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Nurturing the Seeds of Collective Efficacy: A Case
Study of Professional Learning Integrating ELD,
Math, and Collaborative Inquiry

by

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Thesis Abstract

This case study documents shifts in teachers' perceptions of themselves and of their English learner students as they participated in a professional learning experience using collaborative inquiry in combination with specialized coaching specific to English Language Development and mathematics instruction. This integrated model of professional learning was based on recommendations across the literature for effective professional learning for teachers of English learners. The researcher used a mixed methods approach combining data from a pre and post Likert-type survey with data gathered from extensive teacher discourse recorded during group discussions and one-to-one interviews. The participants in this study consisted of 4 elementary classroom teachers and two specialist instructional coaches who collaborated to increase conceptual understanding and mathematical discourse for their English learner students. The results indicate positive shifts in teachers' perceptions of their abilities to meet the needs of their English learner students. More importantly, the results indicate significant positive shifts in teachers' perceptions of their English learner students as a result of participating in the professional learning experience. This study recommends the replication of this professional learning model across the content areas as a way to mediate the persistent access and achievement gap for English learner students.

Keywords: collaborative inquiry, collective efficacy, English Language Development, English learners, integrated ELD, mathematical discourse, professional learning, scaffolds

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Chapter One: Definition of Problem

Wide and persistent gaps in access and achievement between English learners and their English proficient peers have been a longstanding element in the history of public education in California. California is also known for extensive research in effective teaching practices, models and programs designed to bridge these gaps (Hakuta, 2016, Moschkovich, 2013, Olsen, 2014). Nevertheless, the gaps remain, and with the language demands of the Common Core State Standards adopted in 2010, they continue to grow, particularly in math. Calderon et al, (2011), assert that a gap in achievement signals a gap in teacher skill and/or preparation. However, the tenacity of the gaps not only in achievement, but in equity, belie causal factors much deeper than instructional practice (Hakuta, 2018; Moschkovich, 2013; Olsen, 2014; Ruffalo, 2018). Professional effective development specific to teachers of English learners must address the deficit mindsets and unconscious biases of teachers toward English learner students.

Purpose of Research

John Hattie's most current list of factors that influence student achievement (Hattie, 2018), indicates that a teacher's estimate of student achievement has an effect size of 1.62. A size effect of .4 equals one year of growth during one year of school. This means that a teacher's belief that a student will achieve can result in almost 4 years of growth in one school year. Ranked at number two on Hattie's list of factors that influence student achievement (Hattie, 2018), is "collective efficacy," with an effect size of 1.57. Hattie et al., (2018) define collective efficacy in education as. "...teams of educators believing they have the ability to make a difference." The purpose of this study is to examine the shifts in teacher perception as they engage in professional learning that integrates collaborative inquiry with professional learning specific to EL students and math instruction. Specifically, the researcher seeks to document the

potential of collaborative professional learning to nurture the seeds of collective efficacy and positive estimates of EL student achievement. The questions asked in this study are:

- How do teachers' perceptions of their individual and collective capacity for increasing achievement for English learner students in math change by participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?
- How do teachers' perceptions of their EL students' areas of need and/or areas of strength change as a result of participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?
- What changes in decision making, planning, and instructional practice do teachers observe in themselves as they participate in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?

Preview Literature

This section reviews past and current research on the components of effective professional learning specific to English learners and integrated ELD in the context of math instruction. Firstly, the pivotal role of language in learning is reviewed with a focus on explicit vocabulary instruction and scaffolding techniques for supporting English learner students in answering open-ended questions in math (August et al, 2018; Banse et al, 2017; Calderon et al, 2011; Gibbons, 2015; McNeil, 2011; Morh & Morh, 2007).

Next, the importance of creating context rich and collaborative classroom cultures that support multiple opportunities for English learners to practice and apply language is explored. The literature reviewed in this section includes the work of Pauline Gibbons (2015) with her rich offerings of dialogic teaching, a framework of practical instructional routines to extend student

discourse in math (Zwiers et al, 2018), studies on spatial reasoning as a foundation to conceptual development in math (Lowrie & Jorgensen, 2017; McKeny & Foley).

Finally, recommendations for professional development are discussed. The literature reviewed in this section is linked by the application of social learning theory as applied to professional learning communities. In this section, the works of Etienne Wenger (1998), Richard DuFour (2017), and Hargreaves & Fullan (2012) serve as anchors to a variety of papers focused on the pivotal connections that link collaborative inquiry, collective efficacy, and transformative classroom practice (Donahoo, et al, 2018; Hakuta, 2014; Olsen, 2014; Ruffalo, 2018).

Preview Methodology

This mixed methods study frames a detailed qualitative case study with simple quantitative data in the form of a pre- and post- four-point Likert scale survey. A mixed methods approach is appropriate as the researcher seeks to determine whether or not professional learning integrating ELD and math renders positive gains in teachers' perceptions of their capacity to teach EL students and in their perceptions of their EL students' capacity to learn. The Likert scale survey can answer the researcher's questions in terms of *learning outcomes* and provides results that are easy to read and interpret. However, the complexities of the *learning process* are best analyzed through qualitative methods.

Participants for this study include the researcher who also serves as the ELD expert, an instructional coach specializing in math instruction, and four elementary classroom teachers who participated on a voluntary basis. The teachers have a range of experience from 6-15 years of practice. Two of the teachers teach first grade students, one is a third-grade teacher and one teaches fourth grade. All of the participants work for a school district in the Bay Area of northern California.

Qualitative data includes teacher discourse from four group professional learning sessions, individual interviews, and planning and debrief conversations between the researcher or math coach and participating teachers. All of the professional learning sessions, interviews, and coaching conversations were audio-taped and transcribed for analysis. Transcriptions were coded using two overlapping coding methods. The researcher and the math coach coded each transcription independently and then met to discuss the results and resolve any discrepancies.

Significance of Research

The results of this study contribute to the current research and conversation of professional educators and educational policy makers as an example of effective professional development as a means of increasing access, equity, achievement and opportunity for English learners. Hargraves and Fullan assert:

Where students are concerned, the teacher will always be more powerful than the principal, the president, or the prime minister. Successful and sustainable improvement can therefore never be done *to or even for* teachers. It can only ever be achieved by and with them. (Hargraves, A. & Fullan, M., 2012. p. 43).

John Hattie's ranking of teachers' beliefs about their students capacity to learn and their beliefs about their own efficacy as teachers as the top two factors that influence student achievement (Hattie, 2016.) certainly affirm and confirm the need for educational leaders to invest in the professional learning of teachers as the most powerful and effective way to mediate the achievement gap for English Learners.

Summary of Chapter

The problem under study is how to effectively mediate the gaps in access and achievement between English learner students and the English proficient peers in math. The

goal is to determine if a particular model for professional learning is effective in supporting teachers toward positive shifts in mindset and perception of themselves and of their English learner students. The central themes of the study are effective instruction for English learners, context rich and engaging classroom environments that support extended mathematical discourse, and professional development anchored in social learning as applied to professional learning cultures.

Definitions

Collaborative Inquiry. The process of working with others to solve a problem through the process of research

Collective Efficacy. A team's belief in its collective capability to effect change

English Language Development (ELD). A framework of instruction that teaches English learners how to speak, read, write and listen to English

English Learners (EL). Students with a primary language other than English

Integrated ELD. An intentional integration of the standards and the framework for English Language Development into content area instruction to support access to core instruction

Mathematical Discourse. Mathematical discussion characterized by specialized vocabulary, syntax, organization and register unique to math

Professional Learning Community (PLC). A group of educators that meets regularly, shares expertise, and works collaboratively to improve teaching skills and student performance

SBAC (Smarter Balanced Assessment Consortium). California's standardized tests used to measure the academic achievement and progress of students

Scaffolding. Intentional conceptual and linguistic supports provided by the teacher to provide access to instruction and meaning for students

Chapter Two: Literature Review

The efforts to bridge the gaps in access, opportunity, and academic achievement between our English learner students and their English proficient peers are long standing in California. Since 1974, in the case of *Lau v. Nichols*, equal access to a meaningful education has been considered a civil right, not just for English learners, but for all students. Since that time, wide bodies of research, program models, and state and federal legislation have been put into play to support the academic achievement of our English learner students (Calderon et al, 2011; Cummins, 1989; Hakuta, 2018; Olsen, 2014). However, in the 44 years since *Lau v. Nichols*, the achievement gap for our English learners continues to grow (Olsen, 2014).

Calderon, Slavin, & Sanchez (2011) assert that an achievement gap in students signals a corresponding knowledge and/or skill gap in teachers and that quality of instruction is what matters most for EL students. In the context of math instruction specifically, the complexity of the interplay of mathematical language, English language development, and concept development cannot be overstated. It is important, therefore, to consider not only the characteristics of high-quality instruction in Mathematics for EL students, but also the characteristics of effective professional development for teachers of English Learners. The research questions for this study are:

- How do teachers' perceptions of their individual and collective capacity for increasing achievement for English learner students in math change by participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?
- How do teachers' perceptions of their EL students' areas of need and/or areas of strength change as a result of participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?

- What changes in decision making, planning, and instructional practice do teachers observe in themselves as they participate in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?

This chapter reviews literature that discusses three foundational pieces necessary for addressing the achievement gap in Math of EL students through high quality instruction: intentional and strategic instruction of mathematical language, the creation of a collaborative classroom climate that fosters extended language experiences in which to embed mathematical discourse, and, finally, professional learning that integrates collaborative inquiry and professional learning specific to English language development and conceptual development in Mathematics in order to support a sense of collective efficacy in teachers of English Learners.

Intentional and Strategic Instruction in the Language of Mathematics

We know from the now famously named “Matthew effect,” (Stanovich 1986), that the achievement gap for students begins as a vocabulary gap well before their first day of Kindergarten. A limited vocabulary means limited contextual knowledge, and these combined limitations hinder the natural process of learning new word meanings from exposure. A longitudinal study by Mancilla-Martinez and Lesaux (2010) showed that EL students starting with vocabulary knowledge in English approximately two years behind that of their English-proficient peers never caught up, even when they developed vocabulary at faster rates than their English-proficient peers. Words are the basic building blocks of language, and we know that language and learning are “inextricably linked” (Gibbons 2015). Calderon, Slavin & Sanchez (2011) remind us of the many studies that attest to the fact that the vocabulary knowledge of kindergarten and first graders is a significant predictor of both reading comprehension and reading difficulties in middle and secondary grades. Olsen’s research on Long Term English

Learners (2014), certainly confirms these findings and both Olsen (2014) and Calderon et al, (2011) agree that explicit vocabulary instruction is one of the most crucial components of a strong ELD program that should be intentionally implemented starting in early childhood education programs and continuing through grade 12. Most recently, the California English Language Development Standards Kindergarten Through Grade 12 (2012), and the groundbreaking English Language Arts/English Language Development Framework for California Public Schools Kindergarten Through Grade Twelve (2014), clearly define the need for all teachers across all content areas to be teachers of language and both documents clearly define the expectation that EL students will receive both Designated and Integrated ELD every day they are in school. This renewed focus on language has brought with it a renewed focus in research and field studies on the elements of effective vocabulary instruction. Explicit and effective vocabulary instruction, “entails frequent exposure to a word in multiple forms; providing examples of its use in phrases and idioms and usual context; ensuring proper pronunciation, spelling, word parts, and when possible cognates,” (Calderon et al., 2011.). August, Artzi, Barr & Frances (2018), define this approach as extended vocabulary instruction in their study that compares the effects of extended vocabulary instruction and embedded vocabulary instruction. In light of the importance of language in the learning process, it makes sense to start with explicit instruction in academic vocabulary when designing an instructional routine to support English language development and conceptual development in Math, especially with our youngest students.

However, it is important to keep in mind that mathematical language is a language system unto itself. In her essay describing principles for equitable mathematics teaching practices for ELs, Judith Moschkovich presents a, “...complex view of mathematical language as not only a specialized vocabulary but also as extended discourse that includes syntax,

organization, mathematics register, and discourse practices” (2013. p. 45), and she strongly cautions educators that, “While learning vocabulary is necessary, it is not sufficient” (2013. p. 46). Across the literature (Calderon et al. 2011, Gibbons 2015, Hakuta 2014, Kazemi, E. and Stipek, D. 2001, McKeny, T.S. and Foley, G. D. 2013, Lowrie, T. and Jorgensen, R. 2017, Moschkovich, J. 2013, Razfir, A. 2013, Zwiers et al. 2017), the practice of connecting instruction in mathematical language to engaging contextualized experiences is presented as a non-negotiable. These common experiences enable children to engage in mathematical meaning-making while they practice using new language for new ways of thinking. Repeated exposure to the target language in a variety of contexts and experiences, promotes deep processing of word meanings. Moreover, engaging experiences and activities, “broaden participation for students who are learning English,” and this is important, “because we know that participation is connected to opportunities to learn” (Moschkovich, 2013). The importance of mastering academic English notwithstanding, educators must also keep in mind the importance of creating a “third space,” where formal and informal language co-exist in order for emerging bilingual students to leverage their multilingual and multicultural resources in solving problems and deepening conceptual understandings (Razfar, 2013). It is here, at the intersection of language and learning that we must consider the importance of, “...creating learning environments that support all students (but specifically those learning English) in engaging in rich mathematical activity and discussions” (Moschkovich, 2013).

Creating a Classroom Culture of Collaboration to Foster Language and Learning

Cooperative group and partner work around authentic and engaging tasks are the foundation of a classroom culture of collaborative talk and meaning making. Collaborative tasks not only allow, EL students extended opportunities to practice using new vocabulary and language structures, they also provide the teacher with many opportunities to elicit the “longer

stretches of discourse,” necessary for students to focus on how they are using new language for the benefit of their listeners, and to nurture a “supportive context in which students feel able to take risks with language” (Gibbons 2015). It is important to keep in mind, however, that teachers must have the knowledge and skill to be able to create, plan for, and implement group tasks that develop conceptual knowledge and support language learning. Gibbons (2015) offers extensive discussion and explanation of the characteristics of group work that is effective for English learners, such as clear and explicit directions, tasks where talk is necessary (information gap tasks are described), tasks that are cognitively appropriate and challenging, a clear outcome for the group work, and tasks that are integrated with a broader curriculum topic. Fisher and Frey (2011) acknowledge the all-important skill of classroom management and, with their twenty “Spotlight Lessons,” provide substantial scaffolding for teachers as they embark on a new school year of productive group work. Specifically addressing instruction in mathematics and language, McKenry and Foley (2013) highlight the integration of measurement tasks with children’s literature and classroom discourse as a way to, “...build a base for a quantitatively literate child,” in their review of The Better Mathematics through Literacy (BTML) project. In this integrated approach designed for young elementary age students, stories provide a common meaningful context and measurement tasks allow children to engage in thinking and talking about number and quantity as they interact with concrete objects. The authors assert that, “... a focus on geometric concepts and unit analysis in the early grades can develop the cognitive tools for children to achieve a deep understanding of dimension and proportion in the middle grades” (p. 321).

Zwiers et al., (2017) provide concrete support for teachers of mathematics seeking to make a shift to productive group work that capitalizes on the interdependence of mathematical concept development and language development, through their framework of four design

principles (support sense-making, optimize output, cultivate conversation, maximize linguistic and cognitive meta-awareness) and seven mathematical language routines (MLRs). Note their fourth design principle, meta-awareness. In exercising meta-awareness, both teachers and students reflect on and talk about the reasoning and language used to solve a problem and communicate strategies to an intended audience. In addition, teachers who seek to promote conceptual thinking along with language development must be aware of the difference between social norms for collaborative group work and sociomathematical norms as outlined by Kazemi and Stipek (2001). Sociomathematical norms, such as, “an explanation consists of a mathematical argument, not simply a procedural description,” allow both teachers and students to move beyond “surface implementations...” of “...reform-minded mathematical instruction,” such as providing manipulative and having students solve problems in groups, and progress into deeper mathematical inquiry and understanding (Kazemi and Stipek, 2011).

Along with planning for and managing an engaging experiential environment, one of the essential skills discussed throughout the research is that of using talk to scaffold referential (open-ended) questions for English learners (Banse et al. 2016, Banse et al. 2017, Gibbons 2015, Kazemi, E. and Stipek, D. 2001, McNeil, L. 2011, Mohr, K. A. J., and Mohr, E. S. 2001).

McNeil (2011) examines the scaffolding functions of a 5th grade teacher’s talk as she engages her EL students in referential questions. He discusses the teacher discourse moves of reformulation, repetition and elaboration, but more importantly he documents and defines the discourse moves the teacher uses to support her EL students in the early stages of English language development who are unable to respond, at first, to the referential questions, moves such as wait time, reducing degrees of freedom, using physical objects, non-verbal communicative moves, and providing possible responses. Banse et al. (2016), extend and elaborate upon the work of McNeil (2011) by defining referential questions during math

instruction as those that, “invite students to explain their mathematical thinking” (p.102). In addition to asking open-ended questions, the authors offer and explain 4 additional strategies for scaffolding EL students during mathematical discussions as follows: follow open-ended questions with close-ended questions, as needed; scaffold students’ responses by repeating, extending and rephrasing; model mathematical vocabulary in context; include EL students in mathematical discourse each day (Banse et al., 2016. p. 102). Mohr and Mohr (2007) provide concrete and explicit support for teachers by defining 6 categories of EL student responses to teacher generated questions (appropriate/correct response, partially correct response, incorrect or inappropriate response, response in the native language, another question, or no response) and a corresponding “response protocol,” for each type. In addition to their response protocol for teachers of English learners, the authors encourage teachers to allow sufficient wait time, accept phrases and partial answers, and to listen closely to students with a focus on the content of the message rather than its grammatical structure in order to increase interaction. Gibbons (2015), uses the term teacher-guided reporting to describe the process during which, “...the teacher provides scaffolding by clarifying, questioning, and providing models for the speaker so that the learner and the teacher together collaboratively build up what the learner wants to say” (p. 34). Scaffolding learning and language simultaneously while implementing content area standards and language development standards in tandem is a daunting task and requires a high level of knowledge, skill and expertise. This brings us to the next theme in the literature reviewed, the need for effective professional development specific to working with English learners in the context of math instruction.

Professional Development Specific to Collaborative Inquiry, ELD and Math

Calderon et al. (2011), assert that the wide and persistent achievement gap “signals a need for increased teacher and staff preparation,” and that “closing the achievement gap means,

in part, closing similar gaps in teacher preparation programs and ongoing professional development.” Effective instruction for EL students requires a specific skill set of teachers, and effective instruction in Mathematics requires an additional skill set. Teachers need to know how to connect new learning to prior knowledge, scaffold new learning and new language concurrently, elicit extended discourse from students and respond to students in ways that affirm, confirm, nudge for deeper thinking, and gently correct language and any misconceptions. In addition, EL students have cognitive, academic, social and emotional needs that go beyond language. Teachers must be able to go, “off script,” in order to adapt, shape and add to the curriculum, materials, and assessments they are given (Olsen, 2014), all while creating authentic language experiences that will foster extended conversation and deep cognitive processing (Gibbons, 2015). Calderon et al., (2011), Hakuta (2014), and Olsen (2014), all recommend the use of collaborative cycles of inquiry, particularly if the collaborative work is centered on formative assessment as a teaching practice, as a powerful vehicle for ongoing effective professional development. Hakuta (2014), sees formative assessment as particularly powerful for teachers of ELs as it involves adjusting instruction in response to evidence, timely and relevant feedback for students, and student participation through self-assessment. Furthermore, he asserts that, “an instructionally based perspective of formative assessment can only be successful with effective uses of language by both the student and the teacher. And if this practice is supported effectively, it can be a powerful agent of change in instruction by providing ELL students with a rich and powerful source of language input for their English language development in the context of content instruction” (Hakuta, 2014. p. 434). Moschkovich (2013) reminds us that professional development that has an impact on student achievement is long-term, exposes teachers to examples of best practices in mathematical discourse, engages them in reading about discourse in classrooms, links professional learning to real classroom work and

uses their actual curriculum materials. Hargreaves and Fullan (2012) remind us that, “Successful and sustainable improvement... can only be achieved by and with,” teachers. They encourage educational leaders to, “...invest in developing teachers’ capabilities and give them time to sharpen these capabilities to high standard” (p. 45). The authors present a professional capital view of teaching that assumes, among other assertions, that, “...good teaching is technically sophisticated and difficult, requires high levels of education and long periods of training, and is a collective responsibility” (p. 14). DuFour (2015) revisits the power of the PLC process that requires educators to, “...work collaboratively in recurring cycles of collective inquiry...under the assumption that the key to improved learning for students is continuous job-embedded learning for the educators” (p. 98). Donohoo, Hattie, & Eells (2018) explain the power of collective efficacy as a team’s belief in its collective capability to effect change. In relation to teams of teachers, Eells (2011) demonstrated that, “...the beliefs teachers hold about the ability of the school as a whole are strongly and positively associated with student achievement across subject areas” (p. 110). With an effect size of 1.57, Hattie (2016), places collective efficacy at the top of the list of factors that influence student achievement. School leaders are urged to provide their teachers with, “evidence of impact,” and to help them, “...make the link between their collective actions and student outcomes” (Donohoo, Hattie, & Eells 2018).

More pragmatically, Moschkovich (2013) reminds us that professional development that has an impact on student achievement is long-term, exposes teachers to examples of best practices in mathematical discourse, engages them in reading about discourse in classrooms, and links professional learning to real classroom work and uses their actual curriculum materials. Most recently, Ruffalo of Education Trust-West (2018) recommends professional development, “focused on both English and math to improve the English language skills and math scores of English learners,” along with ongoing coaching and sufficient time for collaboration between

English language development teachers and math teachers. Ruffalo (2018) describes a successful professional development model at an elementary school in California where teams of three teachers and a math instruction specialist meet once a month to design a math lesson with an emphasis on scaffolding English learners. Each teacher implements the lesson and prepares to discuss how the lesson went and how it can be improved at the next meeting. As a result of this collaborative model of professional development, English learners at this school meet or exceed the math standards on the annual standardized state assessment at three times the rate of English learners in the state in 2017 (Ruffalo, 2018, p. 15). Similarly, a team of researchers in Australia have combined their individual areas of expertise, one in math, and the other in equity to:

Develop, implement and evaluate, an intervention rich in spatial reasoning that supports teachers' content and pedagogical knowledge as well as enabling our target students' access to powerful mathematical concepts and processes. This dual focus-both teachers and students-will provide considerable scaffolding for all learners. (Lowrie, T. & Jorgensen, R., 2017, p. 68).

Summary of Chapter

The research reveals that in order to mediate the achievement gap in math for English learners, teachers must be able to integrate practices and strategies that support the development of English language, mathematical language, and concept development concurrently. These types of strategies and practices can only happen in classrooms where learning and meaning making are co-constructed in active, hands-on, collaborative cultures of academic talk. Creating a collaborative culture of conversation in the classroom requires a marked shift away from the lock-step direct instruction of the No Child Left Behind era. Teachers must be intentional about creating multiple opportunities for EL students to engage in language production, not just for the sake of language development and increased fluency, but for concept development and increased

learning. The research in this study attempts to address the areas discussed in the literature review through the following questions:

- How do teachers' perceptions of their individual and collective capacity for increasing achievement for English learner students in math change by participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?
- How do teachers' perceptions of their EL students' areas of need and/or areas of strength change as a result of participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?
- What changes in decision making, planning, and instructional practice do teachers observe in themselves as they participate in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?

The literature supports the need for further research within these questions. Now more than ever, continued opportunities for achievement and success for English Learner students depend on a confident command of language across the content areas. Leaders must support effective instruction for EL students by investing in the professional capital of teachers, and in so doing, nurture the seeds of collective efficacy among teams of educators with robust, ongoing and supportive professional learning that emphasizes the interdependency of language and cognitive development.

Chapter Three: Methodology

This study was a qualitative study with a cohort of 4 elementary school teachers, 1 Math specialist instructional coach and 1 ELD specialist instructional coach, who was also the researcher, within the setting of a professional and collaborative inquiry cycle. Based on the premise that an achievement gap signals a corresponding skill or knowledge gap in the instructional practice of teachers (Calderon et al. 2011), this study was launched in response to the alarming achievement gap in math between the English Learner (EL) students and their English Proficient (EP) peers in the elementary school with the highest percentage of EL students in the home school district of the author. In 2017, just 4.35% of the 5th grade EL students at Peach Tree Elementary School met standards on the Math CAASPP. Zero percent of the students in this cohort exceeded standard in math CAASPP in 2017, the third year in a row without a single EL student exceeding standard in math for this particular cohort of students.

Guided by a social theory of learning as applied to the professional development of teachers (DuFour, 2015; Hargreaves & Fullan, 2012; Hattie et al. 2018; Leana, 2011; Wenger, 1998), the primary goal of this study is to gain a better understanding of how teachers' perceptions of their personal and collective efficacy in meeting the language and conceptual needs of their English Learner (EL) students, specifically in Math, changed during the course of participating in a collaborative professional learning module. The study also documents the changes in instructional practice that emerged during the course of the professional learning experience. After reviewing the literature, three questions regarding effective professional development for teachers of EL students in Math evolved:

- How do teachers' perceptions of their individual and collective capacity for increasing achievement for English learner students in math change by participating in a

professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?

- How do teachers' perceptions of their EL students' areas of need and/or areas of strength change as a result of participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?
- What changes in decision making, planning, and instructional practice do teachers observe in themselves as they participate in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?

In this chapter, the research study's methodology will be discussed. The research design of the project will be reviewed, and descriptions of the educators who participated in the study will be shared. Data for this study were collected from an elementary school district located in the Bay Area of northern California. The chapter will outline the instruments and procedures used to create an analysis of the study. The researcher chose to use qualitative data methods via surveys, interviews and collection of artifacts, in an attempt to document the shifts in teachers' perceptions of themselves and of their students, and any shifts in instructional practice during the course of a collaborative professional learning module specific to ELD and Math. This chapter will also outline the analysis of the data collection and any limitations that existed in the research design.

Design

A case study approach using qualitative measures was used to conduct this study. A total of 4 elementary school general education teachers spanning grades 1-4, and two instructional coaches participated. The four classroom teachers were given pre- and post- questionnaires to document shifts in their perceptions of their capacity to meet the language and content needs of

their EL students in Math. The purpose of asking teachers to engage in the questionnaire at the beginning of the study, before any professional learning had occurred, was to collect an initial set of data that would then be compared to see how teachers' perceptions changed as a result of participating in collaborative professional learning. Individual and group interviews were conducted at different points of time in the study in order to gain a deeper understanding of teachers' needs, thinking and decision making processes.

Participants

The study occurred with four general education teachers and two instructional coaches as they engaged in an integrated professional learning module that combined professional learning specific to ELD and Math within the setting of a collaborative inquiry specific to Math instruction designed to meet the language and conceptual development needs of EL students. All four teachers and both instructional coaches volunteered to engage in the professional learning module and in the data collection elements for the study. The teachers, at the time of the study, worked at three different K-5 elementary schools in a school district located in the Bay Area of northern California. Each teacher worked in an integrated self-contained single grade classroom and were responsible for delivering both Math and ELD instruction to their EL students within the self-contained setting. Two of the classroom teachers taught first grade, one taught third grade, and the other fourth grade. The years of professional experience among the participants were from 5-27 years.

Setting

The research was conducted in a school district located in the East Bay region of the San Francisco Bay area. The school district serves primarily students in Orchard City, a suburban,

family-oriented community with a wide range of socio-economic incomes. The researcher focused her study on work with teachers working at Peach Tree Elementary School.

The student population at Peach Tree Elementary School in Orchard City, California consists mostly of white and Hispanic or Latino students totaling 70.8% of the population. The school currently consists of 668 students, therefore the Hispanic or Latino population at 43.4% is 290 students. This is a significant portion of the student population. In addition, as shown in Figure 2, this elementary school has a significant population of English Learner students, only slightly less than the state average at 20.1%, but significantly more than the district percentage of EL students which is only 10.1%.

The gap between the percentage of EL students in the district and the percentage of EL students at Peach Tree Elementary is important in light of the history of the community. Just 25 years ago, Orchard City was a very small agricultural community serving primarily farmers and people related to the agricultural industry. Migrant farm workers moved in and out of Orchard City according to the growing season. The K-8 school district consisted of 1 elementary school and 1 middle school. Between 2000 and 2005 the population in Orchard City increased by 58%. This staggering growth was fueled by the increased cost of housing in San Francisco and a growth in the number of families with school age children born in the early 1990s. In 2000 the population was about 23,302 residents. It grew to over 42,000 in 2005. As of 2016, Orchard City's population was upwards of 60,000 and it continues to grow. Currently, there are 8 elementary schools and 3 middle schools in our district. The largest elementary school in our district has over 900 students. This rapid growth, as shown in the data of Figure 3.1, and an influx of families from surrounding Bay Area cities and towns brought much greater diversity to Orchard City schools as Figure 3.2 clearly shows.

Historical population		
Census	Pop.	%±
1950	1,729	—
1960	2,186	26.4%
1970	2,649	21.2%
1980	4,434	67.4%
1990	7,563	70.6%
2000	23,302	208.1%
2010	51,481	120.9%
Est. 2016	60,532 ^[7]	17.6%

U.S. Decennial Census ^[29]

Figure 3.1. Population Growth in Orchard City, CA. Adapted from Bay Area Census. Retrieved on August 5, 2018 from <http://www.bayareacensus.ca.gov/cities/Brentwood.htm>

Figure 3.2. Changing Demographics in Orchard City, CA. Adapted from “Bay Area Census,” retrieved on August 5, 2018 from <http://www.bayareacensus.ca.gov/cities/Brentwood.htm>

The growing pains have been especially challenging for the teaching staff at Peach Tree Elementary School. This

	Census 2000		Census 2010	
TOTAL POPULATION	23,302	100.0%	51,481	100.0%
In households	23,265	99.8%	51,335	99.7%
In group quarters	37	0.2%	146	0.3%
RACE				
White	17,201	73.8%	34,969	67.9%
Black or African American	579	2.5%	3,389	6.6%
American Indian and Alaska Native	143	0.6%	333	0.6%
Asian	666	2.9%	4,051	7.9%
Native Hawaiian and Other Pacific Islander	73	0.3%	202	0.4%
Some other race	3,387	14.5%	4,964	9.6%
Two or more races	1,253	5.4%	3,573	6.9%
HISPANIC OR LATINO AND RACE				
Hispanic or Latino (of any race)	6,565	28.2%	13,779	26.8%
Not Hispanic or Latino	16,737	71.8%	37,702	73.2%
White	14,692	63.1%	27,944	54.3%
Black or African American	553	2.4%	3,197	6.2%
American Indian and Alaska Native	95	0.4%	178	0.3%
Asian	632	2.7%	3,903	7.6%
Native Hawaiian and Other Pacific Islander	49	0.2%	170	0.3%
Some other race	51	0.2%	129	0.3%
Two or more races	665	2.9%	2,181	4.2%

school is located at the east end of Brentwood in a neighborhood with the highest number of high density and low-income housing. Peach Tree not only has the highest population of EL students but also the highest population of Title 1 and Special Education students. Peach Tree is a relatively new school (operational for just 4 years) that opened in response to the city’s growth. However, the majority of the teaching staff transferred from other schools in the district, schools where the number of EL students was not so significant. Many teachers in the school district, even now, may have taught several groups of students over the years with not one English

Learner. The low number of EL students district wide has created a culture of transference of responsibility for the academic achievement of EL students. Many schools in the district still use pull out models for intervention and for ELD. In this respect, the achievement gap in Math at Peach Tree Elementary school most certainly points to a gap in professional learning (Calderon et al. 2011).

▼ Fluent-English Proficient and English Only			
Achievement Level Distribution Over Time			
	3rd Grade (2015)	4th Grade (2016)	5th Grade (2017)
Mean Scale Score	2416.7	2481.1	2509.1
Standard Exceeded: Level 4	18 %	21 %	21.33 %
Standard Met: Level 3	26 %	31 %	20.00 %
Standard Nearly Met: Level 2	20 %	33 %	34.67 %
Standard Not Met: Level 1	35 %	15 %	24.00 %

Figure 3.3 Math SBAC Results for English Proficient Students at Peach Tree Elementary School

In light of the history of the school district, and the history of our state, for that matter, an achievement gap between EL and English proficient (EP) students at a school with a large percentage of EL students would not be unusual. However, the achievement gap in Math between EL and EP students at Peach Tree Elementary School is alarming. Figure 3.3 shows that Math standards were met or exceeded by 41% of English proficient 5th graders in 2017.

English Learner			
Achievement Level Distribution Over Time			
	3rd Grade (2015)	4th Grade (2016)	5th Grade (2017)
Mean Scale Score	2373.3	2388.5	2395.3
Standard Exceeded: Level 4	0 %	0 %	0.00 %
Standard Met: Level 3	14 %	8 %	4.35 %
Standard Nearly Met: Level 2	37 %	28 %	21.74 %
Standard Not Met: Level 1	49 %	64 %	73.91 %

Figure 3.4 Math SBAC Results for English Learner Students at Peach Tree Elementary School

In stark contrast, as shown in Figure 3.4, only 4.35% of EL students in 5th grade met standards in 2017. No EL students exceeded the standard. The gap is large and widens each year. For the purposes of this study, the exaggerated achievement gap at Peach Tree Elementary School was a most conducive setting. The gap itself created a point of entry into the classrooms and conversations of the teachers. The staff at Peach Tree Elementary school, after 3 years of concerted effort, began to realize that they needed to explore a different set of strategies and skills in order to support their EL students in both language and learning. The EL students and Peach Tree Elementary School had the lowest test scores in the district, but for the purposes of this researcher, this was not a deficit, and it was not a challenge. It was a key. It was the key that opened the door to the day-to-day practice of teachers who were ready for change.

The timing of the study was also key. Participants were recruited in early June at the closing of a school year, a time when teachers are looking forward to the new school year. The fourteen-week study allowed teachers to engage in professional reading and discussion over the summer break in preparation for beginning the 18-19 school year with new skills and strategies to implement during Math instruction with their EL students in mind.

Instruments

Quantitative data and qualitative data were collected for this study during group professional learning sessions and one-to-one interviews of participating teachers. The study began with a four-point Likert scale survey made up of six questions that measured teachers' perceptions of their efficacy in determining the language and content area needs of their English learner students in math, and in choosing appropriate instructional strategies and scaffolds in order to meet those needs. The researcher chose to administer the same survey at the end of the study in order to document any shifts in teachers' perceptions of themselves and/or of their EL students. The questions on the pre- and post-survey were as follows:

1. I feel confident in my ability to determine appropriate learning targets in math for my EL students.
2. I feel confident in my ability to determine appropriate language targets in math for my EL students.
3. I feel confident in my ability to select the key vocabulary for my EL students for concept development in math.
4. I feel confident in my ability to provide language scaffolds for my EL students in order to facilitate their participation in answering open-ended questions during math instruction.
5. I feel confident in my ability to adapt math curriculum to meet the needs of my EL students.
6. I feel confident in my ability to design collaborative math tasks that will support conceptual development in math.

In addition to these questions, the researcher conducted short interviews with each participating teacher after each of two collaborative learning sessions. The researcher used the same questions for each interview in order to be able to track shifts and/or progressions in

thinking and to be able to determine if a correlation existed between shifts/progression and the previous professional learning experience. The interview questions were as follows:

- In light of (insert title of most recent professional learning module), what do you see as your next step as you refine your instructional practice in Math to effectively support your EL students?
- What do you need in order to implement this next step?

Additionally, final questions were created to be used during the last session of professional learning. The questions would be posed to the group in a collaborative discussion. The questions for the final discussion are listed below:

1. What are some things you are thinking about in regard to your instructional practice in math as we conclude this professional learning experience?
2. Are you planning to implement any of the new strategies you learned about in the professional learning cycle? If so, explain.
3. Did you have any experiences that surprised you during the implementation phase of the learning cycle?
4. What have you learned about your EL students and their learning needs in math as a result of this cycle?
5. Which elements of the professional learning cycle did you find most helpful?
6. Which elements of the professional learning cycle would you omit or change? Explain.

Anecdotal notes of the group discussions during professional learning modules and of any spontaneous and informal conversations occurring over the course of the study were an invaluable source of data as the researcher sought to identify common threads of thinking as well as shifts in thinking as teachers voiced and re-voiced their own and each other's ideas. Snippets

of these exchanges became touchstones for the group as we worked together to incorporate new thinking and new instructional strategies into the very beginnings of a new school year. Based on the ideas of *social capital*, conversations and patterns of interaction between teachers focused on student learning (Leana, C. R., 2011.), and *collective efficacy* (Hattie et al. 2018), the belief among a group of teachers that together they can make a large and measurable difference in student achievement, the researcher knew the importance of documenting both formal and informal exchanges between members of the group.

Procedures

In the document, “Unlocking Learning II: Math as a Lever for English Learner Equity,” Rachel Ruffalo (2018) of Education Trust-West, recommends the offering of, “sustained teacher professional learning opportunities to simultaneously support English Language Development and Math achievement for English Learners.” One of the successful models of professional learning described in this document was a “Unit of Study,” team consisting of four teachers and a math instructional specialist (Ruffalo, 2018. p. 3). This team approach confirmed for the researcher the decision to for a small cohort of teachers, including a math instructional specialist, for a collaborative and integrated professional learning experience.

Recruiting the members of this group was the first step in the process of solidifying the framework of the study. The researcher’s position as the Coordinator of EL Programs for the district, and her experience as a bilingual teacher for the thirteen years previous, granted her the insider’s advantage of being able to leverage her professional friendships and her knowledge of individual school sites as she considered recruitment options. First, the researcher contacted the instructional coach who specialized in math to extend the invitation to collaborate in designing and facilitating the professional learning module of the study. Once the math coach was secured, the researcher reached out to the principal of Peach Tree Elementary to gain approval for issuing

an invitation via e-mail to her teachers. The researcher and the principal of Peach Tree Elementary had a substantial history of collaborating around ELD and professional learning, and Peach Tree was the elementary school in the district with the highest number of EL students. Moreover, the researcher had recently attended a presentation made by one of the lead teachers of Peach Tree on the equity gap in the math scores between EL students at Peach Tree and their English Proficient peers. The researcher knew that a project integrating ELD and math would be welcomed by the principal and teachers of the school.

The staff at Peach Tree was invited to a brief informational meeting about the professional learning opportunity during which the invitation to participate in the study was given. Two teachers accepted the invitation. Initially, only teachers from Peach Tree school were invited to participate in the study, but a coinciding series of workshops offered by the district instructional coaches enabled the researcher to extend the invitation to participate in the study to all elementary teachers in the district. In this manner, two teachers from different schools were added to the team.

Next, the researcher and the math instruction specialist met to design the initial collaborative learning experience for the teachers. The researcher and the math coach met over a series of days to design a collaborative workshop that would be facilitated during three hours of release time during a regular school day. The initial conversations and decisions resulting from this collaborative effort will be discussed further in chapter 4 as they document the integration of professional learning specific to ELD with professional learning specific to content development in math.

Once approval for research was secured from the district director of curriculum and instruction and received from the Institutional Review Board, the cohort of teachers came together for the first professional learning session. The Likert scale survey was administered at

the very beginning of the session before any part of the workshop had occurred. Teachers responded in written form to each of the questions which were presented on a sheet of paper. In order to preserve anonymity, the researcher instructed the teachers to not include their name on the document. Once the surveys were completed and collected, the professional learning session began. The math coach and the researcher took turns taking notes of the conversations during the workshop depending on who was facilitating the discussion at the time.

Two dominant themes emerged during this initial learning session; the need for affirmation, and the need for permission. Teachers' perceptions of their abilities to diagnose and address the needs of their English Learner students were much lower than their actual levels of knowledge. As the learning and discussion moved forward, the coaches noted the teachers not only nodding in agreement with many of the strategies presented, but also sharing about their own experiences in implementing said strategies. The learning session became an opportunity for the coaches to affirm the thinking and knowledge teachers were bringing to the table. Similarly, the teachers communicated a need for permission to abandon certain traditional practices in order to have time to implement key strategies.

At the conclusion of the workshop, the group had made it through the learning around the first best practice, creating language-rich math tasks. The group agreed to meet at a later date to continue with the learning around scaffolding strategies for open ended questions. The researcher and the math coach met to debrief the session and plan for next steps.

A week after the learning session, the researcher scheduled a one to one interview with each teacher. Each participant was asked the following questions:

- In light of (insert title of most recent professional learning module), what do you see as your next step as you refine your instructional practice in Math to effectively support your EL students?

- What do you need in order to implement this next step?

After each teacher had been interviewed, the researcher and the math instructional coach met to review the results of the initial questionnaire and the answers to the interview questions. It was during this meeting that the researcher and coach agreed to engage the group in further learning through a professional book club centered on a book about Number Talks. The scaffolding strategies to support EL students in answering open ended questions could easily be embedded in the book club discussions. In addition, the researcher and the math coach agreed that ideas for the type of language-rich math tasks needed in order for EL students to participate fully in number talks would also emerge during the reading and discussion. One idea that emerged was the idea that starting with dot talks, typically a kindergarten version of number talks, would be a good way to scaffold both language and learning for EL students and for EP students of any age who may not have had previous exposure to the types of open-ended questions presented to students in this practice.

As the first day of the new school year approached, the group agreed to implement Dot Talks starting on the first day and to create games, tubs, or math tasks for exploration during the first two weeks. The math coach and researcher created a coaching plan with each teacher in order to provide individualized support in implementing new practices and language scaffolds. Anecdotal notes were taken by the math coach or researcher during these planning conversations with teachers and reviewed together in subsequent meetings.

A date for the final meeting of the study was set. Teachers agreed to bring their own notes on EL student participation and student work samples to share at the meeting. The same questionnaire given before the professional learning module was administered again, this time as a post- questionnaire. The final interview questions were then posed one at a time to the group

as a whole and notes were taken on the ensuing conversation by both the math coach and the researcher.

The researcher and the math coach met a few days later to debrief the final meeting and go over the notes of the discussion. The researcher took notes on this conversation in order to document the insights and recommendations for further research or action of the math coach.

Analysis

Data were examined and analyzed through the lens of social learning theory as applied to the professional development of teachers. Social learning, specifically the ideas of professional capital, and collective efficacy (DuFour, 2015; Hargreaves & Fullan, 2012; Hattie et al. 2018; Leana, 2011; Wenger, 1998, influenced every aspect of the study from initial design through recommendations. The researcher used an iterative process (Srivastava & Hopwood, 2009), but even this process was influenced by social learning theory as hypothesis were discussed with the math coach and ultimately shaped by the collaborative conversations around data analysis.

Because the researcher was interested in documenting the *process* of change in the context of a social learning construct, varied forms of qualitative data were used in order to provide detailed case study of professional learning. The qualitative data included teacher discourse from four group professional learning sessions, individual interviews, and planning and debrief conversations between the researcher or math coach and participating teachers. All of the professional learning sessions, interviews, and coaching conversations were audio-taped and transcribed for analysis. The transcribed discourse from the learning sessions, interviews, and planning or coaching conversations was copied and placed into an Excel file. The researcher and the math coach coded each transcript independently and then met to discuss the results and resolve any discrepancies.

Transcripts were coded in two ways. First, text segments were coded as addressing one or more of the following areas of teachers' perception of their capacity for meeting the needs of their English Learners (i.e. perceived strengths, perceived knowledge/skill gaps, perceived obstacles to implementing research based instructional strategies, perceived needs, requests for specific professional support). Second, using In Vivo coding (Miles, et al., 2013), segments of text were coded for content that indicated how teachers' perceptions and/or beliefs about their own capacity and instructional practice in math instruction for EL students might be changing.

Summary of Chapter

Based on the premise that an achievement gap signals a corresponding skill or knowledge gap in the instructional practice of teachers, the purpose of this study was to gain a better understanding of how teachers' perceptions of their personal and collective efficacy in meeting the language and conceptual needs of their English Learner (EL) students, specifically in Math, changed during the course of participating in an integrated professional learning module. The study also served to document emerging changes in instructional practice that occurred during the course of the professional learning experience. The research was conducted in a K-8 school district in the East Bay area of northern California. The researcher leveraged insider knowledge as a long-time employee of the district to recruit the participants. A team of four elementary classroom teachers, an instructional coach specializing in math, and an ELD specialist (the researcher) were assembled in order to conduct the study. A case-study approach was used in order to present the story of the qualitative data gathered in order to document the individual and collective thought processes of the participating teachers.

This data included transcripts of teacher discourse gathered during four collaborative learning sessions, one-to-one interviews, and planning conversations. Products such as planning documents, lesson plans, and student materials were also gathered as artifacts in order to

document emerging changes in perceptions and practice with concrete evidence. The qualitative data was analyzed using two overlapping coding systems as well as analysis through an iterative process. The researcher used procedures consistent with prior studies that were effective in providing basic data on the research questions as well as adding to the ongoing narrative around effective instruction for English Learners.

Chapter Four: Data Analysis

This research project was launched in direct response to three consecutive years of declining test scores for the English learners in a small school district in California (DataQuest, 2018). The decline in achievement over time in math was particularly alarming. If the most powerful remedy for the achievement gap of English learner students is to provide teachers with the knowledge and skills needed to provide effective instruction, as asserted by Calderon et al., (2011), then it makes sense to engage in research specific to the effectiveness of professional learning approaches.

The purpose of this research was to engage teachers in a professional learning experience integrating professional learning specific to English learner students and math instruction. This integrated approach was based on best practices and key recommendations listed across the literature on effective professional development (Calderon et al. 2011; DuFour, 2015; Hakuta, 2014; Hargreaves and Fullan, 2012; Hattie et al, 2018; Ruffalo, 2018). Learning Forward, a professional learning association, defines effective professional developments as:

- (a) ...providing educators with the knowledge and skills necessary to enable students to succeed and to meet the challenging state academic standards; and
- (b) ...sustained, intensive, collaborative, job-embedded, data-driven, and classroom-focused... (2018).

This case study documents the shifts in perception and practice of a cohort of teachers engaged in the process of sustained and collaborative professional development that is data driven, job-embedded and classroom focused. In the previous chapter, the methodology and design of the study, the participants and setting, the instruments and procedures, along with a

data analysis overview were all reviewed. This chapter provides an analysis of the data collected through surveys, interviews and teacher discourse recorded during group meetings.

Data Presentation and Analysis

Both quantitative and qualitative data were gathered during this mixed method study. Quantitative data were derived from a brief pre- and post- survey intended to quickly validate or negate the effectiveness for change of the professional learning experience. Qualitative data were gathered in individual interviews and transcriptions of teacher discourse recorded during group meetings and discussions over the course of the twelve-week study. The presentation and analysis of the data will be organized in a similar manner. The quantitative data will be presented and analyzed first. Then, the qualitative data will be presented and analyzed in order of occurrence so as to fill in the background and highlight important details of the case study.

Quantitative Data: Survey

Teachers took a four-point Likert scale survey that measured teachers' perceptions of their efficacy in determining the language and content area needs of their English learner students in math, and in choosing appropriate instructional strategies and scaffolds in order to meet those needs. The survey asked teachers to respond to varying agreements or disagreements on their confidence in their abilities to diagnose EL student needs and to make appropriate instructional decisions for their EL students. Before taking the survey, the teachers had not participated in any professional learning that integrated English Language Development and math instructional strategies. Therefore, their initial responses demonstrate their perception of their efficacy in meeting the needs of their English learner students before engaging in the professional learning module. The responses of the teachers on the post survey indicate shifts in

the perception of their abilities to provide effective instruction for EL students in math as a result of participating in the twelve-week professional learning module.

Teachers responded to a total of six questions choosing Strongly Agree, Agree, Disagree, or Strongly Disagree regarding their confidence in their abilities to meet the language and content area needs of their EL students during math instruction. Two of the questions specified the specific best practices, scaffolding open-ended questions during math discussions, and creating collaborative math tasks, that were the focal points of the professional learning. The quantitative data are presented as a bar graph for each question.

Question 1: I feel confident in my ability to determine appropriate learning targets in math for my EL students.

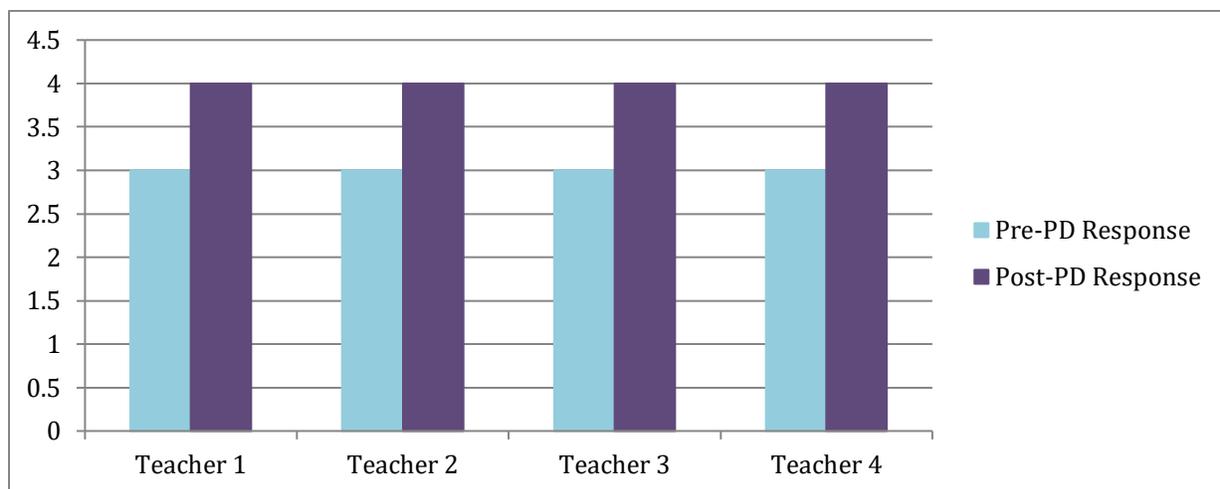


Figure 4.1. This figure illustrates results for the pre-PD and post-PD surveys for Question 1.

Figure 4.1 illustrates the pre- and post- study survey data of the 4 participating teachers on Question 1: I feel confident in my ability to determine appropriate learning targets in math for my EL students. Prior to participation in the twelve-week learning module, all four of the participating teachers agreed with this statement. At the end of the study, the result shifted in that all four participants marked Strongly Agree in response to Question 1. Even though both

sets of responses to Question 1 can be viewed as positive, the initial response of Agree instead of Strongly Agree signals a common-sense reservation and uncertainty that was an important theme in the initial group learning sessions.

Question 2: I feel confident in my ability to determine appropriate language targets in math for my EL students.

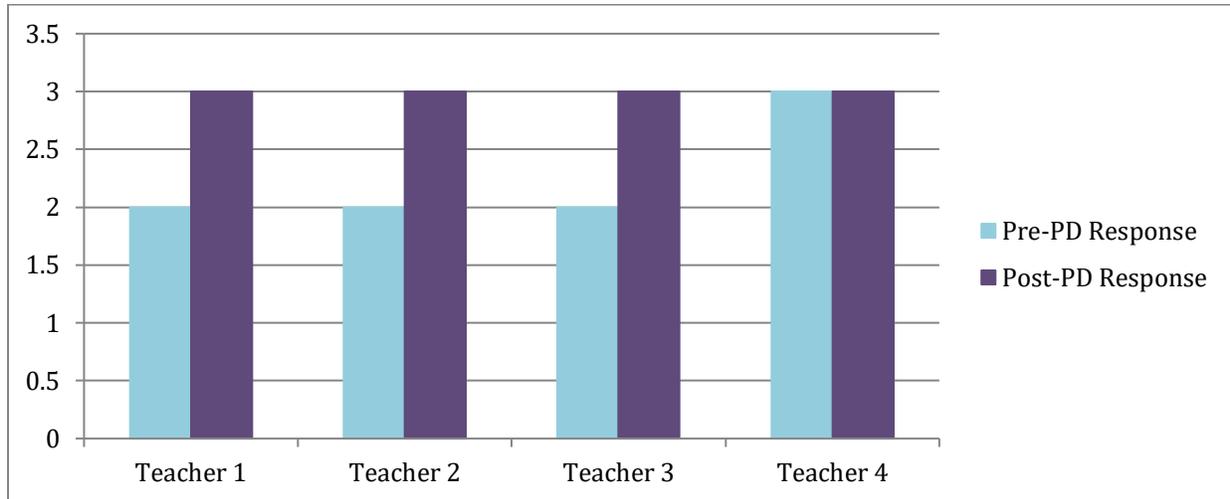


Figure 4.2. This figure illustrates results for the pre-PD and post-PD surveys for Question 2.

Figure 4.2 illustrates the pre- and post- study survey data of the 4 participating teachers on Question 2: I feel confident in my ability to determine appropriate language targets in math for my EL students. Prior to participation in the twelve-week learning module, three of the four participating teachers disagreed with this statement and one teacher agreed. At the end of the study, the results shifted to show all four teachers in agreement with Question 2. A movement from disagreement to agreement about one's efficacy in supporting language learning during math is significant. However, it is important to note that Teacher 4 did not increase her answer from agree to strongly agree. Of the group of teachers, Teacher 4 had the most experience working with EL students in schools with very high percentages of EL students. It makes sense that experience leads to an increased sense of efficacy. It would seem that Teacher 4 did not

grow as a result of the professional learning. But, this result may signal the growth in awareness of the group of the pivotal role of language development in the development of conceptual knowledge in math. An increase in awareness of language demands in math, specifically for EL students, was an important theme that emerged during the culminating discussion.

Question 3: I feel confident in my ability to select the key vocabulary for my EL students for conceptual development in math.

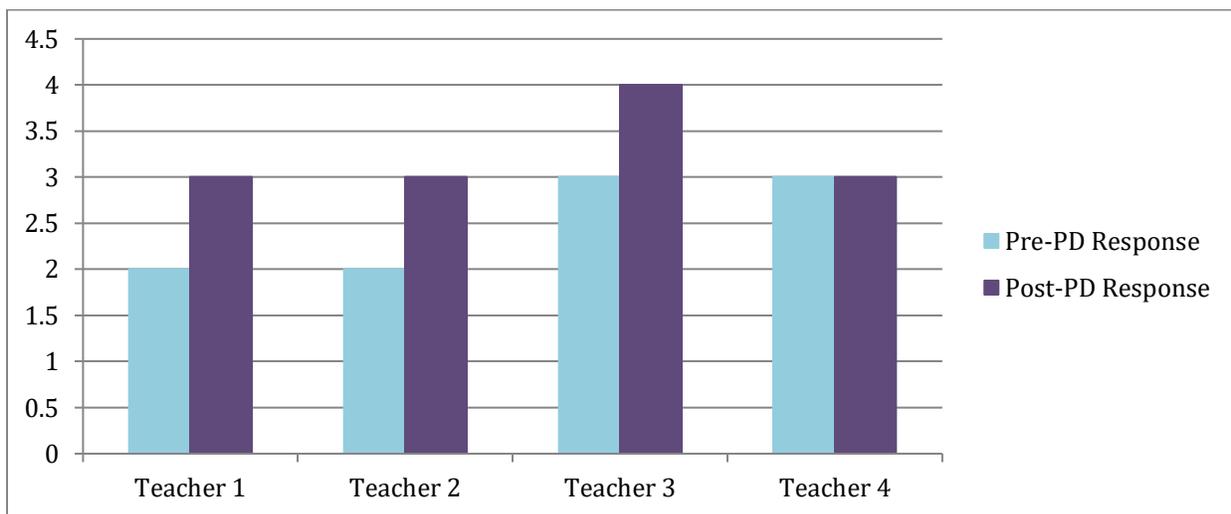


Figure 4.3. This figure illustrates results for the pre-PD and post-PD surveys for Question 3.

Figure 4.3 illustrates the pre- and post- study survey data of the 4 participating teachers on Question 3: I feel confident in my ability to select the key vocabulary for my EL students for concept development in math. At the end of the study, Teachers 1-3 reported positive-growth in the area of selecting key vocabulary. Again, the results for Teacher 4, who came to the group with more years of experience, did not show an increase in confidence. Perhaps the data speaks to a plateau point and more targeted staff development is needed to push teachers to a deeper level of understanding of how to strategically weave in explicit vocabulary instruction for EL students to enhance conceptual development in math.

Question 4: I feel confident in my ability to provide language scaffolds for my EL students in order to facilitate their participation in answering open-ended questions during math instruction.

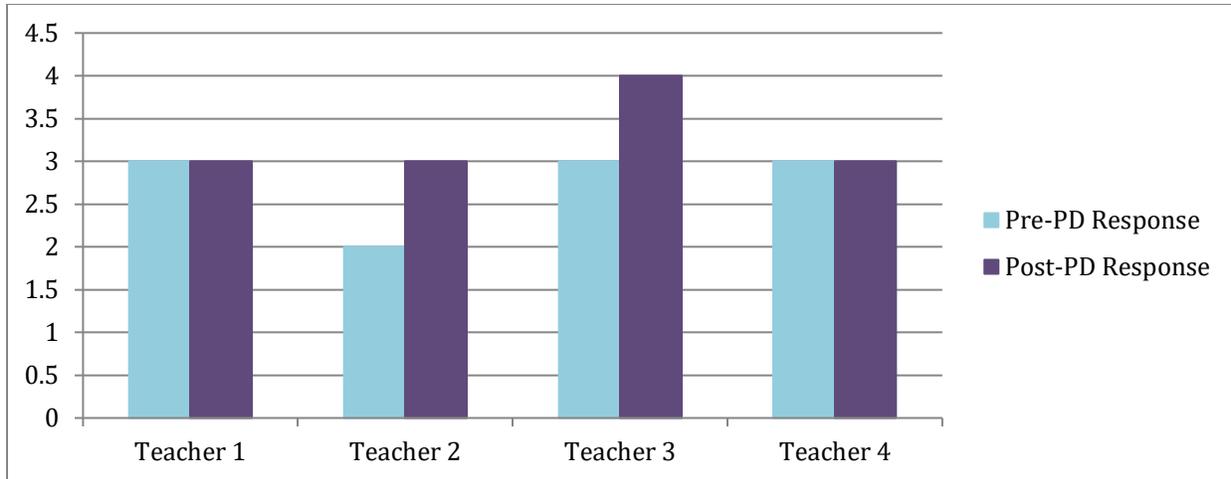


Figure 4.4. This figure illustrates results for the pre-PD and post-PD surveys for Question 4.

Figure 4.4 illustrates the pre- and post- study survey data of the 4 participating teachers on Question 4: I feel confident in my ability to provide language scaffolds for my EL students in order to facilitate their participation in answering open-ended questions during math instruction. Teachers 1 and 4 entered the professional learning module feeling confident about their abilities to scaffold language specific to open-ended questions. Professional learning on this type of scaffolding consisted of learning specific teacher moves such as reformulation and reduction in degrees of freedom (McNeil, 2011, p.398). Both Teachers 1 and 4 were well versed in scaffolding techniques for open-ended questions. Teacher 1 used language scaffold's frequently in her early childhood classroom. Teacher 4 had years of experience working with English learner students. Teacher 2 and Teacher 3 both served on the district math committees for their grade levels. During the one to one interviews, both teachers shared that they considered themselves strong math teachers, and both considered themselves to be novices in regard to teaching ELD.

Question 5: I feel confident in my ability to adapt math curriculum to meet the needs of my EL students.

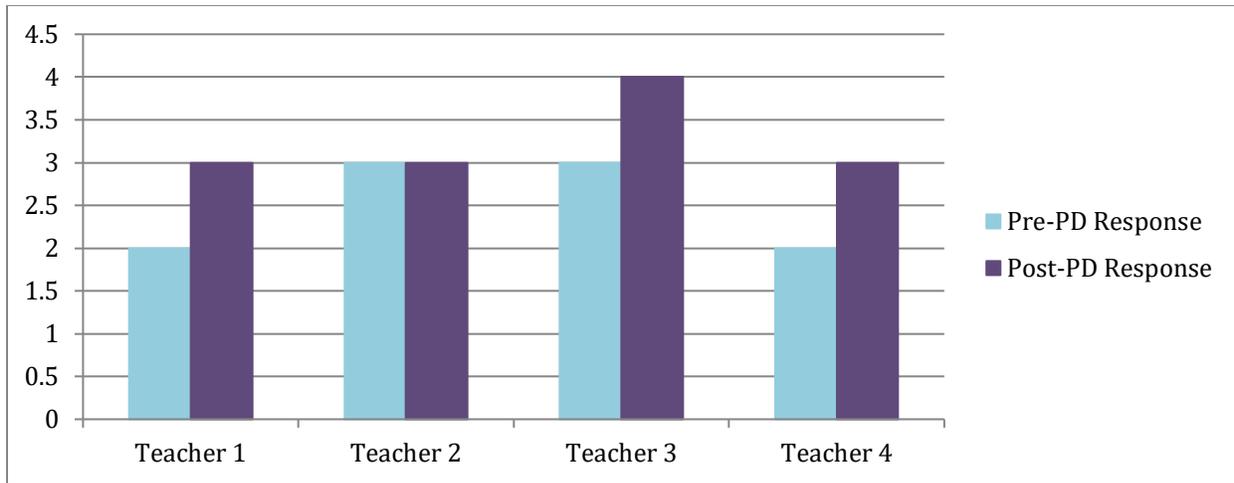


Figure 4.5. This figure illustrates results for the pre-PD and post-PD surveys for Question 5.

Figure 4.5 illustrates the pre- and post- study survey data of the 4 participating teachers on Question 5: I feel confident in my ability to adapt math curriculum to meet the needs of my EL students. Here, Teachers 1 and 4, the teachers who felt confident in their use of language scaffolding techniques, entered the professional learning module feeling less confident than Teachers 2 and 3 who felt strong as math teachers. The data confirms the necessity for and the power of professional development that integrates ELD with content knowledge and brings experts from each area to engage in collaborative learning.

Question 6: I feel confident in my ability to design collaborative math tasks that will support conceptual development.

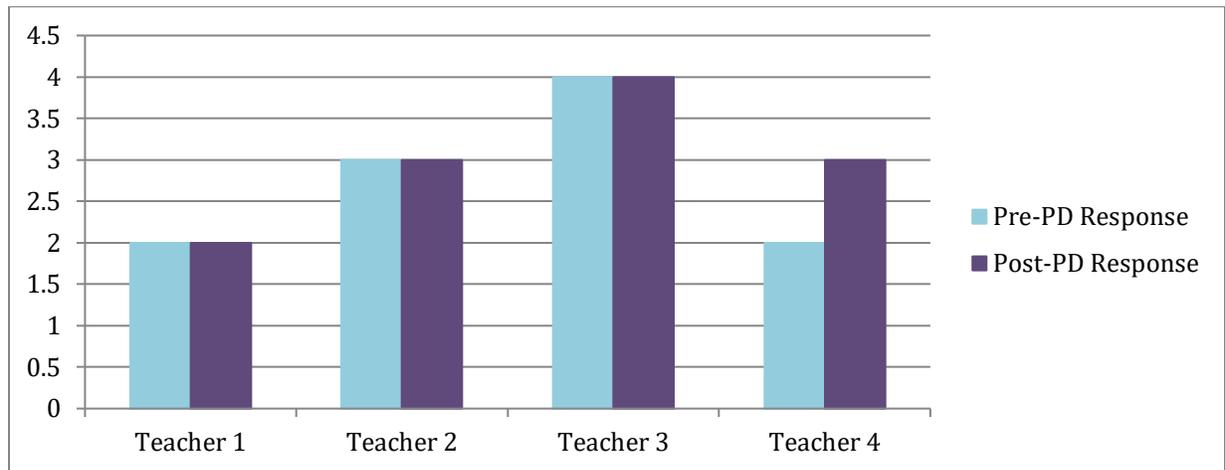


Figure 4.6. This figure illustrates results for the pre-PD and post-PD surveys for Question 6.

Figure 4.6 illustrates the pre- and post- study survey data of the 4 participating teachers on Question 6: I feel confident in my ability to design collaborative math tasks that will support conceptual development. Once again, Teachers 2 and 3, who considered themselves to be strong math teachers, entered the learning experience feeling confident in regard to this question. Teachers 1 and 4 entered feeling less confident. It is important to note that during the course of the learning module the cohort began to research types of math tasks effective in developing mathematical concepts independent of language in order to provide all students, but especially EL students, deeply contextualized and multisensory learning experiences upon which the teachers could attach mathematical language (Barrata-Lorton, 1995; Gibbons, 2015; Lowrie & Jorgensen, 2017). This approach called for a complete departure from the district adopted curriculum and pacing guide for first grade, Teacher 1's grade level. Teacher 1 requested one to one support from both the ELD and Math coaches to formulate a plan to begin implementation of a system wherein she would provide more time for math exploration to her young students.

Qualitative Data: Teacher Discourse

Collaborative conversations, both formal and informal, are at the very heart of any social learning construct in that they provide the evidence of the exchange, the sharing, and the shaping of ideas as they evolve into action. Teacher discourse provided a rich source of important data that were gathered by means of audio recordings during a variety of settings. Recorded conversations included planning and debrief conversations between the instructional coaches and/or participating teachers, informal group discussions during the learning sessions, one-to-one interviews, and a formal group discussion facilitated by specific questions during the last meeting of the module. All of the recorded teacher discourse was transcribed, copied, and placed into an Excel file in order of occurrence. The researcher and the math coach coded each transcript independently and then met to discuss the results and resolve any discrepancies, also as the learning events and conversations took place. This means that the transcripts were coded and discussed over a series of collaborative meetings as opposed to one or two longer working sessions. For this reason, the qualitative data gathered from the audio recordings of teacher discourse have been organized in chronological order with the emergent themes presented and analyzed as they emerged during the course of the study.

Planning Session 1: A conversation between the ELD coach and the math coach

Here, in the very first conversation of the study, two powerful and salient themes of cross-over and collaborative synergy rose quickly to the surface. Cross-over refers to instructional strategies that the ELD coach and the math coach viewed as effective for English language development, mathematical language development and conceptual development. Collaborative synergy is defined in the context of this study as the result of teachers combining their ideas and skills to build something new together, whether it is a concrete plan for implementation or the building of a new professional identity. Both coaches were surprised by

how quickly they agreed on the strategies of focus for the first professional learning experience with the cohort of teachers. A sample of this conversation is shown in Appendix A.

The initial discovery of the cross-over of powerful scaffolds shared between math and ELD sparked the collaborative synergy that was a common thread throughout all the conversations and interactions between the cohort members. In this particular context the synergy manifested itself in an abundance of resources as both coaches gathered professional articles, video, manipulatives, lesson artifacts, etc., from their own archives. Both coaches agreed that the preparation time for the learning session was much less as they worked together than it had been in past situations when they each worked on their own.

Group Learning Session 1: Coach ELD, Coach Math, Teachers 1, 2, 3, and 4

The entire cohort made up of 4 classroom teachers and the ELD and math coaches came together during a three-hour release time. The coaches engaged with the teachers in a collaborative learning experience that centered on bits of learning followed by open discussion. During this time, two common themes emerged from the teacher discourse; the need for affirmation and the need for permission to go off script. All four teachers who volunteered to participate in the research project were known by the researcher to be strong teachers. Two of them were twenty-year veterans. But, all four teachers questioned their own capabilities and/or decision making when planning math instruction for their EL students (see Appendix A).

It is important to note that even though it was just the first meeting of the cohort, the context of engaging in research and trying new approaches integrating ELD and math had already been made very clear. The specific context of a collaborative inquiry that existed outside of district pacing guides and adopted curriculum, and the fact that the teachers volunteered to participate, created the sense of informality which is so crucial to building the trust needed in order for teachers to be honest and vulnerable about their practice (Hargreaves & Fullan, 2012).

One-to-one Interviews: ELD Coach and Participating Teachers

Within a week of the first group learning session, the researcher met with each of the teachers individually to ask them two questions:

- In light of (insert title of most recent professional learning module), what do you see as your next step as you refine your instructional practice in Math to effectively support your EL students?
- What do you need in order to implement this next step?

All four teachers had immediate answers (See Appendix A). The data collected during these one-to-one chats suggest that given the time, permission, and the safe space within which to try new teaching strategies, our teachers are up to the task and quickly assess their needs and next steps in order to move their practice forward. The power of collaborative synergy is evident as well. Teachers were willing to move forward quickly to implement new strategies because they all agreed to try something new presented in the workshop and to share out at the next meeting. However, the role of instructional leader should not be underestimated. The leader must create and reinforce the boundaries of the safe and informal space for learning and must move the conversations and the learning forward by providing the resources teachers need (DuFour, 2015; Hargreaves and Fullan, 2012; Wenger, 1998). In this specific instance, the coaches moved the learning forward by switching gears and moving to a book club model for the rest of the group meetings. The coaches made this decision after comparing their notes on the transcription of the first group learning session and the notes of the one-to-one chats between the participating teachers and the ELD coach.

Book Club Conversations: Math Coach, ELD Coach, Participating Teachers

The decision was made to read and discuss **Number Talks: Helping Children Build Mental Math and Computation Strategies, Grades K-5** by Sherry Parish (2010). In addition, each member of the cohort was invited to select a book of her choice related to math instruction or language development or both. The group agreed to meet three times to discuss implementation of number talks and to share out what they were reading in their choice book. An interesting conversation among the group took place via text messages at this point (see Appendix A). Here, the importance of choice as important to effective professional development emerged (Calderon et al., 2011). However, choice does not equal complete autonomy. The conversations here also reveal that teachers seek out the opinions and suggestions of the expert coaches and rely on instructional leaders to make important connections between the professional learning and how it applies to classroom practice. Over the course of the research project, the teachers looked to the coaches for direction when navigating unknown territory as illustrated further in this snippet of conversation from the first book club meeting (see Appendix A).

Culminating Discussion: ELD Coach, Math Coach, Participating Teachers

This discussion was the final event in the professional learning module. The researcher posed six questions to the group. Each question is presented with teacher responses that represent the group of teachers as a whole (see Appendix A). In this final discussion the themes in the literature around social learning as it applies to professional development stand out. The power of collaboration in a small cohort that includes an ELD specialist coach and a math specialist coach are evident in the teacher discourse. All the teachers expressed a desire to continue meeting as a group. All teachers reported important shifts in practice including the implementation of several strategies for increasing student talk during math, increasing time for hands on exploration and problem solving, and pulling math language into designated ELD.

More importantly, shifts in teacher mindset were observed. All four teachers reported an increased value for collaborative inquiry and discussion with their peers. Most notably, the power of a creating a safe space through collaborative culture (DuFour, 2015; Hargreaves & Fullan, 2012; Wenger, 1998), comes to the forefront when Teacher 2 feels safe enough to share with the group her that she had biases and assumptions about EL students that were rooted in a deficit mindset.

Interpretations

Both the quantitative data presented in the results of the survey and the qualitative data showed the effectiveness of professional learning embedded in the context of a collaborative inquiry with a small cohort of teachers and specialist coaches. Important shifts in practice were observed over the course of the twelve-week study, including the implementation of several strategies for increasing student talk during math.

More importantly, shifts in teacher mindset were observed. All four teachers reported an increased value for collaborative inquiry and discussion with their peers, and all expressed a desire to continue meeting and collaborating as a group. This increased appreciation for collaborative endeavors came as a bit of a surprise to the researcher. While all the members of the cohort had engaged in professional collaboration to some degree, none of them had engaged in a true collaborative inquiry over a sustained period of time. The teacher discourse revealed that the willingness of the teachers to engage in reform based instructional practice, actually caused them to isolate themselves from their grade level peers at their respective school sites. This isolation stemmed from the fact that their grade level peers placed district assessments and pacing guides at the forefront of their priorities when considering next steps in instruction. This decision-making process runs in direct opposition to collaborative practice centered on an immediate classroom instructional goal and teacher generated informal assessment.

The findings also speak to the unique synergy that comes to life during collaborative endeavors. Evidence of this synergy was noted by both the researcher and the math specialist coach during the initial planning meeting as demonstrated by the ease of shared decision making. Shared decisions allowed both coaches a singularity of focus as they selected professional literature and presentation materials for the first group learning session. This collaborative synergy created a bond of trust and shared excitement that set the tone for the inquiry project. Because each coach had a distinct area of expertise, they each entered into the inquiry as co-learners with the group of teachers. This initial mindset of engaging *with* teachers as opposed to presenting best practices *to* teachers, created a shared space of safety that enabled teachers to be vulnerable and honest about their practice and thinking.

Over the course of the group discussions, teachers openly shared both their failures and successes and asked for feedback from the group. The small group setting allowed for a feeling of informality that in turn created a certain intimacy. From this intimacy and informality a sense of trust evolved. During the culminating discussion, one teacher felt safe enough to share a very personal and positive shift in her view of EL students as a direct result of participating in the collaborative inquiry. This data supports the importance of cultivating an authentic collaborative culture wherein teachers can safely contend for a deeper understanding of transformative pedagogy and practice. The cultivation of this space falls to instructional leaders.

Summary of Chapter

Chapter IV presented and analyzed the quantitative data collected by the survey and the qualitative data gleaned from teacher discourse. The analysis demonstrated that small group collaborative inquiry combined with specialized coaching is a viable model of professional learning to address achievement gaps for English learner students. Significant shifts in practice were observed during the study along with significant shifts in teacher mindset and perception.

Chapter V will discuss recommendations for education based on this study. Limitations of the research will also be reviewed.

Chapter Five: Thesis Recommendations

The purpose of this study was to document the shifts in perceptions and practice of teachers as they engaged in a collaborative learning experience specific to English learner students and math instruction. Four elementary teachers and two instructional coaches formed a small cohort to engage in professional learning combining collaborative inquiry and specialized coaching specific to ELD and best practices in math instruction. The research questions for this study are as follows:

- How do teachers' perceptions of their individual and collective capacity for increasing achievement for English learner students in math change by participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?
- How do teachers' perceptions of their EL students' areas of need and/or areas of strength change as a result of participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?
- What changes in decision making, planning, and instructional practice do teachers observe in themselves as they participate in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math?

Within this chapter, a summary of the findings will be shared as well as any interpretations by the researcher of these findings. Educational implications will also be considered. Lastly, limitations of the research and future research directions will be reviewed.

Finding Summary

Throughout the twelve-week period, teachers participated in a variety of collaborative learning experiences specific to scaffolding language and learning for English learner students during math instruction. Prior to the twelve-week unit of study, all four teachers indicated that they did not feel confident in their abilities to determine appropriate language targets in math for their EL students. The findings also revealed a lack of confidence in their knowledge of scaffolding techniques, especially for open ended questions and academic discussions in math.

At the end of the study, the research findings show that engaging teachers in professional development within a context of social learning is effective for increasing a sense of efficacy, both individual and collective, in the use of scaffolding techniques and in making instructional decisions to meet the needs of EL students. The findings also confirm that the professional learning model combining small group collaborative inquiry with specialized coaching was effective in fostering positive shifts in teacher estimates of English learner achievement.

Interpretation of Findings

Both the quantitative data presented in the results of the survey and the qualitative data showed the effectiveness of professional learning embedded in the context of a collaborative inquiry with a small cohort of teachers and specialist coaches. Important shifts in practice were observed over the course of the twelve-week study, including the implementation of several strategies for increasing student talk during math. The data and analysis answered the research questions and can be used to inform planning and implementation of professional learning specific to integrating ELD with content area instruction. Findings that support specific types of professional learning models place the onus of student achievement squarely on the shoulders of instructional leaders. For too long, leaders and policy makers in education have conferred a

sense of blame and singular responsibility for student achievement on classroom teachers. If leaders want teachers to engage in true reform education, they must remove the weight of NCLB systems focused on standardized assessment. Instead, resources should be allocated in support of building the capacity of teachers and instructional coaches to engage in teacher driven formative assessments and informal collaborative inquiries based on student need.

Findings in Context

The first body of literature reviewed discussed best instructional practices to increase conceptual understanding and mathematical discourse for English learner students during math instruction. Systematic vocabulary instruction was a key instructional practice mentioned across the literature (August et al, 2018; Calderon et al, 2011; Moschkovich, 2013; Olsen, 2014) as was supporting increased mathematical discourse through the use of language scaffolds specific to open-ended questions (Banse et al, 2015; Banse et al, 2016; Gibbons, 2015; McNeil, 2011; Mohr & Mohr, 2007). Findings related to the implementation of these practices center around an increase in teacher confidence in the ability to implement them effectively. Further implementation and analysis of student talk and work is needed to confirm the effects of these practices on the student groups of the teachers in this study.

The next grouping of literature reviewed in chapter 2 centered on recommendations for effective professional development. Effective professional development in this instance is defined as professional learning that supports professional collaboration and collective endeavor for the benefit of students (Donohoo et al, 2018; DuFour, 2015; Hakuta, 2014; Hargreaves & Fullan, 2012; Hattie, 2017; Ruffalo, 2018; Wenger, 1998). One research question asked how teachers' perceptions of their individual and collective capacity for increasing achievement for English learner students in math might change by participating in a professional learning module that integrates collaborative inquiry and professional learning specific to ELD and Math. This

question uncovered the need for collaborative inquiry in small group settings. The particular model of a small cohort of teachers working alongside a content area coach, in this case a math coach, and an ELD specialist coach, provided the time and space for teachers to build professional relationships that were formal and informal simultaneously. It is in the informal spaces that a sense of trust and group identity is fostered (Hargreaves and Fullan, 2012; Wenger, 1998). Trust and a sense of belonging are the necessary underpinnings of any group dynamic that will support the vulnerability needed to be honest about one's practice.

More importantly, the second question had to do with teacher beliefs about their EL students. This question asked how teachers' perceptions of their EL students' areas of need and/or areas of strength changed as a result of participating in the professional learning setting described above. Teachers' perceptions of their EL students' needs and strengths did shift over the course of the collaborative inquiry. All teachers reported an increased awareness of their EL students' thinking and problem-solving abilities and of their need for specific language tools to enable them to express and share their thinking with others. One teacher voiced a shift in her view of EL students from low-performing to capable of engaging in many tasks she originally reserved for her students identified as GATE. The final question sought to document how these shifts in perceptions might influence changes in instructional planning and practice. The research revealed the readiness of teachers to engage in reform-based practices within a context that existed outside of formal district constructs. Within this collaborative and informal construct, the coaches played an important role in fostering a sense of confidence in the group members by affirming their plans and by giving them permission to engage in practices that were not yet adopted district wide.

Many key research findings support the conclusion that the best practice of professional learning within the context of a small collaborative group led by an ELD coach and a content

area coach is powerful in supporting teachers as they engage in reform-based practices specific to EL students. At the outset of the collaborative inquiry, teachers were not confident about their abilities to meet the needs of their EL students. They sought the support and affirmation of instructional experts as they implemented new teaching practices. Moreover, teachers reported that many of the obstacles to changing their practice are placed in front of them by site, district, and state administrators who employ traditional systems and accountability structures left behind by the era of NCLB, such as pacing guides and required assessments that were focused on assessment of the standard as opposed to focused on the student learning.

Key concepts of social learning theory highlighted in the findings were the building of trust and a group identity, an informal “third space” wherein teachers felt safe to negotiate new understandings of pedagogy and practice with their peers, and a collaborative synergy that accelerated classroom application and implementation of newly learned skills.

Implications and Lessons Learned

Several implications for leadership arise from this study. Chief among these is the importance of shared making of meaning between teachers and school/district leaders. Key concepts of social learning theory highlighted in the findings were the building of trust and a group identity, an informal “third space” wherein teachers felt safe to negotiate new understandings of pedagogy and practice with their peers, and a collaborative synergy that accelerated classroom application and implementation of newly learned skills. The importance of investing in the social capital of teachers as described by Hargreaves & Fullan (2012) came to the forefront. The collaborative endeavors of teachers on behalf of their students increase in power when teachers assume more autonomy and engage in collaboration that is by nature informal. Anchoring professional learning in the construct of small group collaborative inquiry supported by content area experts will provide teachers the opportunities, resources and supports

they need to truly shift mindsets and instructional practices in ways that powerfully address both the language needs and the academic needs of English learner students.

Teachers need leaders with the courage to engage in true reform education with them, sleeves rolled up, side by side, doing the work. In order to promote transformative teaching, site leaders must increase their understanding of best instructional practices and the power of teacher generated collaborative inquiry.

Limitations

Both the limitations of time and resources were imposed on this study. Since much of the research occurred over the summer break, time with students was limited significantly. The research questions were focused on teacher outcomes in response to this. Additionally, limited resources defined the frequency with which the cohort was able to meet for whole group learning and discussion. Additional funds for increased release time would allow for teachers to engage in group discussions more frequently and allow for peer observations and debrief sessions.

Given additional time and funding, the researcher would expand the case study to a full school year and include notes from classroom observations as well as analysis of EL student work and assessment scores. This would allow for research questions specific to learning outcomes of the students.

Conclusion

Several key research findings support the conclusion that the best practice of professional learning within the context of a small collaborative group led by and ELD coach and a content area coach is powerful and effective for changes in practice that will address the achievement gaps of EL students. The findings highlight the role of leadership in effective implementation of reform based instructional practice. Traditional delivery models of professional learning place

the burden of student achievement squarely on the shoulders of classroom teachers. The literature reviewed and the research findings strongly suggest otherwise. The responsibility of cultivating professional cultures that place student learning at the heart of all decision-making falls to *leaders*. Therefore, educational leaders are ultimately responsible for mediating the achievement gap for EL students in that they are responsible for creating an environment wherein teachers can safely engage in meaning making and contend for a deeper understanding of best practices.

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*Appendix A: Samples of Teacher Discourse***Planning Session 1: A conversation between the ELD coach and the math coach**

Coach ELD: We have three hours with the teachers for this first session. I think it would be good to focus on just two or three of the most powerful strategies for scaffolding language and math concepts for students. What do you think?

Coach Math: I agree. What do you think are the most powerful scaffolds?

Coach ELD: Well, I think we need to go over differentiated sentence frames because they apply in so many situations, but teachers also need to know what to do before you engage the kids in talking. I think we need to go over the importance of hands on experiences.

Coach Math: I agree! I've just been reading about how important it is for kids to touch things and how you can tell how fluent a student is in numeracy by how fluidly they can use their fingers to make calculations!

Group Learning Session 1: Coach ELD, Coach Math, Teachers 1, 2, 3, and 4

Teacher 1: This year I have been pulling my EL students for designated ELD while the other students are playing math games. And, I've been going over the math vocabulary with my ELD group and playing games with dice and dominos with them and talking with them and making them repeat things after me, but I don't really know if that's good ELD or if I should only be teaching them more grammar-based language? It feels right, but I'm not sure if I'm doing the best thing for them.

Teacher 3 expressed her need for permission to go off script as follows:

Teacher 3: I don't know if it is OK for me to be doing this but my students don't have strong number sense so I am not following the district roadmap for third grade and I am not doing every single EnVision lesson and I don't give all of the assessments provided. I make sure I am preparing them for the district benchmark assessments and I know what the standards are. I just know I have to get my students there a different way.

One-to-one Interviews: ELD Coach and Participating Teachers

Teacher 1: I want to continue working on designated ELD and I want you to come and teach an ELD lesson with my group that truly integrates the math concepts with the English language skills they need.

Teacher 2: I need time and I need materials. I need more time to prepare activities for my students and more time to read and discuss. I would like to get the Number Talks book and read it with the group.

Teacher 3: I want to push myself to do more problem-based learning with my students. I would like for you to come and watch me and my students during one of these lessons.

Teacher 4: I want to focus on getting my EL students to talk more in math discussions. Will you come and work with me to create some differentiated sentence frames?

Book Club Conversations: Math Coach, ELD Coach, Participating Teachers

Text conversation:

Coach ELD: Hello Ladies, I have ordered the Number Talks books for all of us.

Let me know the title of your choice book ASAP so that I can order those, too.

Teacher 1: I want to order one that is mostly about child development but it has a big section on language development. Is that OK?

Teacher 4: I don't really know what I should read. Does anyone have any recommendations?

Coach Math: Anything by Jo Boaler will be good. I'm getting this one.

Teacher 4: Thanks! I will look at those titles!

Group Discussion:

Teacher 2: I didn't really know where to start reading in the number talks book. I tried going to the third-grade section but I found I needed to go back to the beginning. I'm not sure where I should start with my students.

Teacher 1: I started at the very beginning with the kindergarten dot talks even though it's the end of first grade. It's going well.

Teacher 4: Do you think it's OK if I start with dot talks for my fourth graders?

Coach Math: Dot talks are a great place to start because you can focus on teaching the routines of number talks with easier content.

Coach ELD: Starting with dot talks would really help your EL students for the same reason. The content will be easier so you can help them focus on the language they will need to participate in the talks.

Teacher 3: I started number talks earlier this year after a workshop at the county office, but I think I would like to start with dot talks next year on the first day of school.

Teacher 4: Maybe we could all start with dot talks on the first day if the new school year so we can see what happens.

Coach Math: I like that idea!

Coach ELD: Can we all agree to plan and prepare for dot talks starting on the first day of school?

Culminating Discussion: ELD Coach, Math Coach, Participating Teachers

Coach ELD: What are some things you are thinking about in regard to your instructional practice in math as we conclude this professional learning experience?

Teacher 3: I am realizing that I need to be more mindful of the language development of *all* my students, *especially* my EL students, but all of my students need me to be more mindful of developing language in math.

Teacher 2: I am thinking about setting up more tubbing and math jobs for my first graders because I think that spending more time on that early in the school year will help them be more successful with addition and subtraction because they will have sense of number that has been built in their bodies. I'm thinking of sending out the old Math Their Way letter to families to ask them for items for junk boxes.

Coach ELD: Are you planning to implement any of the new strategies you learned about in the professional learning cycle? If so, explain.

Teacher 1: I am going to continue with designated ELD lessons that center on math vocabulary and concept building. I started with dot talks on the first day of school and today (10 weeks into the school year); I was going to teach a math lesson about decomposing a number into 3 addends, but I didn't really have to teach it as a formal event because it came out naturally from the kids during our number talks. And, the kids just accepted it like it was nothing new.

Coach ELD: Did you have any experiences that surprised you during the implementation phase of the learning cycle?

Teacher 2: I was surprised to realize that what works for engaging GATE students will work for EL students. I realized my assumption that EL kids are "low" academically. I confronted my own biases. I made a shift from having a deficit mindset about my EL students to having a more assets-based approach.

Coach ELD: What have you learned about your EL students and their learning needs in math as a result of this cycle?

Teacher 1: EL kids are *thinking* even if they can't verbalize what they are thinking. They need language tools!

Coach ELD: Which element/s of the professional learning module did you find most helpful?

*All participating teachers were unanimous in this response.

Teacher 3: The collaborative conversations with a diverse group of teachers increased my confidence and sharpened my thinking. The collaboration sparked new ideas and I was able to process my own learning more quickly. I normally don't come out of my classroom to collaborate with other teachers. Being a part of this group that is a small group helped me feel comfortable and we built a lot of

trust. People were honest and truthful about their practice. And I really liked that we were allowed to choose our own areas of focus, but we also made commitments to each other to do the dot talks.

Coach ELD: Which elements of the professional learning module would you omit or change?

Teacher 1: I don't want to omit anything. I want the group to continue so that we have more time to work with the coaches in our classrooms. I would like to continue working as a group so that we could observe each other and get feedback.