaluate, monitor, improve, and guide future instruction. Furthermore, PMAP Element 4 stipulates that teachers should check for student understanding and assess learning progress (DCPAS, 2016).

Stage Six: Reteach

The final step of the collaborative lesson study process is the reteach stage. The refined lesson is taught by another member of the lesson study team with a different group of students. The lesson study team repeats the observation procedure to gather more information to spark additional discourse on new or repeated findings (Collet, 2019). Collet described the reteach phase as a reinvention, because the exact lesson is never repeated the same way but reconstructed explicitly for the focused grade-level classroom. Collet added, "By valuing students' culture – their values, beliefs, and attitudes – you are also supporting a teaching culture that has positive values about your own role as a professional" (p. 48). Lesson study provides teachers with opportunities to use their professional voices to advocate for meeting student needs (Collet, 2019). The methodology section has a visual display that illustrates how the Pedagogy of Multiliteracies Framework design concept (New London Group, 1996) aligns with and supports collaborative lesson study.

Collaborative lesson study Stage Six is in alignment with PMAP Element 5: Promoting Diversity and Equity, which specifies that teachers should develop positive relationships with diverse learners (DCPAS, 2016). Furthermore, Collet contended that the reteach stage provides additional opportunities for teachers to share, collaborate, and reflect on practices that support educational equity.

Building Authentic Professional Learning

By building a professional learning environment through collaborative groups, colleagues can share decision-making strategies, ideas, and experiences that promote student learning (Kim et al., 2017; Lewis et al., 2019; Mora-Ruano et al., 2019). However, a challenge that may arise from teachers working together is superficial collaboration (Yuan & Zhang, 2016). Yuan and

Zhang described superficial collaborative practices as teachers not having an in-depth discussion on lesson objectives, materials, and activities. Despite this assertion, according to Barber (2018) and Mokhele (2017), lesson study is highly influential in advancing professional growth amongst teachers, and they recommend this approach to improve student performance. Furthermore, Gero (2015) acknowledged that teacher-led collaboration promoted teacher autonomy, resulting in meaningful participation.

Mokhele (2017) performed a qualitative case study design and used face-to-face semi-structured interviews to collect data for the lesson study research. The ten teachers selected for this study had recently completed training on the lesson study model. The researcher acknowledged that the teachers were interviewed in person several times throughout the study. The findings indicated that teachers found the lesson study method to be very informative, useful, and practical, because it was teacher-led and the collaborative sessions were intentionally authentic. Mokhele (2017) found lesson study to be a highly recommended approach to enhance teaching practices and content knowledge in mathematics that impacted student success.

Mokhele's (2017) research findings supported Takahashi and McDougal's (2016) claim that lesson study is a significant source of professional learning development for educators because opportunities to exchange ideas and share perspectives are exercised within the process. Moreover, Barber (2018) purported that lesson study gave teachers opportunities to explore, analyze, and solve students' mathematical tasks, which led to teachers' understanding and anticipating student solutions. Exploration of curriculum materials and a variety of resources promoted rich discussions, leading to purposefully selected meaningful student activities (Barber, 2018). This methodical approach influenced how teachers would design their lessons (Fujii, 2016). Unlike content-focused professional development programs, lesson study is job-

embedded and also gives teachers opportunities to concentrate on observing student engagement and understanding student responses (Lewis et al., 2019) rather than unproductive energy spent on monitoring the teacher (Gero, 2015).

Barber (2018), Lomibao (2016), and Mora-Ruano et al. (2019) affirmed that a correlation existed between teachers' instructional practices and student achievement in mathematics. Lomibao (2016) clarified that teacher knowledge increased when the teachers planned their lessons together. Targeted planning aligned to standards gave students opportunities to engage in meaningful learning that contributed to students exercising their cognitive abilities into practice (Glatthom et al., 2016). Xu and Shi (2018) asserted that teachers and students become benefactors in taking on the role of engaged participants because the construction of knowledge produces quality learning. When teacher learning advanced, there was a common effect; student learning accelerated (Akiba & Liang, 2016; Hattie et al., 2017; Mora-Ruano et al., 2019).

Gero (2015) conducted a quantitative study investigating teachers' attitudes towards improving the quality of teaching using the lesson study approach. Fifty-five elementary teachers representing two urban schools in California participated in a survey of teacher attitudes. The results of Gero's investigation confirmed that implementing lesson study increased teacher knowledge, pedagogical content knowledge, and curriculum knowledge. The lesson study approach positively impacted teacher learning because the process involved intensive collaborative discussions in promoting ways to actively engage students in problem-solving solutions to math problems (Warwick et al., 2016). Additionally, lesson study affords teachers the opportunity to become researchers and put new or collective knowledge into action (Hall, 2014).

Teachers as Researchers

Current research keeps educators up to date with innovative best practices and teaching strategies (Joram et al., 2019; Serdyukov, 2017). Similarly, accomplishing research activates the learning process (Barber, 2018; Fulmer et al., 2018). When teachers become active researchers during focus group sessions and decide on suitable strategies designed to meet the needs of students, they can venture into new learning and develop confidence when applying new instructional methods or techniques (Darling-Hammond et al., 2017; Fulmer et al., 2018; Hall, 2014). Likewise, through the lesson study process, teachers have the capability to emulate research practitioners because the job requires inquiry action in exploring and implementing developmentally appropriate best practices in response to unique student learning needs (Gutierez, 2019). Involvement in participatory research is a salient component of lesson study that provides opportunities to develop a culture of professional collaboration and improve the quality of mathematics instruction (Mokhele, 2017). According to Canonigo (2016), Hall (2014), and Vrikki et al. (2017), lesson study is designed to include collaborative team discussions deliberately infusing meaningful research-based solutions and exploration of curriculum content; by applying this practice knowledge, presented teachers with opportunities to openly share any classroom issues, struggles, or triumphs in a safe environment.

Fujii (2016) and Hall (2014) proclaimed that lesson study can serve as a remedy to teachers working in isolation. Lesson study can bridge the gap between research and practice, because teachers will be engaged in meaningful research to discover intentional instructional methods and maximize student learning outcomes. Moreover, developing a culture of shared intelligence and professional working relationships is critical to harnessing the power of collective knowledge that collaborative research can unleash (Darling-Hammond et al., 2017;

Hall, 2014).

Practicing educational research could be viewed as an additional task in teachers' workload (Joram et al., 2019; Mon et al., 2016); however, Bocala (2015) and Hall (2014) countered that the positive outcomes of lesson study (e.g., deepening of subject content knowledge, developing valuable insights about student reasoning, etc.) make this extra work worthwhile. As educators performed collaborative research, having multiple perspectives provided focus and contributed to new questions and added viewpoints (Fujii, 2016; Gutierez, 2019; Hall, 2014).

According to Nimkulrat et al. (2015), researching one's professional field enhances knowledge. The researchers clarified that through the continued application of deliberate practice or performance, transferring knowledge to others is considered as having expertise in a specific domain. When teachers exercised the course of researching to find effective methods and strategies, content knowledge and pedagogy practices increased (Fulmer et al., 2018; Gutierez, 2019; Lewis et al., 2019; Takahashi & McDougal, 2016). Expertise is shaped through the continual application of research and practice (Fulmer et al., 2018; Lewis et al., 2019; Nimkulrat et al., 2015; Vrikki et al., 2017).

As teachers' research skills developed through active participation and collaborative investigations using lesson study, teachers became more secure and knowledgeable about the content (Fulmer et al., 2018; Gutierez, 2019; Hall, 2014; Takahashi & McDougal, 2016). Other researchers acknowledged that when teachers' learning increased, quality instruction transferred to the students (Gutierez, 2019; Mora-Ruano et al., 2019; Shuilleabhain, 2016; Vangrieken et al., 2015). Additionally, Jones (2017) and Yuan and Zhang (2016) asserted that teacher collaboration increased awareness and professional learning through shared diverse perspectives and

knowledge. Furthermore, teacher collaboration thrived in a supportive school environment where administration and school leaders encouraged relationship-building and community engagement (Fulmer et al., 2018; Gutierez, 2019; Ostovar-Nameghi & Sheikhahmadi, 2016; Trust et al., 2016; Yuan & Zhang, 2016).

Lesson Study for Assessment Purposes to Impact Student Learning

Using lesson study for assessment purposes is a shared responsibility for team members. The student needs become a spotlight of discussions when teachers are given opportunities through lesson study to research-proven methods and actively implement these strategies in the classroom (Collet, 2019; Halem et al., 2016; Hall, 2014). During the team interactive discourse sessions, lesson plans are used as communicative resources to pinpoint areas of weaknesses and plan solutions (Collet, 2019; Fujii, 2016). Through the lesson study process, focused collaboration with colleagues generates assessment possibilities for a diverse community of students (Collet, 2019; Halem et al., 2016; Kanellopoulou & Darra, 2018; Regan et al., 2016). By closely observing, teachers become more aware of students' cultural backgrounds and their ways of thinking during the Observation Stage (Collet, 2019). Collet advised that teachers need to design instruction that promotes cultural responsiveness, awareness that students possess unique identities, communication methods, and ways of doing.

The purpose of assessment is to identify student performance at school and to enhance teaching practices to promote high-quality education for all students (Holcomb, 2017). Assessments are an ongoing process (Morrison, 2015). Additionally, the significance of collecting data is to identify the educational needs of students, provide information about the quality of instruction given, and assist in formulating an improvement plan in required areas (Collet, 2019; Kanellopoulou & Darra, 2018; Mon et al., 2016). When conducted routinely and

utilized with purpose, assessments add value to the progress monitoring of learners (Morrison, 2015).

Observations are a powerful tool when utilized for assessment purposes. Warwick et al. (2016) performed mixed-methods research that consisted of math teachers practicing lesson study in 22 elementary and secondary schools in London. In the second year of this study, participation increased to 56 schools. The researchers gathered qualitative data using video-recorded meetings during the planning and discussion phases piloted in each school. Other data collected for this study was using three separate surveys given to the teachers during the lesson study project. The purpose of the investigations was to evaluate teacher learning. The initial intent of this study was to concentrate on the growth of teacher knowledge.

Ironically, the findings of Warwick et al.'s (2016) study later revealed that focusing on student outcomes empowered teachers to use collaborative analysis to focus on addressing student weaknesses. The team's professional dialogue was identified in the study as a need for teachers to improve to develop a culture of shared understanding to enrich future pedagogy and student performance. Results of the study indicated that critical reflective discussions on student engagement and learning led to expanded teacher knowledge and pedagogical practices (Lewis et al., 2019; Warwick et al., 2016).

In contrast to Warwick et al.'s (2016) research that initially focused on studying teacher learning, Ermeling and Graff-Ermeling (2014) and Lewis and Perry (2017) argued that there is a shift in the teachers' mindsets and instructional foci when the lesson study process is implemented. Instead of concentrating on content learning, student learning is the center of observations and discourse as teachers tailor their instructions to student needs (Ermeling & Graff-Ermeling, 2014; Lewis & Perry, 2017). While student learning outcomes become the

primary focus, pedagogical practices naturally flourish. Lacireno-Paquet et al. (2014) concluded that student learning outcomes identify what students will know and will be able to demonstrate upon completion of tasks assigned. Collet (2019) asserted that data about students' knowledge provides resources for teachers to prepare planning and take action to create meaningful learning.

Lesson study is a valuable method to be used for assessment purposes because participants are actively gathering data to evaluate student engagement, learning, and thought processes during the public observations in preparation for the post-lesson session. During the post-lesson stage, student work samples also become a topic of discussion because these tangible performance tasks provide evidence of understanding and effectiveness of instructional strategies (Saran, 2018). Furthermore, Saran explained that work samples indicate students' misconceptions and areas of struggle that contribute to mistakes. By analyzing student work samples, an educator's professional dialogue through collaborative meetings can support the development of cognitive instructional methods or processes suitable to meet the educational needs of each learner (Collet, 2019; Fujii, 2016; Lewis et al., 2019; Saran, 2018; Warwick et al., 2016). Fujii (2016) observed that teachers examined how to elevate student thinking during the post-lesson stage when comparing peer solutions. This element of the process added rigor to future planned activities as teachers discussed ways to increase the level of mathematical tasks (Fujii, 2016; Saran, 2018).

Multiple Research Evidence Supporting Lesson Study in Other Countries

Holcomb (2017) contended that regularly seeing evidence involving the rise of student achievement will positively affect those who were at first resistant to participating in new initiatives. Furthermore, Holcomb stated that "ongoing data collection, analysis, and use, especially when done in teams, provide stakeholders with information that sustains momentum

and informs continuous improvement" (p. 17). Lesson study presents teachers with opportunities to self-analyze teaching methods and to seek improvements individually and as a collaborative team (Saran, 2018). According to Darling-Hammond (2017), improving teacher quality results in teacher effectiveness and this area of focus has been a top priority in many countries because it is connected to student achievement. Darling-Hammond contended that collective improvement of practice such as using the lesson study method led to meaningful practices because the approach generated better lesson designs, productive collaboration, and opportunities to learn from a diverse culture that impacted the quality of instructional procedures. Multiple research evidence supports that lesson study has been successful in many other countries such as the Philippines, Greece, South Africa, Iran, and United States. Examining well-developed systems of practices is vital because "… they broaden the view of what is possible… international comparisons show how ideas work in practice at the system level" (Darling-Hammond, 2017, p. 291). Empirical research results from various geographical locations described in this literature review substantiate that lesson study may be a worthwhile tool for improving the learning environment and serves as a benchmark for this study's findings.

Philippines

In the Philippines, research by Lomibao (2016) was conducted to determine the impact of lesson study by incorporating the Southeast Asia Regional Standards for Math Teachers (SEARS-MT) dimension teacher attributes to improve the quality of math instruction. According to Lomibao (2016), lesson planning prepared in isolation was the traditional method of teachers. Five high school mathematics teachers with various teaching experiences, ranging from less than five years up to twenty plus years, participated in this study. A mixed-methods research design was used to gather quantitative and qualitative data. The qualitative data analyzed teachers'

perspectives on using the lesson study method, and the quantitative data examined the impact of lesson study on educators. The researcher utilized a paired *t*-test, survey questionnaire, and interviews to triangulate the data.

According to Lomibao (2016), the research findings reported that the lesson study process made the participants more conscious of choosing future rigorous lessons that helped the students acquire mastery of math content and to integrate more cognitive thinking activities. Furthermore, collaborative comments and feedback helped the teachers expand their pedagogy and subject knowledge in math. The teachers agreed that working together collaboratively produced better designs and thus, improved student outcomes (Lomibao, 2016).

Greece

In Greece, accomplished research by Kanellopoulou and Darra (2018) examined teachers' perceptions, attitudes, and experiences in lesson study. A mixed-methods design was utilized to collect data through a survey, meeting calendars, and transcripts of group sessions and teachings to account for data triangulation. The participants were four literature teachers, the Director, and thirty-one students in the Secondary Education School. The researchers reported that a professional learning spirit evolved due to the influence of lesson study and a generation of positive experiences. According to the survey, teacher participants unanimously agreed there was a better understanding of the lesson study process.

Additionally, Kanellopoulou and Darra's (2018) qualitative findings noted that the value of working together produced a culture of learning for both teachers and students. The researchers explained that the lesson study process was highly influential in contributing to informed pedagogical decisions that helped students exercise higher-order cognitive thinking abilities. Moreover, the researchers emphasized that the teachers found successful parts of the

lesson, pinpointed areas of change needed, and noted interventions for student support (Kanellopoulou & Darra, 2018).

According to Kanellopoulou and Darra (2018), initial teacher discussions centered around the students' challenges through misunderstanding of concepts or the learning process. These discussions assisted teachers' goal planning in correspondence with the student's cognitive abilities and learning needs. Teachers mentioned that observing the students' way of thinking and engagement was an essential learning experience. The researchers also reported that lesson study's success depended on the team's commitment, effort, and discipline to follow detailed planning protocols with fidelity. Effective designs using appropriate resources helped teachers make better decisions. As a result of the lesson study process, the original research lesson proceeded through a revision phase, and an improved version became the final product (Kanellopoulou & Darra, 2018).

Iran

In Iran, Arani (2015) conducted a study focused on mathematics lesson using cross-cultural analysis. Through this study, collected data was brought to Japan to initiate a cross-cultural analysis that examined the Iranian mathematics lesson by 36 Japanese educators in efforts to redesign mathematics, develop the quality of pedagogy, and enhance students' academic success in Iran. Arani (2015) operated a qualitative case study research method to implement an Iranian mathematics lesson in which participants included sixteen fourth-grade students, the Principal, fourteen teachers, and the researcher. Japanese educators provided input about how an Iranian mathematics lesson was taught in comparison to the lesson study framework (Arani, 2015).

According to study findings, post-lesson discussions were geared towards student

learning, engagement, and thought processes. However, the Japanese team brought to light that Iranian mathematics lessons focused on the teacher's instructional practices. The report revealed that Iranian teachers spent more time having students find the right answer to math solutions rather than understanding the problem or mathematical concepts. The researcher concurred that expanding collaboration of transnational learning provided a new approach to professional development. This study offered Iranian teachers the opportunity to learn from the perspectives of another culture and to enrich current teaching methods by using the lesson study framework.

United States

In the United States, a qualitative research study by Barber (2018) was conducted to investigate the professional development of three teachers' mathematical-task knowledge using the lesson study process. Data were gathered and analyzed from semi-structured interviews, observations, and field notes. The study findings identified important features of lesson study that transformed their instructional practices.

According to Barber (2018), teacher instructions changed due to a growth mindset shift and rigor was added to students' cognitive level of mathematical tasks. For example, one of the participants in the study shared an instructional adjustment they implemented as a result of their work in the lesson study; they began asking the students more questions to help them make their thinking more explicit. Additional improvements to teacher instructions included intentional selection of specific mathematical tasks and anticipation of student strategies to encourage rich mathematical discourse (Barber, 2018).

Summary

Teacher collaboration through lesson study prevents isolated professional practice, focusing on subject-specific team dialoguing to grasp content and expand knowledge of how to

teach content effectively to students (Mokhele, 2017; Shuilleabhain, 2016; Takahashi & McDougal, 2016). Trend data in national assessments revealed that the United States has generated low math scores and is not one of the top-performing countries in mathematics (Mullis et al., 2016; OECD, 2012; OECD 2016; OECD 2019). In aspiring to revamp the quality of math instruction in the US, lesson study is considered as a viable means to transform the traditional professional development framework to advance student performance outcomes (Fujii, 2016; Lewis & Perry, 2017).

The Pedagogy of Multiliteracies Framework (New London Group, 1996) design concept is evident in the collaborative practices of lesson study that impact teacher learning and the quality of instruction. Lesson study allows teachers to seek Available Designs and take action (Design) in doing meaningful research to create developmentally appropriate tasks (The Redesigned). This collaborative process provides teachers autonomy to develop practical lessons aligned to standards and promote a united workforce. Researchers argued that teachers generate collective analysis, taking ownership of analyzing plans or data as a group when the lesson study team works together to design the group's collaborative lesson (Bocala, 2015; Hall, 2014; Vrikki et al., 2017). The acquisition of skills and knowledge through participatory research requires the immersion of professional practice (Nimkulrat et al., 2015). Furthermore, lesson study permitted teachers to engage in collaborative discussions with long-term goals in mind, learn the subject matter, study the students in action, and build collegial relationships to establish a professional learning environment aimed at closing mathematical gaps and meeting the needs of the students (Takahashi & McDougal, 2016).

The purpose of conducting and reporting empirical research on lesson study is to assist in helping teachers understand this process. Furthermore, relevant information on lesson study's

potential impact in improving instructional practices in teaching mathematics will assist in boosting student performance (Collet, 2019; Fujii, 2016). Teachers gain an increased understanding of pedagogical approaches through the lesson study approach that leads to improved student achievement; furthermore, deliberate planning of subject matter content provides students with meaningful learning experiences, contributing to their development of skills, concepts, and productive thinking (Collet, 2019; Glatthom et al., 2016).

Teacher learning remains a prevalent challenge. This current study will add to the body of knowledge by informing professional educators that lesson study coupled with teacher performance evaluation elements serves as a practical means for enhancing teaching quality and professional development. Having a larger sample of participants and covering a more extensive geographic scope provides more opportunities for comparative analysis. More research is needed to verify the impact of the lesson study process concerning pedagogical practices, content knowledge, and teachers as researchers in action to investigate a deeper understanding of teacher learning. Continued research on lesson study is recommended to keep findings up to date.

According to Gero (2015), though lesson study has some strong elements used in other countries, not all countries implementing lesson study have been prosperous because this method requires commitment, dedication, and perseverance from all stakeholders to survive. Fujii (2016) and Shingphachanh (2018) cautioned that for lesson study to be successful, teachers and administrators must be steadfast and willing to put dedicated efforts to support the implementation of the stages or risk the integrity of the whole process. Nevertheless, to ensure successful implementation of lesson study and reap the benefits of this method, administration and teacher leaders must be fully engaged throughout the entire lesson study process (Hall, 2014; Takahashi & McDougal, 2016; Warwick et al., 2016). Also, leadership roles should be

established before the start of lesson study so that teachers are aware of clear expectations; furthermore, documenting evidence of reflective discourse to track collaborative observations and progress will help ensure that the lesson study process is executed with fidelity (Hall, 2014; Warwick et al., 2016).

Evidence from multiple research studies on lesson study is organized in a concept analysis chart that provides information on the study, purpose, participants, design, analysis, and outcomes (Table 1). Having the full support of all stakeholders involved may enhance quality teaching practices, elevate student performance, and create a professional learning environment for 21st century learners (Arani, 2015; Barber, 2018; Fujii, 2016; Gero, 2015; Kanellopoulou & Darra, 2018; Lomibao, 2016; Mokhele, 2018; Warwick et al., 2016). Despite the numerous hours and level of grit required to implement and sustain lesson study, the benefits outweigh the time commitment. Whenever time is invested for educational purposes that impact teacher and student learning, nothing is wasted.

Table 1

Lesson Study Concept Analysis

STUDY	PURPOSE	PARTICIPANTS	DESIGN/ ANALYSIS	OUTCOMES
Arani (2015)	Analyze an Iranian mathematics lesson using cross-cultural analysis	Sixteen fourth-grade students, the Principal, fourteen teachers, and Arani	Qualitative: Case study Collected data was brought to Japan to initiate a cross-cultural analysis that examined the Iranian mathematics lesson by 36 Japanese educators in	Iranian teachers learned from the perspectives of another culture and enriched current teaching methods by using the lesson study framework

			efforts to redesign mathematics, develop the quality of pedagogy, and enhance students' academic success in Iran	
Barber (2018)	Investigating teacher learning using lesson study to enhance teachers' mathematical-task knowledge	Three teachers located in New York, USA	Qualitative: Analyzed before and after semi-structured interviews, observations, and collected field notes	Identified important features of lesson study that enhanced professional development in mathematics. Teacher instructions changed due to a mindset shift and rigor was added to students' level of mathematical tasks.
Fujii (2016)	Investigating the lesson study process	Three Japanese public schools using the lesson study framework process in Tokyo	Qualitative: Case study Analyzed observation field notes, transcriptions of video-recorded meetings, and lesson plans.	Two findings: Meetings followed the lesson plan structure Found that two-thirds of time spent collaborating focused on the flow of the lesson
Gero (2015)	Investigating	55 elementary	Quantitative:	Confirmed that

	teachers' attitudes towards improving the quality of teaching using the lesson study approach	teachers representing two urban schools in California	Survey of teacher attitudes	teacher buy-in, building relationships, a collegial atmosphere, implementing and sharing of best practices were some of the benefits attributed through prosperous implementation of lesson study Confirmed that implementing lesson study increased teacher knowledge, pedagogical content, and curriculum knowledge
Kanellopoulou & Darra (2018)	To examine teachers' perceptions, attitudes, and experiences in lesson study	Four literature teachers, the Director, and thirty-one students in the Secondary Education School located in Greece	Mixed-Methods Quantitative: Survey Qualitative: Transcripts of lesson study meetings and teachings Meeting calendars	Findings revealed that the teachers unanimously agreed there was a better understanding gained of the lesson study process and the value of working together produced a culture of learning for both teachers and students

				The lesson study process was highly effective in contributing to informed pedagogical decisions that helped students exercise higher-order cognitive thinking abilities
Lomibao (2016)	To infuse the SEARS-MT dimensions attributes with lesson study and determine the impact of teacher quality	Five high-school mathematics teachers teaching grade 10	Mixed-Methods Analyzed observation field notes, transcriptions of video-recorded meetings, and lesson plans. Quantitative: Survey questionnaire Paired *t*-test Qualitative: Interviews The qualitative data analyzed teachers' perspectives on using the lesson study method, and the quantitative data	Findings reported that the lesson study process made the participants more conscious of choosing future rigorous lessons that helped the students acquire mastery of math content and to exercise more cognitive thinking activities Helped the teachers broaden their pedagogy and subject knowledge in math

			examined the substantial impact of lesson study on educators	
Mokhele (2018)	To investigate teacher perspectives on using lesson study to develop their professional practice	Ten teachers who participated in an instructional leadership lesson study project One math teacher	Qualitative: Face to face interviews and follow-up telephone interviews Case study	Findings pointed out that teachers found the lesson study method to be very informative, useful, and practical because the approach was teacher-led, and the collaborative sessions were intentionally authentic
Warwick et al. (2016)	Examined lesson study's dialogic mechanisms that prompted teacher pedagogy outcomes to improve and influence student learning	Math teachers practicing lesson study in 22 elementary and secondary schools in London during the first year. In the second year, participation increased to 56 schools	Mixed methods Quantitative: Data analysis of video-recorded discussions and three separate surveys Qualitative: Transcriptions of videos using open coding process	Initial purpose of the investigations was to evaluate teacher learning however, the study later revealed that focusing on student outcomes empowered teachers to use collaborative analysis to focus on addressing student weaknesses. Results of the study indicated

	that critical reflective discussions on student engagement and learning led to expanded teacher knowledge and pedagogical practices.

Chapter III: Methodology

Professional collaboration is an intervention intended to enhance the quality of instructional delivery for students to gain optimal knowledge and understanding. Mandated professional collaborations are intended to create a learning environment of continuous adaptation whereby any issues or needs are addressed; however, this practice has historically been negatively perceived by some educators as not meaningful or relevant to their professional learning (Mokhele, 2017). Dissatisfied teachers are following the guidelines of focused collaboration with superficial intentions and low expectations. This approach hinders the efforts towards increasing the current low math scores in the US and breeds a hostile collaborative culture. A widely known effective model that generates innovative conversations amongst teachers and shifts perspectives to bridge theory and practice is lesson study. Proactive teachers are developed through the six stages of lesson study to have a mindset of grade-level unity that consciously advances effective lesson plans to promote student outcomes. The purpose of this qualitative study was to understand the attitudes and perceptions of elementary educators practicing lesson study and its influence on their professional practice.

Research Design

A qualitative case study design was selected for this current research. The phenomena under study are the kindergarten collaboration team of teachers' experiences implementing lesson study and how this method may have influenced their perceptions of the quality of their instructional practices. Triangulation was achieved through the use of multiple data sources described in the instrumentation section of this chapter. The objective of assembling data was to examine the facts, make connections that supported my research investigation, and report the findings in an organized manner so that readers may understand the significance of this empirical

investigation and potentially be inspired to apply lesson study in their own schools.

Setting

Data were collected in an elementary school setting in the southeastern United States that service over 300 military-connected students. At this location, Eagle Pride Elementary (pseudonym), there are approximately 20 teachers plus additional support staff who service students in pre-kindergarten through fifth grade. The students and teachers are currently engaged in a traditional in-person instructional learning environment.

Participants

As a current elementary teacher in the southeastern United States serving military-connected students, I had a desire to conduct this research study at my school with my grade level. COVID-19 impacts resulted in my school agency moving teachers to fill in-person vacant teaching positions and to accommodate medically sensitive teachers by placing them in virtual teaching vacancies. This realignment of staff allocations changed the course of typical school operations from stable to unstable. My preliminary grade level participants for this study were directly impacted by the shifting of staff resulting in them being unwilling to participate because they had plans to move to another school, and could not commit to voluntarily participating in this study. Paramount to my research success needs was having a group of highly energetic, reliable, and stable group of educators who were willing to voluntarily participate. Upon reflection, I concluded that the kindergarten collaboration team and supporting specialist teachers were the only group to meet the aforementioned criteria and therefore, were selected as the participant group.

For participants to make a quality, informed decision, I provided them with detailed information about the lesson study process and the role expectations prior to commencement.

The participants were fully aware that voluntary participation may cease at any time. All participant names, school, and district were given pseudonyms during data collection, data analysis, and throughout the entire study to protect anonymity. Participants were given a paper copy of the informed consent forms and these documents were also delivered via email. The participants signed the consent forms, indicating their interest and giving their consent to participate. All six participants committed and completed this research study.

The all-female kindergarten collaboration team was experienced in conducting focused group sessions but had no prior experience with lesson study. Due to COVID-19, the teachers gained the technical skills to teach students in a virtual setting and built good working relationships. This background information is noteworthy because some of our collaboration sessions were conducted online, and this experience gave the participants the familiarity to collaborate virtually when the need or request surfaced during the study. Five out of six participants worked at the study site for at least four or more years. Their history together formulated strong elements of a healthy team dynamic. Being familiar with one another allowed open communication, comfortability in assigning roles and responsibilities, and encouraged empowerment. These factors may have influenced the study's outcome since positive working relationships, the freedom to take risks, and the autonomy to make co-planned activities may have determined how meaningful lesson study was for both teachers and students.

Sapphire is a participant that has been teaching for seventeen years. She is a kindergarten teacher and has been teaching at Eagle Pride Elementary for four years. This participant holds a master's degree in educational leadership. Her past teaching experiences include teaching first and second grades. Sapphire has been an educational coach and a reading interventionist.

Betty is a participant that has been teaching for seventeen years in the primary grade

levels. She is a kindergarten teacher and has been teaching at Eagle Pride Elementary for five years. Her teaching experiences include teaching grade levels from fourth to sixth. The participant holds a master's degree in elementary education and certification as a media specialist.

Karen is a participant that has been teaching for twenty-one years in the primary grade levels. She is a kindergarten teacher and has been teaching at Eagle Pride Elementary for two years. Karen holds a master's degree in special education and is a certified school counselor.

Yolanda is a participant who is currently the information media specialist and has maintained this position for eight years at the same location, Eagle Pride Elementary. Before becoming the information media specialist, she was a second-grade teacher for twelve years. This participant holds a master's degree in elementary education.

Evelyn is a participant that has been teaching for eighteen years. She is currently the technology specialist and has previously taught elementary art for over five years at Eagle Pride Elementary. The participant holds a master's degree in elementary art education and is a certified technology specialist.

Kat is a participant who has a bachelor's degree in special education and has been teaching for thirty years. She is a resource special education teacher and has been teaching at Eagle Pride Elementary for seven years. Kat holds a master's degree in instructional technology and also holds a certification in behavioral disorders.

Instrumentation

For this research, I utilized researcher field notes, an observation template, a focus group reflection of observations form, and individual and focus group interviews. These tools allowed for the collection of objective and subjective data through in person or virtual platforms by the

primary researcher. The researcher is considered a primary instrumental tool to gather, interpret, and analyze data (Creswell & Poth, 2018; Saldana, 2016).

I took field notes as I observed the participants and reflected on my own experience during the progression of each stage of the lesson study process, which is explained in further detail later in this chapter. The field notes consisted of descriptive information that included observable actions and conversations during focus group sessions. The entries documented what the reflections mean to me and to what extent the group followed the lesson study procedures. Furthermore, I recorded my thoughts, questions, or ideas related to my research investigation. Field notes were documented during or immediately after each meeting, including the date and time of the journal entries.

Participants used the observation template (Appendix C) to record specific observations from the co-planned lesson. They took notes of student learning and examined the students' cognitive processes when engaged in the collaboratively planned math task. Participants brought their completed observation template to the following collaboration meeting. During this scheduled team discussion, the designated scribe used the Focus Group Reflection of Observations Form (Appendix D) to record what participants shared about their collective findings on what was seen, heard, and perceived to be important. Simultaneously, the joint conversations during this reflective phase were audio recorded, transcribed, and gathered for data preparation for document analysis.

Semi-structured individual and focus group interviews with protocols (Appendices E and F) are critical tools for gathering feedback. The steps that I have taken to develop reliable interview protocols align with Castillo-Montoya's (2016) Interview Protocol Refinement (IPR) model to enhance quality data findings. The model guided me to formulate intentional protocol

questions that connect to my research investigation. Inquiry-based dialogue is incorporated in the probing questions to seek further details or insights into new information.

To ensure feasibility and replicability of the interview approach, I conducted a pilot interview with peers and volunteers for soliciting their feedback using the protocols in a similar virtual setting. According to McGrath et al. (2019), peers or volunteers can be used to test interview questions in helping the researcher develop active listening skills, clarify questions, and explore language that invites open conversations. After receiving feedback, I made adjustments to align protocols with the research question and also changed some of the wordings to make the sentences clearer. This technique was imperative to rehearse due to the newly practiced virtual etiquette for video conferences.

Procedures

Preparation

After acquiring university IRB approval, I obtained agency approval. Next, I presented participants with a lesson study overview and explained the data collection process, as well as informed them of their privacy rights as participants, which are further described in this section. Once all stakeholders granted permission and consent, I proceeded with my research study and collected data.

The lesson study process begins with the lesson study team determining a subject of interest. For this study, the selected participants were asked to focus on math. Participants were given the option to attend training in person or online via Microsoft Teams. I trained the participants and provided them with PowerPoint presentations containing information from Collet's (2019) adaptive version of lesson study. Furthermore, I gave the participants any additional information or resources related to this research.

As part of this interactive training, participants developed observation skills and practiced taking notes as specified in the observation template (Appendix C) when watching online videos of teachers executing a lesson study plan in the classroom. According to Collet (2019), Lee (2015), and Lewis et al. (2019), training the eyes to see with explicit objectives is a hallmark of lesson study. Participant training is a prerequisite to Stage 1 of the lesson study cycle and is included in the total duration of this research. This training took approximately two weeks.

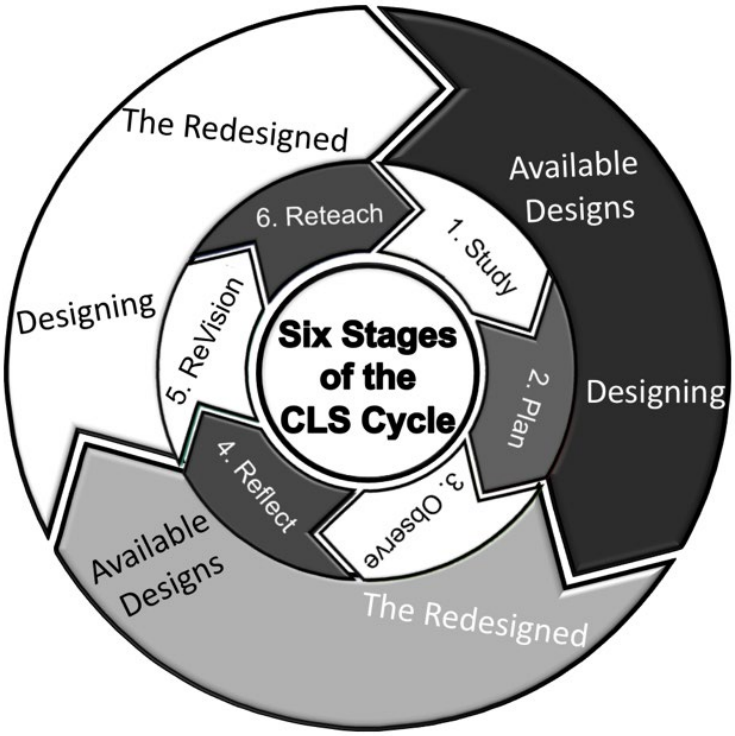
Theoretical Framework Tied to Collaborative Lesson Study Cycle's Six Stages

The Pedagogy of Multiliteracies Framework (New London Group, 1996) designs of meaning concept parallels with the lesson study stages as shown in Figure 4 and is the theoretical framework used to benchmark the meaningfulness of lesson study. The participants addressed every element of this theoretical framework as they completed the six stages of lesson study. The first element, Available Designs, included accessible resources that were identified by the participants to meet their focus of study. This element provided the opportunity for the participants to provoke exploration of materials and resources. This action enhanced the participants working together to find and study available materials and resources (e.g., multiplicity of discourses, documented collaborations, previous lesson plans, past or current research, nonmaterial Available Designs, etc.) and verified that their focused task aligns with the school agency's standards. The initial occurrence of Available Designs is synonymous with lesson study Stage 1: Study

The second element, Designing, is where the identified available materials and resources were used by the participants to plan student learning experiences. This is synonymous with

Figure 4

Collaborative Lesson Study Cycle (Collet, 2019)



Framed Within Pedagogy of Multiliteracies Framework (New London Group, 1996).

what the participants were instructed to do in lesson study Stage 2: Plan. The Redesigned, the third element, is the customized lesson product made from collaborative planning, in which the participants developed an effective instructional plan. In lesson study Stage 3: Observe, the participants increased their knowledge through observation to adjust instructional strategies based on student performance.

The Pedagogy of Multiliteracies Framework (New London Group, 1996) designs of meaning concept repeats as the lesson study cycle continues to the next stage. As The Redesigned becomes another's accessible resource (New London Group), this theoretical process was repeated to complete one lesson study cycle (Figure 4). The second occurrence of Available

Designs aligns with lesson study Stage 4: Reflect, in which the participants reflected on their takeaways from observations. The following element, Designing, is repeating the method of transforming the materials and resources, which occurred in Stage 5: ReVision for the second iteration of the customized lesson plan. Afterward, the final Redesigned element reintroduces the new customized lesson product - in this case, the second iteration of the customized lesson plan and the teachers who may have evolved from the transformative learning. Stage 6: Reteach is putting the second iteration into practice. In addition to the instruments assigned to a particular section in this study, the researcher's field notes, defined earlier in this chapter, were utilized throughout the entire lesson study cycle. I used my field notes as foundational groundwork for deeper data analysis.

Six Stages of the Collaborative Lesson Study Cycle

The Researcher's Role. My role as the researcher was to provide training for the participants on the collaborative lesson study process in person or via Microsoft Teams. I provided the participants with resources containing information about the lesson study stages. As part of this interactive training, participants developed observation skills and practiced taking notes when watching online videos of teachers executing a lesson study plan in the classroom. After completing the training, I became a participant-observer with a selective approach as the discussion facilitator led the lesson study stages. I kept close contact with the discussion facilitator via text, email, and virtual meetings to help prepare agendas when needed. I attended the collaborations to address any clarifying questions asked by the group and was an active resource; however, all decision-making plans were made by the participating teachers who serviced and were familiar with the educational needs of their kindergarten students.

Once lesson study training and implementation of lesson study commenced, I took field

notes throughout the course of this research study to gather observation data of the implementation process. I used field notes to investigate any influences that practicing lesson study had towards the quality of instructional math practices. With participants' consent, I digitally audio recorded collaborative sessions to ensure the accuracy of my notes. Additionally, the audio recordings were transcribed using the automatic transcription features in the digital recording tools. I also reviewed the transcriptions to check for accuracy. Participants received transcriptions of the audio recordings for the opportunity to make any modifications.

Transcriptions from all audio recordings were utilized for data after being member-checked by the participants. Using the participants' vetted transcriptions, I used these data to manually code the text to identify and build categories that connected to my research questions. Data were used for this current study and will not be used for future research projects.

Microsoft Teams sessions are encrypted and adhere to security standards. Only invited participants and I were given authorized access to enter the virtual platform. I had exclusive access to audio recordings. Pseudonyms were used to safeguard participants' identities. The participants' names and the name of the participants' education agency were not used for any presentations or publications.

Team Roles & Responsibilities. The team established focus group roles and determined who was the discussion facilitator, scribe, and timekeeper (Appendix B). These conventional positions are a standard education agency procedure. The principle behind assigning group roles is to keep meetings on track and efficiently use time more. Once the lesson study team established their positions during the implementation of lesson study, they kept the same role throughout the lesson study cycle. An objective to focus group collaboration is to plan agendas and responsibilities to target specific actions for the next steps. The discussion facilitator sets the

agenda, promotes dialogue, and helps keep the group on task. In addition, this person also guided conversations and monitored discussions to ensure opportunities for everyone to participate. I kept close contact with the discussion facilitator to help prepare agendas, if needed, and answered any clarifying questions regarding the implementation of lesson study stages. The scribe was tasked to record accurate comments and ideas from the other participants. The scribe documented the process by taking notes using the team's standard method throughout the cycle, but once the team reached Stage 4: Reflect, the scribe typed minutes on the Focus Group Reflection of Observations Form (Appendix D) using Google Docs for this stage only. The lesson study team had access to view the notes, add, or make any changes to the minutes at any point in time. These minutes were also projected on the digital board during collaboration. Before the meeting adjourned, the scribe confirmed any decisions or follow-up responsibilities with the lesson study team. At the start of each session, the timekeeper reviewed team norms. The timekeeper tracked time and assisted the discussion facilitator in pushing the topic of conversation according to the agenda. Team norms were established after participant roles were identified.

Launch Stage 1: Study. The disciplinary focus for the lesson study was on math. The participants looked at student assessment data and discussed past practices to help decide on math skills that needed development. Participants then studied the standards, curriculum materials, resources, and researched on the focus topic. The participants collaboratively fused ideas. The participants explored an area of math instruction that they wanted to improve based on students' needs. Before the end of each meeting, the lesson study team decided on action or discussion items for the next collaboration.

Stage 1 includes lesson study training and implementing the initial study stage. The

duration to complete Stage 1 was approximately 45 minutes each session that occurred twice a week, for three weeks; the total duration was approximately 270 minutes in total or 90 minutes each week for three weeks. The participants set the time and location to hold the meetings.

Launch Stage 2: Plan. Using available resources, the participants collaboratively designed a customized research lesson that included a title and a brief description of the activity, goals, standards, and procedures. The participants discussed the flow of instruction and predicted student solutions. To collectively prepare participants for the next stage, the lesson study team created observation guidelines and followed this agreement with fidelity. An example of team observation guidelines consisted of not talking to the teacher, observers, or students. The duration to complete Stage 2 was approximately 45 minutes each session that occurred twice a week, for two weeks; the total duration was approximately 180 minutes or 90 minutes each week for two weeks.

Launch Stage 3: Observe. The participants decided who was the first volunteer teacher to implement the customized lesson plan. The participants planned a convenient date and time to conduct the observation phase. Educational aides or substitute teachers were scheduled in advance to cover the kindergarten classes during a 45-minute math block. Each participant used an observation template (Appendix C) to jot down what was seen, heard, and why the observations were relevant. The participants' mission was to focus on students' thinking and learning, rather than the teacher. The duration to complete Stage 3 was approximately 45 minutes.

Launch Stage 4: Reflect. During Stage 4: Reflect, the participants discussed their observations. The scribe used the Focus Group Reflection of Observations Form (Appendix D) to consolidate their learning. The volunteer teacher was invited to speak first about experiences,

feelings, and thoughts on implementing the customized lesson plan; participants used this information to become more effective instructors and for future planning. The duration to complete Stage 4 was approximately 45 minutes each session that occurred twice a week, for one week; the total duration was approximately 90 minutes.

Launch Stage 5: ReVision. In Stage 5: ReVision, the participants examined their joint lesson plan to make improvements. Discussions focused on what worked, what did not work and action taken to tweak the original lesson. The duration to complete Stage 5 was approximately 45 minutes each session that occurred twice a week, for one week; the total duration is approximately 90 minutes.

Launch Stage 6: Reteach. The procedures for Stage 3: Observe and Stage 4: Reflect were repeated with the second iteration of the customized lesson plan. During Stage 6: Reteach, the team roles and responsibilities remained in effect. A different volunteer participant taught the revised lesson plan with a different set of students. The duration to complete Stage 6 was approximately two weeks with approximately 45 minutes for repeating Stage 3 and 90 minutes for repeating Stage 4.

Implementation of the Lesson Study Focus Group Process: Participants in Action

Described in this section was the participants' implementation of the lesson study focus group process. As the six participants proceeded with the lesson study process, they were sitting spread apart throughout the designated classroom during focused group sessions. Two audio recorders were located at the center of the area and with participants' consent, the digital tools were turned on once the meetings started. There were three delegated focused group roles: facilitator, time keeper, and scribe. In addition to these roles, the participants decided to assign substitute roles for each other in case a member had an unexpected absence. For example, Mary

volunteered to take over Evelyn's role if she was not going to be present.

The designated facilitator, Yolanda, greeted the lesson study team at the beginning of each session. Next, the focus group session routines that followed were team norms read aloud by the timekeeper or facilitator. Then the previous minutes were read aloud by the scribe. Finally, Yolanda would read aloud highlights of the agenda and after, the floor was open to anyone who had any inquiries or comments. This process was the participants' lesson study session routine before discussing agenda items in greater detail. Before the timekeeper announced the end of each session, the scribe documented agreed upon action steps in the minutes.

Yolanda also volunteered to be the first teacher to implement the collaboratively designed lesson. Evelyn volunteered to be the scribe. Karen volunteered to be the time keeper. Betty was the second volunteer teacher to implement the collaboratively designed revised lesson. Mary and Sapphire were on stand-by to assist with anything the team needed or to be in a substitute focused group role position.

The participants chose to meet in person if they were at school during the scheduled session dates. However, if a participant was not at school during a scheduled meeting, the participant would request in advance to join the session online via Microsoft Teams. Occasionally, one or two participants would join a session virtually. For the most part, participants joined the sessions in person. There was one stipulation that the participants strongly agreed to and that was to meet face to face during the two observation days. The participants agreed to not conduct any virtual student observations because they felt that the lesson study team had to be physically in the same room together.

To make sure the time allotted for the lesson study weekly requirements of this

investigation was fulfilled, participants also extended after school sessions if there was a need. Meeting after school meant that participants had to willingly give up their personal time. All the participants understood that participation was voluntary and that each participant had the freedom to opt out of this study at any time. Despite this foreknowledge, all the participants consented to accomplishing the lesson study cycle.

Within the structure of this study's methodology, the participants discovered areas of emphasis to improve upon from last year's end of the year kindergarten summative math data. After deliberating, they decided to focus on creating a team lesson that supported the kindergarten math standard KOA.4: Making ten from a given number. Next, the participants spent time looking through the GoMath curriculum, pacing guide calendar, and agency teacher resources website (Schoology) for information and to generate ideas. After looking through and discussing the available resources, the participants planned their lesson.

While planning the collaboratively designed lesson, the participants reflected on the lesson study training videos and noticed that math was taught in reverse to what they were used to teaching. The participants decided to plan their lesson using this type of teaching technique. Using the reverse model (You Do, We Do, I Do), the collaboratively designed lesson consisted of students first showing what they know after a brief teacher introduction. Then the teacher would provide whole group instruction and finally, individual students would do independent work by themselves. The reverse model gave students opportunity for productive struggle. All the participants had continuous back and forth discussions to ensure everyone agreed to the steps detailed in the written lesson procedures. To help guide collaborative conversations during the planning stage, the participants discussed what they wanted the students to know, understand, and be able to do as a result of the lesson. For students who were struggling to understand the

math concept, the volunteer teacher formed a small group with them to provide tailored instruction.

After designing and gathering materials, the participants decided to conduct a mock trial of the lesson to make sure the timing of activities was adequate, to analyze, and to adjust design flow of instructions. In the mock lesson, five participants role played as the students. Yolanda, designated as the first volunteer teacher, requested to redo her mock practice after the initial performance because she wanted to be confident in the design flow of the lesson.

Prior to the first observation day, the participants developed observation protocols. After observing the collaboratively designed lesson, the participants consolidated their observations and reflected on evidence of student engagement and learning behaviors. They also discussed what did not go as planned and what improvements or solutions were needed when planning the revised lesson.

Once the revised lesson was accomplished, the next step was for the next volunteer teacher, Betty, to conduct a mock lesson. Conducting the mock lesson gave the participants opportunities to refine and improve instructions. The participants then scheduled a time to debrief and reflect on collective observations and discuss the significance of visual evidence gathered during implementation of the collaboratively designed lesson. Finally, semi-structured individual interviews were accomplished and after, a focus group interview was then conducted by me, the researcher.

Post Lesson Study Data Collection: Individual and Focus Group Interviews

After completing the lesson study cycle, I set a date and time with all six of the participants to conduct semi-structured individual and focus group interviews in person or virtually via Microsoft Teams. The semi-structured individual interviews were conducted first.

Next, the six participants attended the focus group interview together on a scheduled date. According to McGrath et al. (2019), semi-structured interviews allow the researcher to probe for exploration concerning deeper issues. Participants decided on a comfortable place of meeting that is private and free from potential interruptions. There were two digital audio devices to ensure proper recordings, and the interview location had a reliable internet connection to minimize disruptions. I began and ended the individual and focus group interviews by thanking the participants for their effort, time, and candid responses. The length of time needed to complete each interview did not exceed 30 minutes. I informed participants that audio transcriptions would be given to them to double-check for accuracy, provide additional input, and make any needed changes if necessary. I requested participants to return any modified transcriptions within a week.

I reminded participants that this is a voluntary qualitative study, and withdrawal from continuing with the interview would be granted at any point. They were also reminded that pseudonyms would be used to mask personal identities to help protect their privacy. I informed participants that all access to electronic data would be password protected and stored in my personal computer at home. Any written data collected were locked in a cabinet in my home office to which I have exclusive access. Three years after completing the study, all data will be destroyed. Cross-cut shredding will be used to expunge transcription or physical documents. Any electronic data will be destroyed through appropriate data deletion methods (Secure Erase) so that data retrieval cannot be restored or recovered.

I reminded each participant that written consent must be signed before interviews were conducted. Since there were no objections, audio recordings commenced. For the individual interviews, the semi-structured individual interview protocol (Appendix E) was used to ask each

participant to reflect upon lesson study and how the stages aligned to the teacher performance management appraisal program (PMAP). The interview questions centered on participants' attitudes and perceptions of lesson study and to what extent, if any, they felt this method impacted the quality of instructional practices.

Afterward, the lesson study team decided on the date and time to participate in the focus group interview, which was conducted in the same room where collaboration was held. Since there were no objections, audio recordings commenced. I used the semi-structured focus group interview protocol (Appendix F) to investigate about self-reported findings of the participants' collective experiences in practicing lesson study. According to McGrath et al. (2019), investigators prefer transcribing their interviews or reviewing interview transcriptions verbatim even though the process is time-consuming because they get a sense of becoming familiar with the data.

Data Analysis

The data analysis approach for this study followed Williams and Moser's (2019) three-step inductive coding process, which consisted of open coding, axial coding, and selective coding. I used this systematic coding process to extrapolate useful transcription data from the joint observation reflection discussions, semi-structured individual and focus group interviews. As I conducted the three levels of coding process to analyze data, I started with one set of transcriptions that included two pieces of joint observation reflection discussions after Stage 3: Observe and Stage 6: Reteach. The next set of data that I analyzed were the semi-structured individual interviews. Then, I analyzed the semi-structured focus group interview. My field notes intertwined with the transcription data as I interpreted the findings to explain the added value of my research inquiry.

Open codes, the first level of coding, generate general patterns (Williams & Moser, 2019). Using the participants' vetted transcriptions from joint observation reflection discussions, and semi-structured individual and focus group interviews, I manually coded the text line by line to identify and build categories that connected to my research questions. I looked at one set of transcriptions at a time and reviewed the documents several times to familiarize myself with the collected data.

While I read the transcripts, I jotted down any ideas or notes and annotated by highlighting, circling, and underlining key words or phrases, and then read the text again to repeat the review. I anticipated creating numerous codes from this initial coding phase. As I completed this coding process, I became submerged in the data and began to see patterns that surfaced frequently from the focus group discussions, joint observation reflections, and interviews.

Next, I conducted axial coding by taking the open codes derived from the single words or phrases and established themes within the categories (Williams & Moser, 2019). Axial coding is also referred to as emergent coding (Saldana, 2016). The created themes depended on the open codes that emerged from the pervasiveness of the conversations or responses gathered during data collection. Other trends developed during data analysis that did not pertain to the primary focus of the study but may have indicated indirect influences. In this case, these patterns were shared in the discussion section of the report.

The last coding procedure is selective coding. This iterative process of recoding and refining codes helped me analyze how the themes from axial coding are related or not related, and possible significant interactions with each other. Williams and Moser's (2019) three-step inductive coding process was repeated for each dataset before moving on to the next. My

ultimate task was to find connections between the evolving patterns and common themes from my data and synthesize my findings towards an explanation to my research questions.

The field notes were analyzed through Saldana's (2016) holistic coding. Holistic coding allowed a general sense of possible categories that emerge from a chunk of data rather than line by line. The efficient macro-level coding compensated for the disadvantages of line by line coding. This approach benefited the bigger picture of overall trends when observing the participants in every lesson study stage. For example, possible detailed themes from field notes may not match themes from the interviews, however they all may fall under a similar major category. Having multiple perspectives of the datasets strengthened the findings due to the check and balance nature of overall versus detailed trends.

Summary

This qualitative case study research design supported the exploration of a professional development model intended to improve designing learning experiences, the delivery of instruction, and grade level collaborations. For this research, I captured participant feedback on perspectives and attitudes towards the lesson study method. The participants were assigned established roles and responsibilities, given information regarding their research privacy rights, and trained on the framework and stages to effectively execute lesson study. Data were assembled to examine the facts of the outcomes from a comprehensive viewpoint. The usefulness of a small sample size qualitative study allowed me to cultivate a thorough understanding of the phenomenon in greater depth from multidimensional perspectives (Yin, 2018). The study findings contributed valuable information for educators who desire to use the lesson study method to enhance professional practices as a more meaningful pathway for professional development.

Chapter IV: Findings

The intent of this qualitative case study, conducted in the Southeast region of the United States, was to determine if lesson study influenced a more meaningful collaborative approach during focused group sessions. Using New London Group's (1996) designs of meaning concept encapsulated in the Pedagogy of Multiliteracies Theoretical Framework to gauge the relevance of lesson study, I sought to explore a deeper understanding of the attitudes and perceptions of elementary educators practicing this method during focused collaboration. Pseudonyms were used to mask and protect the identities of educators and the school involved in this investigation. Reported in this chapter are the findings from qualitative measures that helped to examine the overarching research question:

> What were the attitudes and perceptions of elementary educators towards practicing lesson study and its influence on the quality of teaching?

In my endeavor to explain the overarching research question, the sub-questions that directed this study were as follows:

a) What were the teachers' initial and post impressions of a complete lesson study cycle, and the reasons for their impressions?
b) What were teachers' perspectives towards practicing lesson study and its influence on improving the focused collaboration process?
c) What were teachers' perspectives towards practicing lesson study and its influence on math instruction?

Participants

All of the six female participants hold higher level Master's degrees in the education

field. Each participant was certified in two or more teaching categories. The participants came from various geographic backgrounds and their elementary teaching experiences ranged from 17-30 years. All the participants were reminded that their contribution was on a voluntary basis. Each participant signed the informed consent forms prior to partaking in this investigation.

Findings

The findings in this section were organized using the research inquiries. Tables were presented to illustrate the codes and themes aligned to the research questions. The findings were structured around the emerging themes. Evidence to support findings transpired from the semi-structured individual interviews, focus group interview, and field notes.

Research Question 1.a: What were the teachers' initial and post impressions of a complete lesson study cycle, and the reasons for their impressions?

Two key themes emerged from the participants' initial impressions of lesson study. These themes were reservations and feelings of doing too much work with no added value. Two significant findings that emerged from participants' post impressions of lesson study were benefits of positive learning experiences and an enriched collaborative environment. Table 2 lists the selective codes and themes for research question 1.a.

Table 2

Research Question 1.a, Participants' Impressions, Codes, Themes Alignment

Research Question 1.a	Participants' Lesson Study Impressions	Codes	Emergent Themes
What were the teachers' initial and post impressions of a complete lesson study cycle, and the reasons for their impressions?	• Initial Impressions	• Feelings of uncertainties • Logistics • Teacher buy-in • Collaboration experience mundane routine • This is a lot just to observe kids	• Reservations • Too much work with no added value
	• Post Impressions	• Observing with fresh focus • Shifts in thinking • Strengthens working relationships • Diverse team • Positive Impacts	• Positive Learning Experiences • Enriched Collaborative Environment

Reservations. When first presented with information and an overview description of the lesson study stages, most of the participants had some reservations. While observing participants' conversations during the initial phase of lesson study, two discussion points that stood out were feelings of worry and finding solutions to meet everyone's work schedule. I noticed some participants looked a little distressed as they conversed about their preliminary thoughts and feelings. Five out of six participants' initial impressions of lesson study were feelings of uncertainty towards how this approach would impact the quality of their teaching or collaborative practices.

In contrast, the one participant, Evelyn, who had a confident feeling from the start about the collaborative benefits of lesson study, did have a concern during her individual interview over "logistics." She voiced, "How are we going to get all these people in the room at the same time when they all have classes to teach?" Evelyn also shared these same feelings during the first week of implementing lesson study.

Without anyone yet looking at their calendar and brainstorming ideas, I noticed that Evelyn and Karen were a bit apprehensive about how everyone could congregate in the same

room during the two lesson study observation days. Karen expressed during her individual interview, “How is that gonna work?... I wasn’t sure how that was going to look, especially with two different class makeups.”

Karen’s statement referred to the two kindergarten classes that were going to be used to complete the lesson study observation stages. Additionally, Evelyn was worried over teachers’ hurt feelings if the team was not able to work together. During Evelyn’s individual interview she stated, “I was a little worried that people might worry that we're being you know, really judgmental, and I didn't want anybody to like leave with hard feelings or anything like that.”

Too Much Work with No Added Value. Sapphire, similar to the other participants’ first impressions, did not quite fully understand the lesson study process and primarily viewed going through the lesson study cycle as, “a bit much.” In agreement during the focus group interview, Betty did not initially see any significance to this collaborative approach and stated, “This is a lot! I look at these kids and observe them every day. So, I thought this is a lot just to observe kids.”

Betty’s initial feeling was a lack of confidence in that the lesson study would make a difference in enhancing math instructions or focused group collaboration. She felt that the kindergarten students in this school year were different from the previous years and believed that the students’ academic skills are further below grade level expectations because of the recent COVID-19 pandemic. Betty stated during the lesson study session:

> We're in the middle of the COVID babies. The babies we have now, they were at home. They really didn't get pre-K… They're so babyish compared to what we used to have. They want you to do everything for them. They look at you to pick up something off the floor.

Karen also had similar initial impressions when she expressed that most of her students have not experienced productive struggles at home. During the lesson study session Karen exclaimed, “I’ve never seen anything like it!” Sapphire agreed as she explained, “The students do not take the initiative to do a task. They are very immature.” Sapphire expressed that during her first quarter parent conferences, many “… parents did confirm that they don’t allow their kids to struggle at home… This makes our job a lot harder when we’re trying to get them to understand certain skills and how to push through.”

Yolanda did not have any set expectations. Although a bit skeptical, she was hopeful that lesson study was going to help the team “learn more about the students, rather than just looking at a graded paper.” Kat’s experiences with focused collaboration in general, prior to lesson study, felt like a mundane routine in which she did not realize there could be more to collaboration. Kat described her past collaborative experiences as “teachers [getting] together [to] look at data and create goals and talk about student work.” Yolanda and Kat’s comments of their initial lesson study impressions were derived from the semi-structured individual interviews.

Although some participants had doubts, they were all interested in learning and anxious to implement the lesson study. During the focus group interview, Evelyn voiced, “I think that this process really supports the direction that the school agency is going with having people come in and coach.” I observed the participants nodding in agreement when Yolanda added, “I have a good positive feeling about lesson study and the reason why is because you get a chance to gain more knowledge about the kids and how they're working out the math problem.”

Despite the workload expectations that were explained during the lesson study training sessions and existing reservations, these feelings did not deter the participants’ decision to proceed with this process. Their presence indicated that they were interested in implementing

this collaborative method. All participants were willing to commit their time and were fully engaged throughout the six lesson study stages.

As I analyzed participants' post impressions, they all agreed that the lesson study was a meaningful method of focused collaboration. Benefits of positive learning experiences and an enriched collaborative environment were two key themes that emerged from participants' post-impressions of lesson study. The participants' positive learning experiences included observing students with a set of fresh eyes and shifts in thinking. The participants' enriched collaborative environment included the strengthening of working relationships, being part of a diverse team, and positive impacts on creating meaningful learning experiences for learners.

Positive Learning Experiences. The missing piece to a meaningful collaborative team lesson, according to Kat's post impression comment during the focus group interview, was the live group "observation." Kat noted that at the time, she did not see the benefits of observing students. However, the lesson study experience had shifted her ways of thinking and learning through observations.

With having opposite viewpoints from initial impressions, Sapphire described her involvement after completing the lesson study cycle as a fresh learning experience. With excitement, she explained during the semi-structured individual interview, "Now that I understand the process of everything and the fact that we've gone through all the steps, I really like it!" Sapphire's newfound outlook resulted in a belief that the school as a whole would benefit, all or at least some of the teachers who were also willing to try lesson study. Betty agreed that lesson study was an effective approach. She voiced that time would be an issue; however, she believed that lesson study was a more beneficial collaborative method than her current school mandate when she expressed the following:

> We could do this and it would be much more beneficial than all the forms that we're filling out. So that would be an easy fix. It would just be figuring out how to cover the classes, so the time is there. It would just be in place of you know, what we're doing.

All participants agreed that lesson study turned out to be a more meaningful collaborative approach and, according to Betty's individual interview response, "went deeper than I thought."

Enriched Learning Environment. Evelyn was optimistic about the possibility that the logistics in applying this method could be implemented at the school level if additional support and opportunity were present. All participants developed closer working relationships and were willing to share lesson study with others, as Yolanda expressed during her semi-structured individual interview:

> I haven't heard of this type of lesson study before. So, I have learned a lot from it. And I've gathered a lot of ideas from it. If there's a way for our school to actually do it, I would love to be a part of it. And I would be able to share information as to how we did it just because I was a part of this lesson study. So, I was glad. I mean, it did take some time, but it's worth it!

During the focus group interview, Evelyn, like the rest of the participants, credited having a safe, non-judgmental environment with colleagues as a "powerful experience" because the whole cycle of improvement is heightened when "people get together to investigate different solutions to a chosen problem, reflect, make tweaks, and try again." Evelyn was relieved that "the team overall kind of gelled together" and kept "the focus on the children and not like on personal things such as teaching style."

A contributing factor, as identified by the participants, leading to the success of lesson study was having a professionally diverse team. While the focus group interview was in session,

Betty proclaimed, “I think that really helped move it along.” Sapphire added that having a professionally diverse education team, that included not only grade level kindergarten teachers but special area educators, also “provided other insights.”

The participants also mentioned during the focus group interview that lesson study was beneficial due to the positive impacts in promoting an enriched collaborative environment because the group worked together to identify and strategically focus in on students who needed more help. Karen pointed out that she “found it was interesting to see the different types of learners that each class has” and mentioned that the group’s planned lesson contributed to a fruitful learning atmosphere. Evelyn stated:

> And I think it was so great to be able to have some of our colleagues come in, in this sort of non, non-judgmental way where they would come in and just kind of observe the children and give you that feedback where you could say, “You know, have you ever noticed that like little Johnny over here is like, you know, playing with pencils or something while you're talking?” I think that's really helpful because now you're going to be able to capture those children who otherwise would have fallen through the cracks.

While observing participants’ conversations after the completion of the lesson study cycle, I noticed that they were very appreciative of having this collaborative experience. All the participants nodded in agreement when Betty said, “We have an awesome lesson ready to use for next school year!” All the participants mentioned multiple times that lesson study was “beneficial” because of how it enriched them personally and professionally.

I was surprised that the participants were taking their own personal notes during the sessions even though they were aware that the scribe was taking minutes. There were moments of laughter, bursts of giggles, or smiles at every session whenever they reflected about their past

teaching or student experiences. I observed participants talking respectfully in a safe, relaxed collaborative environment and listened as they were very candid with their conversations. Although most of the participants were initially not fully convinced that the lesson study could contribute or add value to their professional development, all the participants bought into the advantages lesson study provided for their skill enhancements and were more confident with utilizing this collaborative approach after going through the process. At the end, all the participants felt they built better working relationships and utilized diverse inputs to formulate positive impacts through experiencing a meaningful collaborative environment.

Research Question 1.b: What were teachers' perspectives towards practicing lesson study and its influence on improving the focused collaboration process?

Three significant themes emerged from lesson study that resulted in improvements on the focused collaboration process: a new team dynamic, more time allotted for introspective analyses, and transformation of teacher learning. Table 3 provides the alignment of the theoretical framework and lesson study stages with research question 1.b and the selective codes and themes.

Table 3

Theoretical Framework, Lesson Study Stages, Research Question 1.b, Codes, Themes Alignment

Theoretical Framework	Lesson Study (LS) Stages	Research Question 1.b	Codes	Emergent Themes
Available Designs	LS Stages 1, 4	What were teachers' perspectives towards practicing lesson study and its influence on improving the focused collaboration process?	• Safe space • Camaraderie and cohesiveness	• New Team Dynamic
Designing	LS Stages 2, 5		• Positive experiences • Negative experiences	• Introspective Analyses
The Redesigned	LS Stages 3, 6		• Effective (what worked) • Ineffective (what did not work)	• Transformation of Teacher Learning

New Team Dynamic. All participants felt that lesson study created a new team dynamic by cultivating a "safe space" to build working relationships. All statements in this section that

composed the new team dynamic theme materialized from the semi-structured individual interviews. Evelyn commented that getting to know her colleagues better and at a more personal level contributed to her being open and honest in a non-threatening environment during the lesson study group discussions. Evelyn explained:

> And by shifting the focus away from the teacher, you're, you're making it less personal. And by making it less personal, I think that also builds the relationships because now you're saying, "Well, well, I'm just helping you help your kids." And I think that really helps with the working relationships. You know, we're, we're not evaluating each other. So, we're all on equal footing.

Yolanda felt that having a safe space influenced working relationships. Yolanda clarified:

> It built a really tight relationship because you have to feel comfortable teaching in front of other people. Even though we're not looking at the actual teacher, but we are in their space. We are watching everything that's happening. And I think when you teach in front of others, you could share what went well, what went wrong [which] builds relationships.

Betty noted that having other educators on the team besides her kindergarten grade level teachers gave her a new perspective. She explained, "It gave me a new view on them to see their thought processes and staying on task and working hard, and together, I think it brought us closer together." Sapphire agreed that working relationships changed perspectives because the lesson study process "allowed us to kind of see the other side of the person… and now, outside of all of this, I think we were talking a little more… so I think that kind of speaks volumes as to where our relationship is." Kat agreed that lesson study influenced working relationships because the process created an avenue to building "a lot of cohesiveness" amongst the lesson study team.

Introspective Analyses. A key theme emerging from the group's experiences in focused

collaboration was introspective analyses. All participants felt that introspective analyses on elements such as professional learning and intentional planning led to more detailed collaborative practices. During the focus group interview, Yolanda commented that lesson study allowed a variety of perspectives to contribute to a team lesson, gave impactful results from watching the lesson in real time, and made space to reflect on strengths and improvements needed to enhance instruction. Kat added, "We move away from just talking about [it] and we get really involved in what the students are, are able to do and [with] what they still need help." Evelyn explained:

> So, I definitely think that the lesson study process has a positive impact particularly on the lesson we were doing because it was clear we made mistakes the first time. We definitely made mistakes! And maybe that was actually contributing to some of the confusion for the children.

As Betty reflected on her experiences working as a group during the semi-structured individual interview, she concurred that going through the lesson study process altered paradigms in instructional practices because "it made me second guess or question some of the things I was doing just as a teacher." She explained:

> I mean, it made me look at the kids more and what they were doing more and I think I've kind of got away from that a little bit. I've been looking at data because we're so data driven. Data, data, data! I've been looking at number, number, numbers, and not actually the kids' work in what they were doing. So, it kind of brought me back to that mindset.

While responding to the questions asked during the semi-structured individual interview, Sapphire added that the lesson study experience gave teachers the opportunity to collaboratively plan an effective lesson. Sapphire said:

> But seeing what it should look like, I think that it does help because it allows you to have that time to really see if they understand and can they really explain because a lot of times, it's kind of fast paced. So, I think this allowed us to slow it down a little bit.

In agreement, Karen also noted during the focus group interview:

> I think it forces us to be more intentional with what we are contributing to the group as we plan. And then, you know, just making sure that we're meeting the needs of the students and bouncing off our ideas from each other.

Participants were asked during their semi-structured individual interviews if any negative experiences surfaced during the lesson study process. Half of the participants mentioned that they did not have any negative experiences working as a group. In contrast, three participants, Evelyn, Kat, and Betty, encountered negative experiences during the lesson study process. These negative experiences that transpired from working as a group were about logistics, outside influences, and time.

Evelyn conveyed that her negative experience with lesson study was her thoughts about how to conduct lesson study as a school-based professional development opportunity for others. Evelyn stated:

> I would say probably the only negative thing was me sitting there thinking about, well, how many people did we have to find coverage for? And you know, if every grade level got a chance to do this, how often would we be covering? And, you know, that would probably be the only negative and it's more just a logistical problem that would have to be, you know, balanced out. Or there would have to be a lot of buy-in, you know, from administration and things like that in order for it to work.

Kat brought up examples of how outside influences contributed to negative experiences.

She felt that these unforeseen experiences such as teacher absence due to illness, last minute parent or administration meetings, and a fire drill during the school day was something that could not be planned for in advance. A negative outside interference, according to Kat, is an activity beyond one's control that "can pull people away to where not everybody is able to participate 100% as they're able to, you know."

Betty's negative lesson study experience was feeling that the value of her time was being disregarded at the school level. Betty expressed:

> And even when we set designated time for us to do the lesson study, in certain cases...I don't feel that it was valued. You know, like, as a school. They didn't...value that was our sacred time. And I think that shows across every day in our life. You know, our teaching, like this is our planning period, but we don't get to plan. You know, meetings, this and that.

Despite the negative experiences, the team persevered through unforeseen disruptions and committed to accomplishing the lesson study cycle.

Transformation of Teacher Learning. Transformation of participants' own understandings of teaching occurred as they progressed through the lesson study process, generating opportunities for them to deliberately contemplate and discover what were effective or ineffective strategies in collectively planning for improvements. During the semi-structured individual interviews, the participants mentioned how both collaboratively designed lessons had effective and ineffective strategy traits impacting focus group practices that led teachers to transform their learning.

Effective. An aspect of lesson study that worked well from the participants' perspectives was tailored interactions with the students. They discussed how this aspect contrasted from their

typical approach, which is the 'I Do, We Do, You Do' (i.e., gradual release) instructional model when teaching math. In the typical approach, the teacher teaches the content to the students, the students complete an example together, and then the students individually engage in a math task.

During the focus group interview, an influential strategy that the participants agreed on was adapting the math manipulatives, such as the linker cubes and frogs on the log, to meet the students' needs. Karen mentioned, "Yeah, because they don't even have to say anything, you can kind of see how they're using their manipulatives and kind of gauge whether or not they're catching on or they know what they're doing." During the first post observation reflection session, I noticed that the participants discussed improvements like making sure the next volunteer teacher was strategic on when to give and remove the math manipulatives. The participants observed that on the first lesson, some students were momentarily distracted because, according to Betty's comment during the reflection stage, "… they were playing with the items instead of listening to Yolanda."

Another instructional method Yolanda found effective, as she conveyed her perceptions during the semi-structured individual interview, was having the students explain their strategy. Asking probing questions gave the participants "an idea as to what they're thinking."

Additionally, an effective practice that the participants discussed, which I noted during conversations from the lesson study session, was also being strategic on having students share and explain their solutions in front of their peers while in a whole group setting. Karen said, "… pick those friends to share the wrong one first." I noticed that the participants were implementing this idea from one of the lesson study videos they had watched previously during the training. Yolanda added that after calling on some students to share their thinking, the following question should then be stated to the class, "Does anybody have a different answer?" The participants

learned that intentional selection of specific students to share incorrect and correct responses elicited clearer understanding of students' thought processes and encouraged other students to engage in math discourse, which then led to teachers collaboratively designing for instructional improvements.

Ineffective. All the participants agreed that some of the initial teaching strategies were not working. When comparing the first and second collaborative lesson during the focus group interview, Evelyn explained:

> I know during that first lesson, we were finding that some of our instructional methods were not as effective, particularly when we were maybe changing up the activities too much. In terms of having too many different, I guess, items that we were counting. You know, we're counting turkeys. Now we're counting frogs. Now we're gonna' draw on the paper, you know, and it's cubes now. So, I think that was not very effective.

As the participants discussed during the first reflection observation session, they reached a consensus that one math manipulative would be most beneficial since, "the kindergarteners are already having a hard enough time just doing the math."

The ineffective strategies were taken into consideration so the participants would not, as Sapphire noted during her semi-structured individual interview, "fall into those same pitfalls that [they] failed in the first time." The lesson study process allowed participants ample time to reflect on what did not work for their students. This resulted in brainstorming ideas to fix their mistakes and improve their future instructional design.

Research Question 1.c: What were teachers' perspectives towards practicing lesson study and its influence on math instruction?

All the participants felt that the quality of math instruction was positively impacted by

lesson study. Three themes emerged**:** maximizing colleagues' skillsets, preparation, and collaboration to application. Table 4 provides the alignment of the theoretical framework, the lesson study stages, and the research question with the selective codes and themes for research question 1.c.

Table 4

Theoretical Framework, Lesson Study Stages, Research Question 1.c, Codes, Themes Alignment

Theoretical Framework	Lesson Study (LS) Stages	Research Question 1.c	Codes	Emergent Themes
Available Designs	LS Stages 1, 4	What were teachers' perspectives towards practicing lesson study and its influence on math instruction?	• Teacher awareness of student needs • Diverse perspectives • Collective expertise bank	• Maximizing Colleagues' Skillsets
Designing	LS Stages 2, 5		• Strategy to organize and implement resources	• Preparation
The Redesigned	LS Stages 3, 6		• Put into action to target effective learning • Colleagues' observation to improve student engagement • See evidence of learning process • Eyes to see students	• Collaboration to Application: Learning-by-Doing

Maximizing Colleagues' Skillsets. All the participants felt that lesson study contributed to maximizing colleagues' skillsets which furthermore influenced their approach to math instruction. During the semi-structured individual interview, Evelyn described how teachers who have an area of instructional strength can positively impact others when she commented**:**

> But you know, we all have those areas where we're weak, and this would be a way for our colleagues, who maybe are stronger in those areas, to share their knowledge and their teaching practices with us so that they can kind of elevate us and help us get to that point where we are kind of masters of the content in the curriculum.

The participants decided to target an area of improvement in student learning. Karen expressed during the focus group interview that the Common Core math standard, Find the Missing Addend, is "a skill that in the past was very difficult for students to master." This is what led to

the participants agreeing to collaborate and work on the math instruction to more effectively support the students. Yolanda described how they "bounced off each other with ideas because we had a variety of different expertise in the group." As the participants collaborated during the focus group interview, the range of expertise was perceived as a benefit to maximizing colleagues' skillsets. Evelyn said:

> They can bring all of that knowledge to the table… The lesson study really helps us kind of collect all those, all the smart people in the same room together, and we all can kind of benefit from each other. I do think that it was very beneficial for the math instruction… I would definitely say that having more educators sharing their expertise is going to be beneficial in the long run.

Kat also pointed out during the focus group interview that lesson study "gives us a chance to come back and… refine our different teaching techniques and... our protocols for teaching the lesson." Sapphire also mentioned, "It does promote diversity and equity because, again, we, we had a very diverse team, and you know, the collaborations were very rich and powerful." All the participants felt that lesson study influenced math instruction because the method helped master content and curriculum while promoting diversity within their professional collaboration efforts.

Preparation. All the participants agreed that lesson study assisted in the process of instructional preparation. Being prepared and having a plan is a road map to creating a lesson and gets the students "ready to learn." Sapphire said during the semi-structured individual interview:

> With the planning side, I mean, you can't really, you know, have a lesson without planning. You need to know what materials you're going to use… This gives you that

opportunity to really analyze and to kind of break down...the materials that you have.

In addition to preparing for materials in advance, the participants also had to anticipate student responses and behavior since they were uncertain of how the students would respond to the collaboratively designed lesson, especially with the presence of other adults in the room. Karen stated during her individual interview, "I was really curious to know if that would actually work. And especially with kindergarteners, and with them coming in with limited academic experiences."

I noted during the lesson study session that Betty was concerned about the observation stage of lesson study once she expressed, "When Yolanda came in my room, you saw a few trying to take advantage." Betty further explained that her students are not used to "having so many different teachers" in the same room and believed that if they were accustomed to the presence of other teachers "their behavior should be the same that whatever teacher comes and goes, the behavior usually doesn't spike."

During the focus group interview, Betty described preparing for lesson study as "more upfront work than normal. More than what is put into a normal lesson, but you get this model lesson at the end, which will help you in the future." Developing exemplary lesson plans that can be used in the future is an effective way to practice and master the content. All the participants felt that lesson study influenced math instruction because the method helped with instructional planning and strategies.

Collaboration to Application: Learning-by-Doing. All the participants felt that lesson study influenced math instruction because the collaboratively designed lesson was put into action to target more effective learning. Managing for effective learning was determined by how students responded to the collaborative lesson. During the semi-structured individual interview,

Yolanda stated, “Okay, so we got a chance to actually spend and monitor them as they were actually doing it.” Yolanda further explained, “Instead of looking at real paper after the fact, I was able to see that he had a hard time with one-to-one correspondence. And I wouldn't be able to tell that just by looking on his assessment paper.” During the focus group interview, Evelyn pointed out the advantages of having other teammates present during the live observation:

> We want all of our kids to be engaged. And by having the other teachers come in and just observe what the children are doing during the lesson, you know, they're going to help us be better classroom managers. And to kind of bring in those kids that we would have otherwise lost because there's children that we were losing. You know, sometimes you're so busy helping one particular student you might not see that this kid over here is also struggling. So, having those extra pairs of eyes in the room, kind of frees you up to do your thing, but also kind of draws your attention to the kids who were having difficulties that you might have overlooked otherwise.

Kat recalled the observation reflection sessions during the focus group interview:

> We were truly learning by working with everyone. I mean, it's the eyes to see students. You know, and we're able to actually work and see evidence of their learning, evidence of what's motivating them, you know, and, and their behaviors as, as they're going through the learning process.

The focus group observation reflection discussions described what the participants observed during the collaboratively designed lesson. All the participants agreed there were some action items to fix in the first lesson, such as having the math activity involve students’ use of one type of math manipulative instead of exposing the students to a variety of visuals at one setting. For example, the participants agreed during the ReVision stage of lesson study, to have

students use only linker cubes as the main math manipulative instead of using both the frogs on a log and linker cubes.

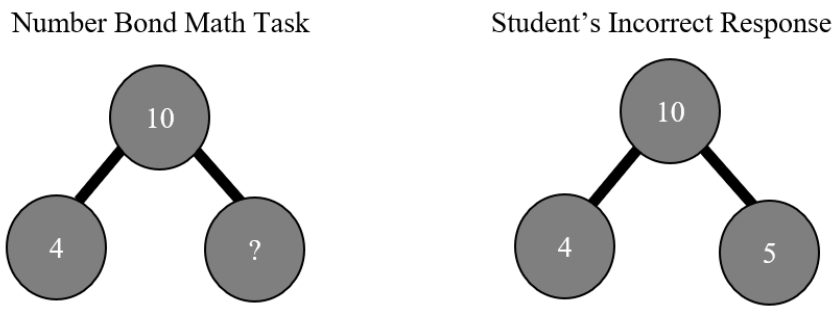
To improve math instructions through greater understanding of the students' thought processes, all the participants decided to change their initial observation protocols for the next observation round. Transcriptions from the focus group observation reflection discussions indicated that all the participants agreed with Betty when she stated, "We might be able to have a different perspective if we can look at other students instead of being confined to one small group... Besides, I'm nosy and I like to see what other students are doing." In contrast to the first observation protocol where each participant observed their own small group of students and did not talk to them, the participants decided to have the freedom to walk around the undivided classroom so they can "hear what the students are thinking." While the students worked through solving their math task during the Reteach stage, the participants asked the students open ended questions such as the following: "How do you know?" "Can you prove that?" "How did you figure that out?"

This pivot allowed the participants to gain insight on improving instructional math practices. For example, in the number bond math task, students had to figure out how to make ten from a given number. Figure 5 shows an example where the students were given the number four and asked to provide the number to make ten as well as a student's incorrect response. Although the correct answer was six, some students incorrectly responded with the answer five. During the observation reflection session, Kat reported to the lesson study team that when she asked a student to explain how she solved the unknown number to complete the ten number bond, the student replied, "I know it's five because five comes after four." This response revealed that some students did not have a strong foundation of number sense, did not fully

understand how numbers related to ten and thus, the teachers needed to improve math practices related to this task.

Figure 5

Example of Number Bond Math Task and Student's Incorrect Response



In addition to the students' verbal feedback, observing together as a team rather than as just one individual teacher gave the participants more insight on student thinking. One example was when the students were instructed to draw the correct amount of linker cubes to make ten from a given number, seven. Instead of drawing three cubes, the participants observed some students drawing only one cube and a few other students using their linker cube manipulatives to make red and blue patterns. These incorrect responses prompted the participants to strategize new instructional practices during the observation reflection session because not all students were understanding the task or did not have the prerequisite skill to solve the math problem. Having the participants observe the students at the same time provided rich discourse when they discussed their collective observation findings.

All the participants' semi-structured individual and focus group interview comments, and my field notes corroborated the significance of having multiple eyes and perspectives during the observations, which they believed to be meaningful to collaborative discussions. After observing

the collaboratively designed lesson, Kat said, “We usually talk about collaboration but today, we got to actually see it!” All the participants felt that the lesson study influenced math instruction because the method helped manage effective learning and monitor student progress.

Summary

Findings from this investigation revealed that participants going through the lesson study were appreciative of acquiring a unique collaborative experience. Each participant expressed their appreciation to assist in this study and for being able to extend their individual thought processes in a safe, nonjudgmental group setting. A new team dynamic, introspective analyses, and transformation of teacher learning contributed to a meaningful collaborative process. Participants were clear in explaining how being able to communicate their thoughts among the group supported planning, defining, and receiving feedback to improve the collaborative process. Furthermore, maximizing colleagues’ skillsets, preparation, and learning-by-doing heightened the quality of instructional math practices. The group participants uncovered ideas and strategies from each other’s diverse professional and educational backgrounds that led to practical application of practices in teaching math.

Chapter V: Discussion

The purpose of this qualitative case study was to understand participants' lesson study experiences and the influence this process had on their professional practices. The pedagogy of multiliteracies designs of meaning (New London Group, 1996) was the theoretical structure sourced to connect previous empirical research to the phenomena under study. This final chapter answers the overarching research question:

> What were the attitudes and perceptions of elementary educators towards practicing lesson study and its influence on the quality of teaching?

The sub-questions that provide details to explaining the central research question were as follows:

a) What were the teachers' initial and post impressions of a complete lesson study cycle, and the reasons for their impressions?

b) What were teachers' perspectives towards practicing lesson study and its influence on improving the focused collaboration process?

c) What were teachers' perspectives towards practicing lesson study and its influence on math instruction?

Analysis of Findings

Reported in this final chapter are descriptions of the major findings, the meanings for each theme, and why these findings are significant to answering the research questions. Next, I draw a nexus by describing the relationship between the dominant themes and theoretical framework. The connection between the lesson study stages, focused collaboration improvement process, and math instruction are interwoven to shape the quality of instructional delivery.

Research Question 1.a: What were the teachers' initial and post impressions of a complete

lesson study cycle, and the reasons for their impressions?

Findings from this investigation revealed that the participants were initially reluctant to invest personal or planning time to do the lesson study because the initial thoughts that surfaced were doubts about possible barriers that could affect the implementation procedures. The participants were a bit hesitant about conducting the lesson study because they were not sure if everyone in the group would be consistently present throughout the study. All the participants nodded in agreement when Karen voiced her frustrations during the session, "Our planning time is always being taken away from us to do other administrative things other than what we want to do, and that is to prepare our activities for the students or plan."

Karen's statement is consistent with Vangrieken et al.'s (2015) claim that perceptions of unproductive collaboration stem from worry, lack of commitment, lack of trust, and a shortage of teacher buy-in. Critical to the success of implementing lesson study is teachers' willingness to commit and dedicate time and energy to actively engage in this methodical joint process (Huang & Shimizu, 2016).

Another significant preliminary finding was the participants feeling that devoting precious time implementing an unfamiliar collaborative model seemed risky because they "didn't know exactly what it was going to be about," commented Yolanda during the focused group interview. This finding is in line with previous researchers claiming that unfamiliarity with the lesson study may pose a challenge (Huang & Shimizu, 2016) because the process by nature is multifaceted (Collet, 2019) and requires educators to be collectively dedicated to accomplishing a shared goal (Canonigo, 2016; Fujii, 2016; Shingphachanh, 2018; Takahashi & McDougal, 2016).

Collet (2019) argues that acquiring experience in lesson study is job-embedded and

performance-driven. In the education realm, teachers need to be active mentors in promoting best practices (Cravens & Wang, 2017). Despite the participants' brief reluctance initially, they wanted to explore collaborative pathways to improve their teaching, and their voluntary presence during the course of this study acknowledged this desire. This willingness to participate aligns with Cravens and Wang's (2017) research that addresses the need to prevent surface-level teacher learning by encouraging teachers to step into leadership roles and initiate meaningful change. Interestingly and in contrast, Canonigo's (2016) finding reported that teacher buy-in was subverted if implementing lesson study was mandated.

A positive learning experience gleaned from this study was the participants observing students with fresh eyes. This finding means that the participants looked at student engagement from a different angle. All the participants felt that observing students working was a meaningful experience because the debrief sessions provided collective information about the learners' thinking and these insights helped the participants improve their teaching. This finding is consistent with Lomibao's (2016) study claiming that gathering evidence of student learning during the observation phase made participants more aware of designing rigorous lessons and expands their content knowledge and practice of teaching. Collet (2019) argues that the benefit of being an observer is looking at students more intently and understanding how the "nuances of planning and the realities of learning come together" (p. 64). The participants found the lesson study to be a practical and productive teacher learning experience, promoting the quality of their instructional practices because they were free to make decisions pursuing common goals.

Observing students with fresh eyes warrants carefully studying student learning and promotes shifts in mindset. Observing as a team and collectively debriefing on evidence of student engagement led to shared perspectives and a deeper understanding of student thinking.

All the participants felt that gathering and sharing observation data was a productive experience because different perspectives, according to Sapphire during the group session, "gave us additional information that we could use for future lessons." Gathering evidence when deliberately asking students open-ended questions about their cognitive processes and solutions directs teachers to "skillfully designing lessons" (Huang & Shimizu, 2016, p. 10).

An enriched collaborative environment involves building collegial relationships and having the liberty to be honest, yet, professionally respectful of others and their ideas. An enriched collaborative environment allows teachers to be vulnerable to make, discuss, and learn from mistakes or discuss lessons learned without feeling pressure or animosity. All the participants felt comfortable participating in the lesson study because they were able to collectively choose a difficult math concept to teach and improve on. Evelyn's statements during the focused group interview represented the participants' feelings about their collaborative atmosphere experience when she said,

> It feels very self-guided. It also feels like we were addressing a real-world problem that the teachers have… This is something we know we're weak in and we know it needs to be improved because this is something that you know, spirals back and comes back later… You get the automatic buy-in because it was something that was real to us and authentic to us.

Researchers suggest that building a positive, united environment where diverse inputs are exercised, shared, and welcomed promotes teacher learning (Kim et al., 2017; Lewis et al., 2019; Mora-Ruano et al., 2019).

Confidence in doing lesson study emerges when experiencing the process, and greater understanding is attained through performance (Collet, 2019). At the end of the lesson study

cycle, all the participants felt that they had gained confidence because using this approach deepened the quality of their professional practices. This finding is consistent with previous research claiming that the lesson study increases educators' pedagogical content knowledge and overall "made them better teachers" (Gero, 2015, p. 10).

The common post-impression response from all the participants was that they were grateful to participate in the lesson study. Evelyn stated, "I would love to do it again!" Yolanda commented that "lesson study was a good experience" and said, "I enjoyed being a part of this!" Sapphire, Karen, and Kat had similar reactions as their semi-structured individual interview comments reflected their gratitude for being involved in the lesson study process. Betty's statement succinctly described everyone's feelings of the lesson study being a more meaningful approach in comparison to her formal collaboration sessions when she said, "I mean, in all honesty, I got more from this in working with the team than I do meeting with my team every week, you know, doing our focused collaborations."

Betty's profound statement aligns with previous research studies indicating that teachers' time is too valuable to waste on meetings that they feel are irrelevant to their professional learning (Cravens & Wang, 2017; Holcomb, 2017; Joram et al., 2019). All the participants believed that they grew professionally during the lesson study process and that their time was well spent.

Research Question 1.b: What were teachers' perspectives towards practicing lesson study and its influence on improving the focused collaboration process?

A dominant finding that materialized from this investigation was cultivating a new team dynamic. In this study, I have found that a productive team dynamic operates on thriving ideas, exchanging knowledge, sharing responsibilities, and overcoming barriers or discomforts in a

non-threatening, collaborative environment. Researchers also support the same finding that a productive team dynamic is a cohesive group working as one unit (Canonigo, 2016; Kanellopoulou & Darra, 2018). Evelyn remarked about getting to know the participants more personally during the individual interview when she stated, “It's kind of nice just to be able to sit down and just talk frankly with each other about things and just kind of being honest with each other.” This finding is consistent with Won’s (2017) research reporting that a culture of trust can overcome the collaborative barriers of fear or criticism and provides a comfortable atmosphere that encourages and allows for open conversations of thoughts and ideas to flourish.

Another major finding in this study is introspective analyses. Introspective analyses are self-reflections. Reflective action or reflective practice is self-reflecting on learning experiences and taking action to examine, provide, and receive feedback to build new experiences (Canonigo, 2016; Darling-Hammond et al., 2017). Collet (2019) asserts that reflecting on effective and ineffective strategies provides learning opportunities to strengthen and fine-tune instructional practices.

Furthermore, researchers believe that the lesson study process “enables teachers to access their practice knowledge and see the outcome of their reflective actions” (Huang & Shimizu, 2016, p. 7). Collet (2019) claims that reflective action increases perceptiveness and supportive reasoning and promotes instructional change. Despite the importance of introspective analyses, the participants felt that reflection was not a top priority during their mandated focused group sessions. During Evelyn’s individual interview, she expressed the need for meaningful, reflective practice:

> We're on pacing guides, and we have to, like continuously be pushing forward. And I feel like we don't have enough time for reflection… I really think it's important for us to have

> that time to reflect because I feel like we're always so busy and so rushed, and we don't have time to sit down and say, "Well, how did that go? Am I happy with how that went? And if not, what can I do to make it better?"

Team observations and debriefing on lessons learned from the observations were unfamiliar territory to the participants. The participants believed that observing students through the lesson study process developed fresh eyes to see learners and contributed to a profound gateway toward collaborative learning. According to Kat, there was a missing element to improving the school's current focused collaboration. She exclaimed, "We see there's a missing piece, which is the observation!" Collet (2019) describes observing as a tool generating instructional shifts because exposure to new information, ideas, and learning emerges while examining the students' thinking processes more closely. Collet's statement supports previous research describing reflective discussions about observing students as a vessel to deepen teacher knowledge and instructional practices (Lewis et al., 2019; Warwick et al., 2016) and was consistent with the findings of this study.

Sapphire agreed that real-time group observations helped to improve teaching. She expressed during the lesson study session:

> But you know, being able to have all of those other sets of eyes, it gives you that different perspective… A lot of times we don't have the time to be able to really dive in and see. Is this something that, you know, I need to, you know, revise this and do this because, again, when you look at our pacing, it's so fast-paced!

Betty added:

> It's hard for one person to get around and check all kids. Having that, you know, multiple hands-on deck, multiple people looking, telling you, and telling you the kids' train of

thought, and the mistakes, and then us comparing them. It helps me now to go back and say, “Hey, this was, you know, multiple kids thought this way or multiple kids did this wrong.”

Collet (2019) reports that “mindful reflection” opens opportunities for deep thinking to occur after the observation phase. I found that observations from multiple perspectives must reach a shared understanding to develop common language so that there are no communication barriers or confusion. Reflecting on and discussing what was seen and understanding the importance of visual evidence supports instructional improvements (Collet, 2019; Mon et al., 2016).

Although teaching in front of peers is intimidating and “can be a highly stressful experience” (Gero, 2015, p. 20), I found that an optimistic team dynamic produced a cohesive environment and cultivated camaraderie in a safe space. Being comfortable working together in a trusting, noncompetitive atmosphere, through the lesson study process, emitted teacher confidence to teach and prevented the escalation of discomfort or tense emotions during the observation periods. As a result, Collet (2019) advised, “You will grow as a teacher and as a learner. You will get smarter together” (p. 78).

Another significant finding was the transformation of teacher learning. Transformation of teacher learning occurs when there is a change or mindset shift in teacher knowledge (Collet, 2019; Fulmer et al., 2018; Lewis et al., 2019). According to Huang and Shimizu (2016), lesson study has “changed teachers’ belief about teaching” (p. 7), because the process enables educators to build teachers’ knowledge and support innovative teaching strategies that improve future planning (Kim et al., 2017; Lewis et al., 2019; Mora-Ruano et al., 2019). The findings from this study proved to be consistent.

For example, the participants were excited to try a reverse teaching strategy called *You Do, We Do, I Do* (Waddell, 2018) to incite productive struggle for students during their math lessons. This strategy aimed at having teachers collectively examine student responses and apply new understandings to adjust the effectiveness of the collaboratively designed lesson. The participants asking students open-ended questions about their solution process was also a fresh learning experience for the teachers as they jotted down rich observations. All the participants believed that they had learned a new way of collaborating that was meaningful to their practice. Evelyn's comments represented the participants' perspectives during the focused group interview when she said:

> Getting together with other professionals and having all those different perspectives, I think it really helps everybody to grow as a team and grow together… I think it really is helpful for everybody involved because we've all been able to kind of lift each other up and say, "Well, you know, I saw this thing happen. I know, I've had a kid like that before and this is what worked for me. You know, maybe this would work for you as well."

Collet (2019) stated, "Understanding can be changed through exposure to new information or even through looking at what you already know in a different way" (p. 71). Furthermore, researchers support the finding that transformation of teacher learning occurs through lesson study because an increase in teacher knowledge emerges (Ermeling & Graff-Ermeling, 2014; Lewis & Perry, 2017) when producing an improvement plan and applying new instructional techniques (Darling-Hammond et al., 2017; Fulmer et al., 2018; Hall, 2014).

Research Question 1.c: What were teachers' perspectives towards practicing lesson study and its influence on math instruction?

The findings revealed that the lesson study provided an expanded learning opportunity

for broadening educators' growth mindset and that implementing this method advanced instructional practices and, as a consequence, the students reaped the benefits. Research supports this finding with the understanding that promoting the quality of instructional practices plays a vital role in student success (Akiba & Liang, 2016; Collet, 2019; Darling-Hammond et al., 2017; Fujii, 2016; Hattie et al., 2017; Mora-Ruano et al., 2019). Table 5 illustrates the lesson study stages aligned with teacher evaluation performance quality indicators. During this study, I have found that maximizing colleagues' expertise involves bringing diverse skillsets together, background knowledge, and experiences to formulate solutions to improve teaching.

Table 5

Lesson Study Stages, Performance Quality Indicators, Emergent Themes Alignment

Lesson Study (LS) Stages	**Performance Management and Appraisal Program (PMAP)** **Quality Indicators**	**Emergent Themes**
Stage 1: Study Stage 4: Reflect	All the participants felt that lesson study influenced math instruction because the method helped with **mastering content and curriculum while promoting diversity.**	• Maximizing Colleagues' Skillsets
Stage 2: Plan Stage 5: ReVision	All the participants agreed that lesson study influenced math instruction because the method helped with **instructional planning and strategies.**	• Preparation
Stage 3: Teach/Observe Stage 6: Reteach/Observe	All the participants felt that lesson study influenced math instruction because the method helped **manage for effective learning and monitoring student progress.**	• Collaboration to Application: Learning-by-Doing

In this investigation, I discovered that maximizing colleagues' skillsets was a valuable resource that may be untapped when not used in total capacity. In contrast, having a solid

understanding of the math content and being able to effectively teach it to students in a logical manner (Demirdoen, 2016; Gul, 2015; Pella, 2015; Shulman, 1986) is hindered when filling out mandated forms and documentation supersedes meaningful instructional planning and teacher learning. Betty's individual interview and focus group interview were consistent with others' frustrations as all the participants nodded in unison during the lesson study session:

> Our meetings are so focused on forms, forms, forms, forms, forms, data, data, data, that we've gotten away from teaching and looking at the kids and their work. We have this form we have to fill out for this meeting and it takes forever. We have this other form to fill out for the same meeting. You may have three teachers in the room and two were filling out forms. One's trying to take notes. And in reality, you're so, we're so worried about that. We like, we're far from students anymore. Like looking at the actual student and doing those type of things… it has pulled us away from teaching.

Lewis et al. (2019) states, "Lesson planning should repeatedly surface team members' knowledge and beliefs about pedagogy and help team members' ideas bump up against each other and against ideas from research" (p. 24). The lesson study pushed teachers to focus on teaching and synergizing colleagues' expertise to develop and employ authentic strategic designs, rather than putting an emphasis on filling out forms.

While conducting this study, I also found that designing the lesson involved advanced preparation. Advanced preparation included preparing materials in advance and anticipating student behaviors, as well as considering potential student solutions as part of the design process. This statement was consistent with previous findings as Collet (2019) proclaims, "These anticipations prepare everyone for a more productive experience" (p. 66). Furthermore, Collet asserted that lesson study helps teachers focus intently on predicting student responses which

develops accuracy and assists in developing appropriate and engaging lessons. Anticipating student moves is the educator planning strategically for unexpected misconceptions while thinking through the lens from the students' perspectives.

Sapphire credited the preparation process as giving the participants sufficient time to "…really analyze the curriculum. What is it that they need to know? Why do they need to know it? How are we going to make sure that those gaps are closed?" Since the participants had the autonomy to make decisions throughout this study, I found that teacher autonomy empowered the educators to make meaningful decisions for strategic instructional improvements. For instance, the participants used their initial strategies to optimize and meticulously design their revisions.

This is consistent with the findings of Collet (2019), who explained that constraining "teachers' decision-making power" (p. 47) has an adverse impact on the quality of student learning. Teachers know their students' learning styles and are the ones who are most capable of making informed decisions that best meet their educational needs. Anticipating student responses also helps teachers become mentally prepared for the unexpected during the observation phase (Barber, 2018; Collet, 2019; Fujii, 2016; Takahashi & McDougal, 2016).

The collaboratively designed lesson and the student responses towards this planned activity were the central focus of utilizing the observation period to improve math instruction. Although the lesson study is not about evaluating how the teacher teaches (Collet, 2019; Fujii, 2016; Takahashi & McDougal, 2016), the two volunteer participants implementing the collaboratively designed lesson, Yolanda and Betty, took the liberty to discuss their instructional experiences during the post-observation reflection session. Yolanda, as the first volunteer teacher, enthusiastically shared her instructional experiences:

So, during the introduction, when I first walked in, I thought the whole class was sitting quietly, with their hands on their lap, their eyes were on me… They were well behaved and ready to learn. So, I didn't have to wait for anybody… Then, during the math problem, I heard students counting as they were working out the math problem… Most of them know how to count by one-to-one correspondence. I saw them pointing to each frog, as they were counting. They were also raising their hands to participate… Then, during the math sheet, that was the turning point! I saw some students not drawing out the cubes on that worksheet. They were not drawing out the extension cubes on their paper. So therefore, they weren't getting a correct answer.

Betty, as the next volunteer teacher implementing the collaboratively ReVisioned lesson, added:

Okay, as the teacher, about my experience, it was different… I felt like that lesson that we prepared was better. I think we did make improvements. I think only using the cube train from what I could see made a huge difference! It wasn't going from one thing to another to another. They started with one thing and they stayed with it. And I think they started picking it up faster. There was still by the end of the lesson, several struggling. So, for the ones who got it, even though they got it, I feel like they need more to make it concrete, to work on it. So, to take this lesson and almost keep with the cube train and just add to it.

As Betty continued to reflect on her instructional experience during the post observation session, she explained:

We focused more on number pairs. And we thought if we did number pairs, number pairs, that concept would come with number pairs. So, we'll say you know, what two numbers can you put together to make six? Okay, tell me another way. And another way. So, we

thought, you know, knowing that would give them the knowledge to get there and it didn't. The trend didn't you know, go over. So, now we really see this is something… It's not transferring like we thought it would.

The two participants executed the collaboratively designed lessons (see Figure 6) with minimal anomalies; however, all students did not receive the math concept in totality. The participants expected a specific outcome from the math instructions but realized learning gaps were exposed when there was evidence of a trend in incorrect answers on the worksheet. According to Arani (2015), calculating the correct solution to a math problem is not enough. Students should also acquire the skills to communicate mathematical cognitive processes through various communication methods such as pictorial representations, math manipulatives, and dialogue, demonstrating genuine conceptual understanding (Arani, 2015).

Figure 6

Cllaboratively Designed Lessons

1st Lesson	Math Lesson Overview Kindergarten Math Standard: KOA.4 (Making Ten from a Given Number)	2nd Lesson: The ReVision (Changes)
Personal Connection (Introduce self-first) Good morning, boys and girls. I'm here today to teach you a math lesson. Today we're going to make 10 from a given number. Are we ready to do that? We are putting our thinking caps on.	**Introduction**	**Personal Melody:** "If you're ready, ready, ready, clap your hands! If you're ready, ready, ready, and you like to eat spaghetti, if you're ready, ready, ready, clap your hands!"
So first, I have a math word problem for you to solve. You're going to use these frogs on the log to solve your problem. The problem is... There are four turkeys in the gate. More turkeys joined them. Now there are 10 turkeys. Now you have to figure out, how many more turkeys joined them. That's what you have to figure out by using your frogs on the logs. Does everybody understand? Does anybody have a question? Alright, go ahead. I'll be walking around. If you have a question, just raise your hand. So, who would like to share how they figured out their answer? Have them come up and share and then I'll say, "Well, who if you agree with them, thumbs up. Or if you do not agree with them, put your thumbs down."	**YOU DO** *Students independently solve math word problem using manipulatives *Student volunteers explain solution (Teacher strategically picks volunteer)	Visual Display – Cube train Math manipulatives: Cubes only *Be strategic on having students share and explain their solutions - Volunteer Teacher will: "… pick those friends to share the wrong one first." - Ask the class: "Does anybody have a different answer?"
*GoMath Video Clip Now we're going to look at a math lesson. I have a GoMath lesson for you to watch and I want you guys to pay attention. And you just may get called on to click on one of the answers. *Teacher Modeling Last, we're going to do a page in our math books. We're gonna do page 257. Let me explain how you are going to do it. So, this is an example. I have six cubes, let's count 123456... And I need to make 10. How many more do I need to add? Now, we'll count out 6789 10. And then we'll write the four down. *Using magnets Now let me show you a different way. I have these colorful magnets. I have six green magnets. And I need to make 10. How many more do I need to add?" How many yellow magnets do I have? Okay, so I'm gonna write that down.	**WE DO** Whole Group Instruction * GoMath (Interactive) Video Clip * Teacher Modeling	* Teacher Modeling * Number Pairs (quick review) -Ex: What two numbers can you put together to make six? What is another way?
*Worksheet So now, let's do the math p. 257 that same way. I will come around to check your work or to help you if you need any help. Do we have any questions as to what you're supposed to do? *Number Bonds – Computer Activity 1st Team Observation Protocol – Choose a small group of students to observe. Jot down what did you see, hear, and why does it matter. Do not talk to students.	**I DO** *GoMath Worksheet p. 257 -Draw how many more to make ten *Teacher monitors and checks work *Number Bonds (Computer) *Small group - Explicit Instructions	Open Ended Questioning Strategy - How do you know? - Can you prove that? - How did you figure that out? 2nd Team Observation Protocol – Walk around the room and ask students open-ended questions to explain their thinking.
Closing Exit Question(s) Who can tell me something that you learned today? Who can come and tell me or demonstrate… Show me a way to make 10.		

The findings from Yolanda and Betty's instructional experiences implementing the collaboratively designed lesson are consistent with Saran's (2018) and Warwick et al.'s (2016) study that claim self-analysis of teaching strategies improves the individual teacher and this increase in teacher knowledge benefits the collaborative team. Collet (2019) argues that there is no need to evaluate the teacher during the lesson study observation day because the lesson study team already knows the content and activities that the teacher will present to the students. In contrast, Collet claims that the "hope" is for the collaboratively designed lesson not to go precisely as constructed because "if the outcome is exactly what was expected, [we] will not really learn anything – [we] will just reinforce what [we] already knew" (p. 70).

The participants believed that preparation to get students ready to learn at the start of the lesson was an essential attribute to success. In anticipation of a behavior spike or students not paying attention due to the presence of other adults in the room, the participants agreed to have a captivating introduction that would keep students focused on the volunteer teacher teaching the lesson. For example, in the first collaboratively designed lesson, Yolanda introduced herself by reminding students that her lesson for the week would be in their classroom instead of the media center. After connecting with the students, she orally presented the objectives, an overview of her activity, and student expectations. Similarly, right before Betty proceeded to teach the second collaboratively designed lesson, Karen caught the students' attention at the beginning when she sang a personal melody, "Are you ready? Ready, ready?" Although the two introduction styles are different, I found both strategies to be highly effective in grasping the students' attention and preparing them for learning.

The findings highlighted that the participants' dedicated team effort in preparation and having the materials ready also kept the flow of the lesson running smoothly. Similarly, Glatthom et al.'s (2016) study maintained that deliberate planning contributed to meaningful learning experiences. The study participants' anticipation of potential distractions and eliminating those distractions through the Redesigned planning stage assisted with practical applications leading to improving student outcomes.

The findings also illuminated that learning-by-doing involves taking the collaboratively designed lesson and implementing the plans to completion. Upon reflection during a lesson study session, all the participants agreed when Kat stated, "Having the other teachers, staff members in there, doing the observing and then, coming back as a group and sharing. I think that's really important. And that's a key, you know, aspect that...we don't have right now." In this statement,

Kat mentioned that her current focused collaboration practice does not include observing students as a team and believes that this missing element, incorporated in the lesson study, was a key factor contributing to a meaningful collaboration. The findings in this study support Warwick et al.'s (2016) research suggesting that critical reflective discussions on student engagement and learning led to expanded teacher knowledge and pedagogical practices.

In this study, I found that team observations minimized surface-level conversations during debrief sessions and provided rich, meaningful discourse because the topic of focus, student engagement and learning, fueled the power of visual feedback. Consistent with this finding, Collet (2019) asserted that the focal point of the lesson study team examining students at work was understanding their cognitive thought processes by asking open-ended questions or looking for evidence of what was seen, heard, and why the observations are significant. These observation behaviors were discussion points to help the lesson study team determine the practical applications of the collaboratively designed lesson. During the collaboration session, Betty explained:

> Especially with them being five, and they're everywhere. You don't see everything! You physically can't. So, we were having all eyes on deck. I heard things, "This kid was doing that" or you know, that I didn't see while I was teaching the lesson. So, it helps me know to look for things that I can go back and manage and put other things in place to keep it from happening again to keep the kids engaged and going.

These statements are consistent with Collet's (2019) and Lewis et al.'s (2019) claims that lesson study improves the effectiveness of instructional delivery because this method provides opportunities for teachers to collectively examine, plan, prepare, test, and improve their lessons. The New London Group (1996) confirms that educators should develop efficient strategies by

designing meaningful learning experiences. From collaboration to application, learning by doing is the method that transforms into personal experience. Experience is, according to Collet (2019), acquired through performance and demands action.

Theoretical Framework Connection

The theoretical structure that supports the dominant themes of this investigation stems from the pedagogy of multiliteracies framework (New London Group, 1996) designs of meaning model. The findings in this study were consistent with the Available Designs component because the lesson study process drew upon a larger set of available resources by working collaboratively and involving a group with diverse professional experiences and expertise. Additionally, the findings in this investigation aligned with the Designing component because the reflective actions united with productive dialogue to explore avenues in examining and improving strategies advanced preparation for and creation of instructional designs where innovative possibilities came to fruition.

Furthermore, the findings in this research were consistent with The Redesigned component because the act of doing "transforms information into understanding" (Collet, 2019, p. 92). Purposeful planning led to meaningful collaborative learning experiences that inspired the participants to become active change agents. Figure 7 shows layers of how the lesson study stages aligned with the theoretical framework and dominant themes.

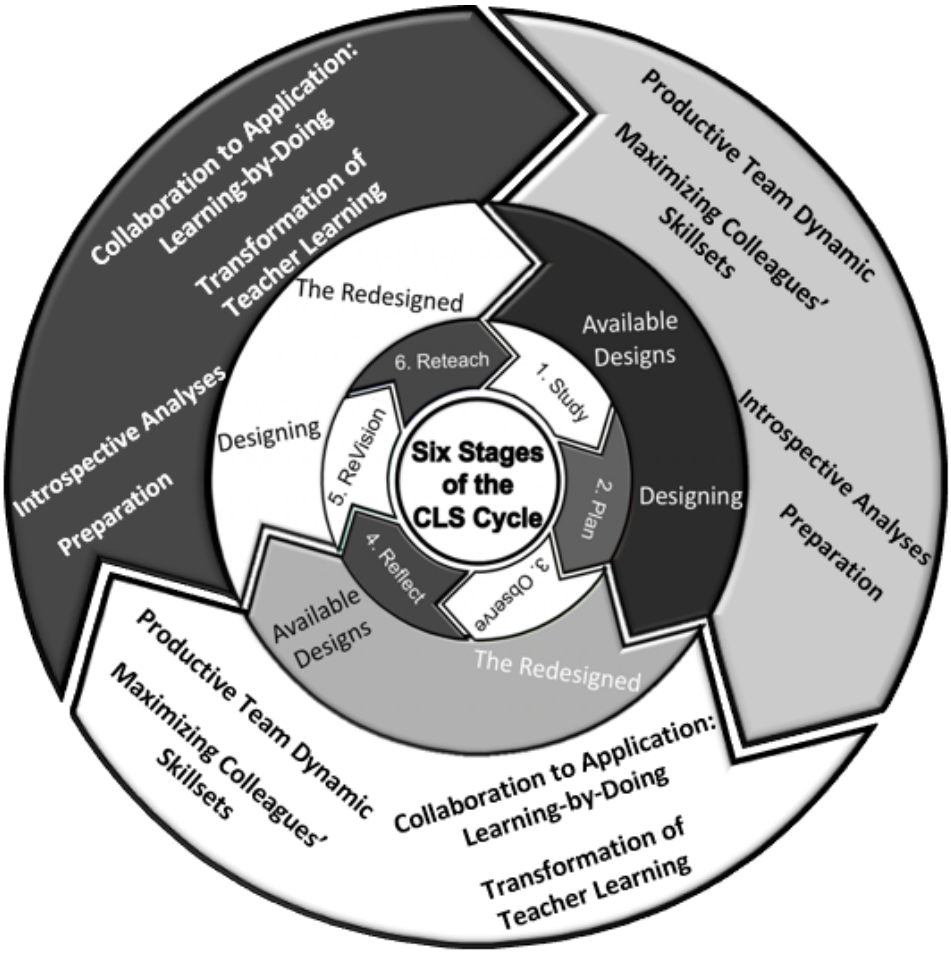
Limitations of the Study

As the researcher, I have identified limitations that may have influenced the outcome of this investigation. Limitations of this study include the small sample of participants as well as limiting the scope to one specific grade level conducted in one geographical region. Thus, the

findings are not applicable to be generalized. Another limitation is that the findings are inclusive of one lesson study cycle. Performing multiple lesson study cycles may add additional findings.

Figure 7

Alignment of Lesson Study Stages, Theoretical Framework, and Themes.



The team dynamic in a healthy collaborative environment and familiarity with focused group roles are also limitations. While the lesson study provides a systematic structure to enhance teacher learning, there is no guarantee that the participants' team dynamic is the same for every school. My positive working relationship with the participants and as a colleague at the study location gave me the advantage of obtaining deep insights due to their trust in me. Other

researchers who do not have the same bond may not get complete insights or candid responses. The participants had prior experience conducting focused group collaboration; however, this was their first time implementing the lesson study. Others who are not experienced with collaborative group roles or have a positive team dynamic may only be able to experience the full benefit of lesson study if the group can work cohesively together.

Implications of the Study

The participants' attitudes shifted due to positive experiences which led to their desire to maintain the lesson study model. They viewed this investigation as an asset to improving the focused group collaboration process and concluded that the lesson study could be utilized school and district-wide. Karen commented, "The strategy is a really good strategy, and it's something that each grade level could even consider implementing." There was unanimous feedback that with the full endorsement of leadership and administration, the lesson study approach could produce greater teacher motivation and buy-in because they felt valued, and this influence, as Kat described during the collaboration session, "brings teachers together more in a way than, than just working together talking about the work." Betty added:

> This was positive because it was a lot of us talking. It was a lot of us sharing ideas. And you know, in like our meetings, we'll sit there five to ten minutes or five minutes silent because everybody's trying to type and catch up. There was none of that in here!

This research enhances understanding of the lesson study as a practical collaboration model that provides meaningful experiences impacting teacher quality and instructional practices. During the participants' reflections, they realized from the observations that there were math learning gaps. The exposure of this learning gap highlighted the need for the participants to delve deeper into the root cause analysis and find solutions to improve math instruction because

the math skill levels of diverse learners were considerably varied and inconsistent. This study adds more information endorsing the benefits of lesson study and expanding teacher knowledge. This investigation adds to previous lesson study research by highlighting the need to strengthen teachers' professional capacity by utilizing and building their diverse skillsets in an authentic and productive manner. Utilizing collaboration time to fill out required documents while conducting group sessions is not an efficacious strategy in promoting productive conversations and results in what participants describe as wasted opportunities that impact the quality of teaching. This current study adds to the body of knowledge by informing readers that the lesson study linked with teacher performance evaluation elements serve as quality indicators in providing a superior education for students. Furthermore, the findings of this study provide information encouraging educators and education systems worldwide that there is a more meaningful approach to focused group collaboration, the lesson study.

Recommendations for Future Research

More research is needed to assess the implications of teacher learning and student outcomes to address undiscovered benefits and discomforts from the lesson study experience. More research is also needed to examine lesson study's influence on establishing a professional learning community to gain deeper insights into advancing pedagogical content knowledge, building teachers' expertise, and elevating and evaluating student learning. Replication of this current study in a different school district or agency is recommended to increase generalizability and verify the accuracy of attitudes and perceptions of the lesson study. Recommendations for research include implementing multiple cycles of lesson study and using other core subjects besides math to provide a more comprehensive understanding of the lesson study model. Future studies on the lesson study process should also be conducted using kindergarten or other grade

levels located in various geographic areas to keep findings current and fresh.

Dissemination of Findings

The purpose of this qualitative study was to gain a comprehensive understanding of the participants' attitudes and perceptions of the lesson study process and the influences that this collaborative model had on the quality of professional practices. As the researcher, I aimed to provide educational leaders with information about the meaningful benefits of lesson study. This collaborative model heightens teacher learning and provides opportunities for teachers to exercise their voices and autonomy in executing their professional intuition and skills in making robust decisions and appropriate strategies to provide students with quality instruction. Findings will be shared with the District Superintendent and the Agency Research Division. Additionally, this dissertation is available in the Simon Schwob Memorial Library's database at Columbus State University.

Conclusion

Teacher collaboration practices in schools have impacted how teachers work together to prevent professional isolation. The findings of this lesson study investigation reiterated that teacher knowledge built through teacher collaboration was a process that takes time and dedicated effort. Action was needed to accomplish this strategically orchestrated collaborative model through learning from past and continuous experiences and shared responsibilities to make improvements. Initially, the participants believed there would be too much work with no added value to the collaborative process; however, in the end, the participants expressed their positive learning experiences through an enriched collaborative environment. The participants acknowledged that collaborative professional learning takes hard work, and the key to decision-making changes was being flexible and maintaining a growth mindset.

This study provided opportunities and a structure for the participants to conduct team observations of students, which they found to be a critical factor contributing to improving math instruction. The participants' rich, interactive dialogues produced shifts in thinking and raised the conversations to a new level. The meaningful collaborations fueled opportunities for the participants to transform their knowledge by purposefully increasing their degree of understanding. After all, "those who can, do. Those who understand, teach" (Shulman, 1986, p. 14).

As the world evolves, so must the delivery of education to prepare students for the future. Lesson study promotes a conducive learning environment that affords open possibilities for instructional improvement (Collet, 2019). If the United States continues to be found lacking in math assessment measurements and falling behind other developing nations, we must change our practices to compete and put students in a position to be competitive with these emerging countries (Carrillo, 2023). Response to action is needed because the future is near.

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APPENDICES

Appendix A

Informed Consent Form

INSTITUTIONAL REVIEW BOARD

You are being asked to participate in a research project conducted by the Principal Investigator, Arlene Harmon, a student in the Curriculum and Leadership Doctoral Program at Columbus State University. This research is under the supervision of the Co-Principal Investigator, Dr. Jan Burcham, Associate Dean for Education, College of Education & Health Professions at Columbus State University.

I. Purpose:
The purpose of this study is to understand the attitudes and perceptions of elementary educators practicing lesson study and its influence on their professional practice. The mandate of collaborative practice has resulted in some teachers expressing frustration and a lack of benefit from their current experiences. With the feedback prompting change, the exploration of lesson study as the method of collaboration could serve as an alternative approach to achieving a more meaningful professional development. This investigation will determine if lesson study is useful in helping educators who are unfamiliar with the lesson study model examine and improve math instruction.

II. Procedures:
If you decide to volunteer as a participant in this study, you will learn about the lesson study process. As the Principal Investigator, my role is to also train the participants face-to-face or online via Microsoft Teams. I will provide you and your team with PowerPoint presentations containing information about the lesson study stages. As part of this interactive training, participants will develop observation skills and practice taking notes as specified in the Lesson Study Observation Template when watching online videos of teachers executing a lesson study plan in the classroom. Participant training is a prerequisite to Stage 1 of the lesson study cycle and is included in the total duration of this research. This training will take approximately two weeks.

As participants, you and your lesson study team will determine who will be the discussion facilitator, scribe, and timekeeper during the initial implementation of lesson study. Since these focused group roles are a standard agency practice, you will be familiar with these position descriptions. As the Principal Investigator, I will keep close contact with the discussion facilitator via text, email, virtual meetings, or face-to-face to help prepare agendas if needed, and answer any clarifying questions regarding the implementation of lesson study stages. The scribe will be tasked to record accurate comments and ideas from other participants. The scribe will document the process by taking notes using the team's standard method throughout the lesson

study cycle; however, once the team reaches Stage 4: Reflect, the scribe will type minutes on the Focus Group Reflection of Observations Form using Google Docs for this stage only. The timekeeper will track time and assist the discussion facilitator in pushing the topic of conversation according to the agenda. Group norms will be established by the team after participant roles are identified. The designated timekeeper will state group norms at the start of each session.

Once lesson study training and implementation of lesson study commences, as the Principal Investigator, I will be taking field notes throughout the course of this research study to gather observation data of the implementation process. I will use field notes to investigate any influences that practicing lesson study may have towards the quality of instructional math practices. With your permission, I will audio record collaborative sessions to ensure the accuracy of my notes. You will receive transcriptions of the audio recordings for the opportunity to make any modifications. Should any of our sessions be conducted online, Microsoft Teams conferences are encrypted and adhere to security standards. Only invited participants and I will have authorized access to enter the virtual platform. I will have exclusive access to audio recordings. Pseudonyms will be used to safeguard your rights as participants. Your name and the name of your education agency will not be used for any presentations or publications.

Your Role as a Participant: Launching the Six Stages of Lesson Study

Stage 1: Study
You will look at student assessment data and discuss, amongst your team, past practices to help decide on math skills that need development. You will then study the standards, curriculum materials, resources, and research on the focus topic. Stage 1 includes lesson study training and implementing the initial study stage. The duration to complete Stage 1 is approximately 45 minutes each session that will occur twice a week, for three weeks; the total duration is approximately 270 minutes in total or 90 minutes each week for three weeks.

Stage 2: Plan
Using available resources (e.g., group conversations, documented collaborations, curriculum materials, previous lesson plans, professional literature, etc.), you and your team will collaboratively design a customized research lesson that will include a title and a brief description of the activity, goals, standards, and procedures. To prepare for the next stage, you and your team will need to create observation guidelines and follow this agreement with fidelity collectively. The duration to complete Stage 2 is approximately 45 minutes each session that will occur twice a week, for two weeks; the total duration is approximately 180 minutes or 90 minutes each week for two weeks.

Stage 3: Observe
You and your team will decide who will be the first volunteer teacher to teach the customized lesson plan with volunteer teacher's set of students. You and your team will plan a convenient date and time to conduct the observation phase. You will use the Lesson Study Observation Template to record what was seen, heard, and why the observations are relevant. The duration to complete Stage 3 is approximately 45 minutes.

Stage 4: Reflect
The volunteer teacher is invited to speak first about experiences, feelings, and thoughts on teaching the customized lesson plan. Next, you and your team will discuss their observations while the scribe uses the Focus Group Reflection of Observations Form to consolidate learning. The duration to complete Stage 4 is approximately 45 minutes each session that will occur twice a week, for one week; the total duration is approximately 90 minutes.

Stage 5: ReVision
You will use this time to look at your team's joint lesson plan to make improvements. Team discussions will focus on what worked, what did not work and take action to tweak the original lesson. The duration to complete Stage 5 is approximately 45 minutes each session that will occur twice a week, for one week; the total duration is approximately 90 minutes.

Stage 6: Reteach
The procedures for Stage 3: Observe and Stage 4: Reflect are repeated with the second iteration of the customized lesson plan. During the Reteach stage, the team roles and responsibilities will remain. A different volunteer participant teaches the revised customized lesson plan with current set of students. The duration to complete Stage 6 is approximately two weeks with approximately 45 minutes for repeating Stage 3 and 90 minutes for repeating Stage 4.

After the completion of the lesson study cycle, I will set a date and time with you to conduct a semi-structured individual interview. You will choose a location that is free from potential interruptions. Using the Individual Interview Protocol, I will be conducting this individual interview face-to-face or via Microsoft Teams. The length of time needed to complete this interview should not exceed 30 minutes. With your permission, I will audio record the individual interview. You will be provided with a copy of the transcriptions from the digital recordings and be given an opportunity to add to or to make any changes.

After the completion of the individual interviews, I will set a date and time with the lesson study team to conduct a semi-structured focus group interview. Using the Focus Group Interview Protocol, I will be conducting this focus group interview face-to-face or via Microsoft Teams. The length of time needed to complete this collective interview should not exceed 30 minutes. This interview location will be at the same place where the team operates their usual collaboration site that is free from potential interruptions.

As the Principal Investigator, I will also audio record the focus group interview. You and your team will be provided with a copy of the transcriptions from the audio recordings and be given an opportunity to add to or to make any changes. I humbly request your support in returning any modified transcriptions to me within a week.

The audio recordings will be transcribed using the automatic transcription features in the digital recording tools. I will also review the transcriptions to check for accuracy. Transcriptions from all audio recordings will be utilized for data after member-checked by you and your team. Data will be used for this current study and will not be used for future research projects.

III. Possible Risks or Discomforts:

There is no direct benefit of this research for the participant. However, there is a benefit to finding out if there is an alternative approach to collaboration that adds meaningfulness to invested time and effort towards increasing professional development. This will help determine if lesson study positively affects the teachers' skills and ultimately improves students' learning and performance in the classroom.

IV. Potential Benefits:
This case study will examine educators' attitudes and perceptions about the lesson study process and its influences on their professional practice. Your contribution by participating in this study will add to the existing body of knowledge in determining if lesson study is a useful model in influencing the quality of teaching mathematics.

V. Costs and Compensation:
There is no cost or compensation associated with participants.

VI. Confidentiality:
Your identity to responses from the focus group collaborations, interview questions, and participation in this study will be kept confidential. You will be assigned a pseudonym to mask your identity. The accumulated data and findings of the study will be attentively coded and safeguarded against any participant identifiers. All access to electronic data will be password protected and stored in my personal computer at home. Any written data collected will be locked in a cabinet in my home office where I will have exclusive access. After three years of the completed study, all data will be destroyed. Cross-cut shredding will be used to expunge transcription or physical documents. Any electronic data will be destroyed through appropriate data deletion methods (Secure Erase) so that data retrieval cannot be restored or recovered.

VII. Withdrawal:
Participation in this study is strictly voluntary. Withdrawal or refusal to participate from the study will be honored at any time without penalty or loss of benefits. You may withdraw at any time by informing me as the Principal Investigator, that you no longer wish to be a participant (no questions will be asked).

For additional information about this research project, you may contact the Principal Investigator, Arlene Harmon at 706-412-8565 or harmon_arlene@columbusstate.edu. If you have questions regarding your rights as a research participant, you may contact Columbus State University Institutional Review Board at irb@columbusstate.edu.

I have read this informed consent form. If I had any questions, they have been answered. The nature and purpose of this research have been sufficiently explained and by signing this form, I agree to participate in this study. I understand that I am free to withdraw at any time without incurring any penalty. I am at least 18 years of age or older.

_____ _____

Signature of Participant Date

Appendix B

Focus Group Protocol

Introduction
I cannot thank you enough for your valuable time in participating in this study.
Now that you have learned about the lesson study process, your team will take this opportunity in the next few weeks to implement this collaborative cycle. Your team will have the autonomy to collaboratively make all decisions that involve the course of this study.

Purpose
The purpose of this qualitative case study is to gain an understanding of the attitudes and perceptions of elementary educators practicing lesson study. Analysis of the qualitative data will determine if the lesson study model influences the quality of teaching mathematics.

Consent Reminders
Throughout this study, I will gather data to capture your experiences and ideas about lesson study. I am interested in your opinions and perspectives about this professional development approach as you experience this method with your team firsthand.

As the Principal Investigator, I will be taking field notes throughout the course of this research study to gather observation data of the lesson study process. I will use field notes to investigate any influences that practicing lesson study may have towards the quality of instructional math practices. With your permission, audio recordings of the focus group sessions will be transcribed using the automatic transcription features in the digital recording tools and to ensure the accuracy of my notes. You will receive a copy of the transcriptions for the opportunity to make any modifications. Should any of our sessions be conducted online, Microsoft Teams conferences are encrypted and adhere to security standards. Only invited participants and I will have authorized access to enter the virtual platform. I will have exclusive access to all data. Pseudonyms will be used to safeguard your rights as participants. Your name and the name of your education agency will not be used for any presentations or publications.

Team Roles
Your role as a participant: Launching the Six Stages of Lesson Study

You and your team will decide who will perform the following team roles.
Designated discussion facilitator, scribe, and timekeeper:

- **Discussion facilitator** will ask predetermined questions, guide conversations, and monitor discussions to ensure opportunities for everyone to participate.
- **Scribe** records comments and ideas from participants. *Before the meeting adjourns*, the scribe will confirm any decisions or follow-up responsibilities with the lesson study team.
- **Timekeeper** tracks time and assists in keeping conversations moving along.

When each session begins, the timekeeper will review team norms.

Discussion Facilitator: _____
Scribe: _____
Timekeeper: _____

Team Norms
Before/When *each* session begins, the timekeeper will state team norms.

Lesson Study Team Norms

1. _____
2. _____
3. _____
4. _____
5. _____

Team has set schedule to meet

Dates / Days: _____
Time: _____
Location: _____

Closing
To close, thank the participants for consenting to share their experiences and perspectives about lesson study.

Appendix C

Lesson Study Observation Template

<table>
<tr><td colspan="3">Lesson Study Team Lesson: Observation Notes</td></tr>
<tr><td>Date:</td><td colspan="2">Location:</td></tr>
<tr><td rowspan="3">Lesson Study Member Name:

_____</td><td>Begin Time:</td><td>End Time:</td></tr>
<tr><td colspan="2">Grade:</td></tr>
<tr><td colspan="2">Volunteer Team Teacher:

_____</td></tr>
<tr><td colspan="3">Observation Task

What did I see or hear during observation of collaboratively designed lesson in action?</td></tr>
<tr><td>What did I see?
What did I hear?</td><td colspan="2">Why does it matter?</td></tr>
<tr><td></td><td colspan="2"></td></tr>
</table>

Appendix D

Focus Group Reflection of Observations Form

<table>
<tr><td colspan="3">Focus Group Minutes (Reflection Stage)</td></tr>
<tr><td>Date:</td><td colspan="2">Location:</td></tr>
<tr><td rowspan="3">Discussion Facilitator:

Scribe:

Timekeeper:</td><td>Begin Time:</td><td>End Time:</td></tr>
<tr><td colspan="2">Attendees:</td></tr>
<tr><td colspan="2">Norms (example)
We begin and end on time. We expect full participation. We can agree to disagree.</td></tr>
<tr><td colspan="3">Discussion Topic

What did we see or hear during observation of collaboratively designed lesson in action?</td></tr>
<tr><td>What did we see?
What did we hear?</td><td colspan="2">Why does it matter?</td></tr>
<tr><td></td><td colspan="2"></td></tr>
</table>

Appendix E

Individual Interview Protocol

Introduction
First of all, thank you so much for your valuable time in participating in this individual interview.

Purpose
The purpose of this qualitative case study is to gain an understanding of the attitudes and perceptions of elementary educators practicing lesson study. Analysis of the qualitative data will determine if the lesson study model influences the quality of teaching mathematics.

Consent Reminders
During the interview, you will be asked several questions about your attitudes and perceptions about participating in the lesson study process and the influences this method may have on your professional practice.

With your permission, I will audio record the interview and also take notes to accurately capture your responses. I will not ask to state your name during the interview. Two hand held digital audio devices in my possession will be used to ensure the audio and the automatic transcribing feature is captured in case one of the devices fail.

A transcription of the recorded data, using a pseudonym, will be given to you to review, check for accuracy, provide further input, and make any needed changes if necessary, before the document is analyzed. At no time will your true identity be revealed and it shall remain anonymous. The collected data will not be used in any further projects. Rest assured that you can opt to not participate or not continue at any time during the interview process by informing me, the Principal Investigator, that you no longer wish to be a participant (no questions will be asked).

Interviewee: _____ Interview Date: _____ Time: _____

School Position: _____

Probe: I am interested in learning about your experiences practicing Lesson Study.

1. What are your general feelings about using the lesson study process to teach math?

    1a) What contributes to why you are feeling this way?

2. As you reflect on the five Performance Management Appraisal Program (PMAP)

teacher evaluation elements, to what extent does the lesson study process contribute to the quality of your teaching practices in math?

Probe: Ask to state feelings and thoughts about each PMAP element in relation to using lesson study to enhance the quality of their teaching practices. Participant may look at PMAP and CLS Process Alignment Chart (Figure 1) for reference.

2a) PMAP Element 1: Mastering Content and Curriculum

2b) PMAP Element 2: Instructional Planning and Strategies

2c) PMAP Element 3: Managing for Effective Learning

2d) PMAP Element 4: Monitoring and Assessing Student Achievement

2e) PMAP Element 5: Promoting Diversity and Equity

3. What are your general feelings and thoughts about lesson study's influence, if any, on working relationships?

    3a) Do you think working as a group in implementing the lesson study process has influenced the quality of teaching? Please elaborate on your reasoning.

4. What other experiences, positive and negative, have you encountered from participating in lesson study to collaboratively work as a group?

5. What comments, if any, would you like to add to this interview?

At the end of the interview, thank participants for their effort, time, and candid responses.

Appendix F

Focus Group Interview Protocol

Introduction
First of all, thank you so much for your valuable time in participating in this focus group interview.

Purpose
The purpose of this qualitative case study is to gain an understanding of the attitudes and perceptions of elementary educators practicing lesson study. Analysis of the qualitative data will determine if the lesson study model influences the quality of teaching mathematics.

Consent Reminders
During the interview, you will be asked several questions about your attitudes and perceptions about participating in the lesson study process and the influences this method may have on your professional practice.

With your permission, I will audio record the interview and also take notes to accurately capture your responses. I will not ask to state your name during the interview. Two hand held digital audio devices in my possession will be used to ensure the audio and the automatic transcribing feature is captured in case one of the devices fail.

A transcription of the recorded data, using a pseudonym, will be given to you to review, check for accuracy, provide further input, and make any needed changes if necessary, before the document is analyzed. At no time will your true identity be revealed and it shall remain anonymous. The collected data will not be used in any further projects. Rest assured that you can opt to not participate or not continue at any time during the interview process by informing me, the Principal Investigator, that you no longer wish to be a participant (no questions will be asked).

Interview Date: _____ Time: _____

Probe: I am interested in learning about your collective experiences practicing Lesson Study.

1. What are your initial and post impressions of a complete lesson study cycle?

    1a) What contributes to why you are feeling this way?

2. What are your perspectives towards practicing lesson study and its influence on

    improving the focused collaboration process?

2a) What contributes to why you are feeling this way?

2b) In what ways were your collaboratively planned lessons effective or ineffective? How do you know?

3. What are your perspectives towards practicing lesson study and its influence on math instruction?

3a) What contributes to why you are feeling this way?

3b) In what ways were your instructional methods effective or ineffective? How do you know?

4. Upon reflection on your experience with lesson study, what other observations or comments would you like to share?

At the end of the interview, thank participants for their effort, time, and candid responses.