Elementary Preservice Teachers' Thinking about Student Learning in a Lesson Study Context

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Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy
In
Curriculum and Instruction

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April 25, 2018
Blacksburg, Virginia

Keywords:
Lesson Study
Preservice Teachers
Student Learning

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Abstract

Building on the epistemological foundations of constructivism (Creswell, 2014) and qualitative research methodologies, a FADE framework (Reinking & Bradley, 2008) and a case study approach (Merriam, 2002) were selected to develop an understanding of preservice teachers' thinking about student learning during their planning, teaching, and reflection through the lesson study (Lewis, 2009) process. Through qualitative methodology, the triangulation of data occurred using qualitative data sources: (a) pre and post interviews, (b) participatory field notes, (c) research lesson plans, (d) debriefing interviews, (e) field notes created by the preservice teachers. Each data source was analyzed individually and then compared across the case providing a deeper understanding of how preservice teachers think about student learning in the context of lesson study including how: (a) preservice teacher grew their thinking about student learning, (b) preservice teachers were better able to observe and look for evidence of thinking about students' learning, (c) the lesson study process allowed them to work as a team, (d) they associated lesson study with being a positive learning experience. This research provides additional insight into how teacher preparation programs can strengthen preservice teachers learning in classrooms through lesson study (Darling-Hammond, 2009; Lewis, 2009; Lewis et al., 2012). It also provides opportunities for further research on connecting planning, reflection, and teaching practices as well as, how to build connections between mentor teachers, preservice teachers, and teacher preparation programs (Parks, 2009).

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General Audience Abstract

This case study explored the impact of a collaborative learning cycle with preservice teachers in elementary classrooms. The research question was: What was the impact of lesson study on preservice teachers thinking about student learning. Preservice teachers participated in a lesson study cycle where they collaboratively developed goals for students, planned a lesson, one teacher taught the lesson and the others observed, and lastly they reflected on this process as a group and adjusted their lesson based on their thinking about student learning. Each of the lessons was taught in real classrooms with students whom they were familiar. The data suggested that preservice teachers were able to deepen their understanding of thinking about student's learning and identify it in their work together. The collaborative process enabled them to further their understanding of thinking about student learning by having additional insight to what they observed in their lessons. The cyclical process of lesson study allowed the preservice teachers to attend to additional observations of their students because they were familiar with the lesson, content, and had considered what evidence of student learning they could collect. This study provides insight into how preservice teacher preparation programs could better connect theory to practice through lesson study cycles and provide authentic collaborative learning experiences for preservice teachers that mimics actual teaching in the classroom.

Dedication

To my parents, *David and Teresa Aker*,

for encouraging and supporting me every step of the way

to my brother, *Cory Aker*

for always reminding me who I am

and to my grandparents, *J.B. and Helen Aker*,

Clayton and Betty Branscome,

for taking me to the library every week and teaching me to love books.

Jeremiah 29:11-13

Acknowledgements

I am thankful for Mary Alice Barksdale who was willing to see more in me than I often saw in myself. Thank you for teaching me what is important and who I want to be as both a researcher and a professor. I appreciate all the hours spent at your kitchen table full of laughter, tears, and motivational speeches.

I appreciate all of the time, suggestions, and questions from my dedicated committee members. I know this process has prepared me for my future work in higher education and you taught me how to lead others through this process.

I also have to thank my sweet family for their prayers and support throughout this entire process. There were many missed events and sacrifices to help me get here. I am thankful you believed in me and were willing to help me fulfill the dream I had in my heart. Mom, for being patient when I was not; Dad, for keeping me on the road, Cory, for reminding who I am and who I will always be; David and Lindsey for making me laugh; Brenda for reading revisions; Darlin and Poppa, for everything you have done to help me get here.

I am eternally grateful to: my runner girls, Allison, Hannah, and Kim for always trying to keep me going on runs and in life; Nicole and Stephanie, for their motivation and/or distractions whenever I needed them; Katie, for listening to each of my worst case scenarios and Bimini's at the beach; all my BRC ladies, Alison, Erin, Hayley, Kat, Laura, Melinda, and Rachel for all their prayers and support throughout this process and for always making me laugh; Kimi and Kristen, for answered prayers, for reminding me who I want to be, and whose I am; Martha, for reminding me why I even did this and so many laughs; Caroline, I would not have survived quantitative methods without you, period; Debbi and Emily, for being the best parts of my job; and Donna, because you always knew the answer.

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Chapter One:

Introduction

The U.S. Department of Education has been working to improve education structures for decades. Reforms like A Nation at Risk (1983), No Child Left Behind (NCLB, 2001), Reading First (2001) and Race to the Top (2009) have encouraged changes that could improve student achievement and accountability (Fogelsong, 2016; Valllie & Beuse, 2007). Unfortunately, these reforms have led to negative effects for teachers and they have had less impact on student achievement than had been hoped (Jones, Jones, & Hargrove, 2003; Vallie & Beuse, 2007). Other countries around the world have made an effort to reform their school systems through professional development of teachers, without focusing solely on student achievement. Lesson Study is one example of this type of reform.

Lesson Study (LS) is a form of professional development that focuses on reflection about teaching practices (Chokshi & Fernandez, 2005; Lenski & Caskey, 2009; Lewis, 2002, 2009; Lewis & Hurd, 2011). LS provides teachers with opportunities to focus on philosophy, practice, and teaching methodology through collaboration and reflection. Fernandez and Robinson (2006) define LS as a "comprehensive and well-articulated process for examining practice" (p. 171). While defined in many different ways, LS has several common components: planning, discussion, observation, reflection, and revision. Groups of teachers choose an area of their practice that they would like to reform. The team develops a joint lesson plan and observes one another to examine their practice. This becomes the foundation for reflective discussions around how to improve teaching in the classroom with a focus on student learning. Central to LS is the

research process involved in teachers' collaborating about their own practice (Chokshi & Fernandez, 2005; Dubin, 2010; Lewis, 2002, 2009; Lewis & Hurd, 2011).

The LS process has been extremely influential in reforming Japanese school systems (Chokshi & Fernandez, 2004; Lewis 2002; Lewis & Hurd, 2011). Forms of LS have been used in Japanese schools for over a century (Dudley, 2013; Groves, Doig, Widjaja, Garner, & Palmer, 2013; Sato, 2008). Stigler and Hiebert (1999) brought LS to the forefront in the United States through their book *The Teaching Gap*. Their seminal LS work reported differences between the United States, Germany, and Japan. Their description of LS in Japanese classrooms interested teachers and researchers and it has begun to spread to other parts of the world (Dudley, 2013; Lesson Study Research Group, 2004; Lewis et al., 2004). Researchers and teacher educators in the United States have begun to implement LS practices as professional development.

Personal Significance

For the past 10 years, I have been an educator in public schools. My time in schools as both a student and a teacher has fostered my love of learning. Furthermore, it has always been extremely important to me to continue developing my craft and to foster the love of learning in my students. The reality of public school teaching in the United States is not always warm and fuzzy. There is a constant push-and-pull between what educators want to do to foster the love of learning in students, and the expectations for teachers related to standards. The teachers with whom I work often speak about lack of autonomy in their teaching; this was something I was feeling when I left the classroom for a literacy coaching position.

One perfect example of this juxtaposition would be test preparation prior to state assessments. Initially, I refrained from asking my students to complete worksheets or cookie cutter activities designed to teach to the test. While I was working in first grade, this was easy;

however, when I moved to fourth grade, things changed completely. It is hard to find a meaningful way to teach guidewords in the dictionary or complex alphabetical order without subjecting students to some boring drill and practice. Something was not quite right and I felt restricted as a teacher. If the other teachers at my grade level were completing worksheet packets to prepare students for testing, was this what I really should be doing? The answer in my heart was a resounding, "no" but the furor of testing can draw a teacher into practices they view as questionable in value (Barksdale & Triplett, 2005; Barksdale-Ladd & Thomas, 2000; Morgan, 2016; Triplett & Barksdale, 2003). Teacher educators must provide opportunities for preservice teachers to gain the knowledge, strength of character, and dispositions for supporting teaching that meets children's needs as learners (Morgan, 2016).

Development and Context

After working as a classroom teacher for several years, I decided to pursue National Board for Professional Teaching Standards (NBPTS) Certification. One of the key components in this process is reflecting on one's teaching. The National Board Certification process requires teachers to focus on specific sections within each lesson that demonstrate the best evidence of student learning, including analysis of strengths and weaknesses. This experience, often a two to three year process, dramatically changed the way I thought about teaching and learning in my classroom. I began to reflect on my teaching and I was striving to determine my students' zones of proximal development when planning next steps in the classroom. During this time, I also hosted many student teachers and found they lacked critical analysis related to their teaching and student learning.

Fast forward several years to my work as a literacy coach and a doctoral student, where I began to frequently deliver professional development to inservice and preservice teachers. I

knew much of this professional development was lost on educators due to lack of fidelity, expectations, time, and reflection on their part. I began to wonder how I could support preservice and inservice teachers by providing meaningful professional development that would truly have an impact on learning in their classrooms. I was especially interested in the role reflection on teaching practices. As I became more familiar with LS, I realized this could be an opportunity to bring each of these components together.

A local university was implementing LS as a part of a seminar course for Master's level students. I began working with my doctoral chair who was analyzing some initial reflections on LS that preservice teachers were writing and I started to read some of the research myself. I developed a plan for a pilot study to begin to document preservice teachers' work related to LS. The purpose of this pilot was to gain insight into preservice teachers' perceptions of LS and how it influenced them as teachers. The preservice teachers worked in small groups, divided by grade levels, developed a lesson plan together, implemented the lesson, and adjusted it based on their observations. Each small group of preservice teachers taught the lesson one time, made adjustments after each teaching, and then retaught the lesson. At the end of the semester, the preservice teachers each wrote reflections about their experiences with LS. I observed the students completing a LS cycle but I did not intervene or provide guidance on the process.

After the pilot study, participants completed a written reflection and submitted the "research lesson" plans. Both of these documents provided qualitative data and it was coded to determine common themes. All the preservice teachers stated they "enjoyed" the process of collaborating with other teachers and having the opportunity to observe in other classrooms. One of the biggest drawbacks the teams discussed was having to juggle pacing guides for different grades or schools. The preservice teachers felt the teaching of the lesson multiple times

allowed them to make changes to improve their lessons. Some of the improvements were smoother transitions, changing materials (sticky notes instead of worksheets), clarifying language on charts, and changing the order of activities. While each of these changes may have helped the preservice teachers, none of them really focused on student learning or developing their knowledge around the topic. This experience provided opportunities to understand LS and how this process allows preservice teachers to collaborate with one another; however, it did not engage the preservice teachers in critical analysis of their teaching and student learning. The presence of a knowledgeable other or facilitator could have fostered more reflection on important components in the process. This surface level thinking and attention to the task itself, is quite normal for the developmental level of preservice teachers. LS can move preservice teachers beyond focusing on their own performance and into a focus on student learning.

The Professional Development Problem

Professional development is a component of public school education in the United States. The U.S. Department of Education requested 100 million dollars in their 2017 fiscal budget for the Supporting Effective Educator Development (SEED) program. It was designed to "increase the number of effective teachers and principals by supporting grantees that would provide evidence-based professional development activities or prepare teachers and principals from nontraditional preparation and certification routes to serve in high-need districts and schools" (United States Department of Education, 2016, p.19). This is one example of current thinking about the importance of providing high quality professional development in the United States. Beyond the support from the federal government for this program, there are also state funds funneled toward providing professional development for teachers.

The U.S. Department of Education and each state outline their definitions of high quality professional development. The Virginia Department of Education (VDOE) provides the following expectations of what high quality professional development should look like for teachers:

Criteria for high-quality professional development should:

a. improve and increase teachers' knowledge of the academic subjects the teachers teach, and enable teachers to become highly qualified if they are teaching in a federal core content area;

b. be sustained, intensive, and classroom-focused in order to have a positive and lasting impact on classroom instruction and teachers' performance in the classroom;

c. be based on, aligned with, and directly related to Virginia's Standards of Learning;

d. be structured on scientifically-based research demonstrated to improve student academic achievement or substantially increase the knowledge and teaching skills of teachers;

e. be sponsored by school divisions, colleges, universities, organizations, associations, or other entities experienced in providing professional development activities to teachers and instructors;

f. be delivered by individuals who have demonstrated qualifications and credentials in the focus area of the professional development;

g. support the success of all learners including children with special needs and limited English proficiency;

h. provide training for teachers in the use of technology so that technology and technology applications are effectively used in the classroom to improve teaching and learning in the curricula and federal core academic subjects in which the teachers teach;

i. promote the use of data and assessments to improve instruction; and

j. be reviewed for high quality and evaluated after completion to determine if the intended results were achieved.

(Commonwealth of Virginia Department of Education, 2004, p. 2).

Each component selected by the state of Virginia is a valid and credible requirement for the funding supplied to school districts. One of the drawbacks is that many of these items are subjective; each school division determines which scientific, research-based practices will be promoted. School divisions also determine the evaluation process for professional development, which is also subjective. These challenges beg answers to a range of questions, like how can schools assess how professional development affected teachers and students? Are we improving teachers' instructional methods and influencing student learning in a positive way? Do our current approaches support opportunities for teachers to reflect on their own teaching individually or with peers?

Professional development has a significant impact on practicing teachers, but is also a crucial component in preservice teaching programs. Demonte's (2015) findings indicate that there will be more than a million new teachers who complete education licensure programs in the next decade. Demonte also poses the question, "Will these teachers be ready to teach?" In order to ensure that new teachers have the opportunity to work with peers and develop the craft of teaching, they will be required to participate in "high quality professional development." The nature of professional development differs widely based upon the state, school district, teachers, and student makeup of schools. Attending a higher education institution to gain teacher licensure should give preservice teachers a solid background and begin their own professional development journey.

Teacher education programs must encourage preservice teachers to engage in "thoughtful and challenging work to set the stage for serious lifelong professional learning" (Ball & Cohen, 1999, Hammerness, Darling-Hammond, & Bransford, 2005; Kennedy, 1999; Lampert & Ball, 1998, 1999; Meier 1992; Sims and Walsh, 2009, p. 725). Teacher education programs must prepare preservice teachers to develop the skills necessary to "learn from teaching" (Darling-Hammond & Hammerness, p. 13, 2005; Sim and Walsh, 2009). Reflection on practice is a skill that must be developed during college coursework and carried into public school classrooms. Taking a constructivist lens, education professors must acknowledge that preservice teachers bring their own socially constructed experiences into the preservice education arena (Lortie, 1975; Piaget, 1973; Vygotsky, 1978). Some of these experiences will be positive and some negative; it is essential that educators working with preservice teachers help them develop critical understandings of how to learn from teaching.

Rationale

The National Reading Panel (2000) concluded that professional development can improve teaching practice. The National Reading Panel applied their findings to both preservice and inservice teachers. Taking things a step further, they also reported that teaching educators methods of improving literacy instruction could have a positive impact on student achievement (National Reading Panel, 2000).

LS develops preservice teachers' abilities to reflect on their teaching practice while applying their work in real life classrooms (Amador & Weiland, 2015; Sims & Walsh, 2009). Many researchers have reported that preservice teachers' most pivotal experiences in teacher education programs take place in the field during practicums (Darling-Hammond, 2006; Feiman-Nemser, 1983; Lampert & Ball, 1999; Sims & Walsh, 2009; Tabachnik, Popkewitz, & Zeichner,

1979-1980). LS provides a fundamental opportunity to look deeper into teaching and learning and providing preservice teachers the opportunity to connect their previous learning experiences with the theory and coursework they are encountering in teacher education programs (Amador & Weiland, 2015; Sims & Walsh, 2009). According to Darling-Hammond (2006), some of the most successful teacher education programs simultaneously integrate coursework and clinical experiences.

Preservice and novice educators need to engage in strategies that support the improvement of teaching and have transferability across teaching careers (Darling-Hammond & Ball, 1998; Darling-Hammond & Richardson, 2009; National Reading Panel, 2000). LS can provide this opportunity. There is some research available on the use of LS in the United States in content areas like math and science, but very little research exists on the use of LS related to language arts. LS research has only begun to appear in English journals over the last 19 years (Dudley, 2013; C. Fernandez 2002, C. Fernandez, Cannon & Chokshi, 2003; M.L. Fernandez, 2004, Lewis, 1998; Lewis, Perry & Hurd, 2004; Lewis, Perry, & Murata, 2006; Takahashi, 2005; Watanabe, 2002; Yoshida, 2002). There is some evidence to associate LS with increased performance for students and teachers, but its deeper impact is still unproven in the United States (Dudley, 2013; McKinsey, 2007; Mourshed, Chijioke, & Barber, 2010; Stigler & Hiebert, 1999; Perry, Lewis, Friedkin, & Baker, 2012). The focus of this dissertation was on the impact of LS on preservice teachers thinking about student learning.

Design of the Study

This study investigated how a group of four preservice teachers used LS to create improved lessons while focusing their thinking on student learning. It provided an understanding of how preservice teachers thought about teaching and the role of reflection in everyday practice.

Preservice teachers completed pre-interviews and post-interviews about the LS processes. After their pre-interview, each preservice teacher participated in a LS group that met several times to develop, research, plan, and teach a lesson to a class of elementary school students. During each meeting, the preservice teachers reflected on the process through debriefing interviews. Reflective participatory field notes were completed after each meeting of the LS team.

A formative and design experiment (Reinking & Bradley, 2008) framed the process of LS so that it could unfold gradually in a collaborative setting. Completing this study in an authentic learning environment provided the preservice teachers with opportunities to construct knowledge together while focusing on children in their practicum placements. It allowed the intervention to be adapted to fit participants' needs based on the data collected during each meeting. Data sources for the study were qualitative and included reflective participatory field notes, lesson plans, individual interviews, debriefing interviews, and a final reflection on the LS process. I selected these data sources to develop a rich, thick description of the case. These qualitative data methods were selected to analyze the impact of LS on preservice teachers' thinking about student learning (Merriam, 1988).

Constructivism was the theoretical lens for this study because it provided the opportunity for participants to construct knowledge together when they experience disequilibrium between perception and reality (Green & Gredler, 2002; Piaget, 1973; Vygotsky, 1978). LS is a group learning experience; thus, it allows teachers and students the opportunity to construct knowledge and experience disequilibrium together. Creswell (2014) describes a social constructivist view for this type of research. He states that the goal is to rely heavily on participants' views of the case being studied (Creswell, 2014; Fogelsong, 2016).

The Research Problem

Preservice teacher education does not prepare candidates for the realities of learning from teaching, specifically with regard to understanding how teaching relates directly to student learning. Further, beginning teachers lack the capacity to work collaboratively with other teachers (like in grade-level teams) to plan and reflect upon teaching in ways that focus on ensuring student learning. LS holds promise for supporting preservice teachers and developing this capacity (Lenski & Caskey 2009; Lewis, 2002, 2009; Lewis & Hurd, 2011; Sims & Walsh, 2009). There is a lack of research on how LS may support preservice teacher learning in the areas of: (a) the relationship between teaching and learning (b) collaborative planning (c) and thinking about student learning. Thus, the research question was:

- What was the impact of lesson study on preservice teachers' thinking about student learning?

This study provided preservice teachers with the opportunity to participate in the LS process for the purpose of thinking about student learning through collaboration and reflection in real elementary classrooms over 4-6 weeks.

Chapter Two:

Literature Review

This literature review about Lesson Study (LS) includes a comprehensive summary addressing the following questions: (a) How does LS fit within the constructivist framework? (b) What is LS? (c) What current research supports LS in education? and (d) What is the current research on professional development practices? The first section is an overview of constructivism founded in the work of Piaget (1973) and Vygotsky (1962, 1978,) with a description of how constructivism translates into teaching and learning in the classroom. Next, there is a description of the LS cycle, along with suggestions and variations for implementation. Research is shared about LS as a form of professional development and its impact on student and teacher learning. This section also contains some of the drawbacks and the lack of a current research base. Further, there is a discussion of research on professional development as it relates to LS. Lastly, goals for implementing LS with preservice teachers are supplied.

The Constructivist Lens

Constructivism focuses on two key principles: (a) that learners construct their knowledge rather than have it passed on to them from others, and (b) that classroom instruction must support this knowledge construction by increasing engagement (Brooks & Brooks, 1999; Gash, 2015; Green & Gredler, 2002; Schlechty, 1990). Adams (2006) writes, "Constructivist learning orientations seek to understand how pupils create their knowledge constructs and what these mean for understanding influences on thought processes" (p. 245). Learners construct knowledge based upon their own experiences, implying that educators must support students in constructing knowledge by presenting them with problems to be discussed, explored, and solved (Adams; Vygotsky 1962).

There are several different perspectives on constructivism that make up the foundational knowledge base. One of the key theorists is Jean Piaget whose work focused on logical reasoning (Gash, 2015; Green & Gredler, 2002; Piaget, 1973). Piaget (1973) theorized that learners continually reconstruct their knowledge based upon conflicts between perceptions and reality. This type of disequilibrium causes learners to revisit known information in light of current observations (Gash; 2015; Piaget, 1973). As learners develop "logical reasoning" abilities (Green & Gredler, p. 56) they learn to address larger problems, creating a system of checks and balances within personal cognitive capacities.

Piaget believed that teachers should engage students in experimenting with their own hypotheses in the context of both individual and group experiences (Green & Gredler 2002; Piaget, 1973). Further development of logical reasoning requires that learners experience disequilibrium repeatedly (Green & Gredler; Piaget). Aside from providing opportunities and experiments for children that challenge their thinking, Piaget also believed that teachers should provide thought-provoking questions to guide students. By questioning students' early ideas and beliefs, the teacher can support their intellectual development (Brooks & Brooks, 1999; Gash, 2015; Piaget). Piaget (1973) centered on student-to-student experiences; however, teachers can also provide goal-centered opportunities to facilitate student learning (Appleton, 1997; Green & Gredler).

Another theorist associated with constructivism is Lev Vygotsky (1962, 1978), whose early work in the field of psychology is still applied to education today. Vygotsky's research applies to social constructivism. Vygotsky believed that "Learner construction of knowledge is the product of social interaction, interpretation, and understanding" (Adams, p. 245; Vygotsky, 1962) .There are similarities between the theories of Vygotsky and Piaget. Vygotsky chose to

focus specifically on higher cognitive functions including "categorical perception, categorical thinking, logical memory, and voluntary attention" (Green & Gredler, p. 56). Key to understanding each of the higher cognitive functions is mastering the learning of one's written language (Vygotsky, 1931/1997, 1978). Learners must develop enough mastery of their primary language to be able to manipulate it in their thinking or to use "speech as a tool" (Vygotsky, 1978). Higher-level thinking requires the capacity to manipulate language from a critical perspective.

Learners must develop self-awareness of their thinking in mastering subject matter by creating categories and identifying items that may not fit within their conceptual classification systems (Green & Gredler; Vygotsky, 1928-31/1988a). This notion is quite similar to Piaget's disequilibrium (1973). As students learn to organize their world, they must deepen their understandings of how subject matter connects and differs. By developing knowledge and creating connections conceptually, learners also develop their cognitive capabilities (Green & Gredler; Vygotsky, 1928-31/1988b).

As teachers apply Vygotsky's theories in classrooms, their goal should be to draw thinking processes out of the child. Vygotsky wrote, "the teacher, working with the child, explains, informs, inquires, corrects, and forces the child himself to explain" (Vygotsky, p. 216, 1934/1987). After the student participates with the teacher, there should be encouragement to repeat through this process independently (Vygotsky, 1934/1987). An important component of this process [often attributed to Vygotsky mistakenly] is scaffolding. Vygotsky did not mention scaffolding in his work, but focused on teacher modeling, explaining means by which teachers could assist students in developing their thinking (Brooks & Brooks, 1999; Green & Gredler; Gredler, 2001; Vygotsky, 1934/1987). In today's world, Vygotsky's work could be applied to

several scenarios in which modeling can occur: cognitive apprenticeships, situated learning, reciprocal teaching, or peer tutoring. Each scenario provides students with the opportunity to have an expert work beside them, supporting the student to achieve "results that are just out of reach" (Smidt, 2009, p.87).

One application of Vygotsky's work in this area is reciprocal teaching. When using this teaching strategy, students monitor and develop their own thinking by (a) asking themselves questions, (b) clarifying what they read, (c) summarizing, and (d) making predictions (Palincsar & Brown, 1984; Smidt, 2009). Reciprocal teaching enables students to monitor their learning and thinking related to a specific passage, but more importantly, it helps them develop an understanding of how to effectively process information and comprehend (Palincsar & Brown, 1984; Smidt, 2009).

One component under the umbrella of constructivism is social constructivism which addresses beliefs about what knowledge and learning actually are, as well as the "locus of learning" (Green & Gredler, 2002, p. 57). Theorists of social constructivism believe student knowledge should be co-created within a classroom of students and teachers working together to revisit and apply theories of knowledge (Bredo, 1994; Green & Gredler; John-Steiner & Mahn, 1996; Perkins, 1999). A context in which social constructivism has been described is the community of practice. "Communities of practice" involve an expert passing on information to a novice (Lave & Wenger, 1991). "Communities of practice" can occur in classroom scenarios where students work together to understand information, then reform new groups who share and adjust information with other class members, taking learning beyond the individual (Lave & Wenger).

Similarly, holistic constructivist theory contributes to the understanding of constructivism. The key principle within this approach is that learners must understand the whole in order to focus on learning the parts (Green & Gredler). Green and Gredler discuss how whole language is an example of holistic constructivist theory related to literacy instruction. Children engage in developing decoding skills when reading a text in order to understand how these decoding skills will foster their reading of texts in general. By encouraging students to make the connection between the whole and the part, holistic constructivists encourage the student to develop ownership in learning. Holistic constructivists believe the act of learning resides within the student's thinking about their learning processes and builds upon the students' individual strengths and weaknesses (Green & Gredler). Students' interests and motivations play a key role in this theory.

Constructivist Comparisons

It is important to compare and contrast the work of constructivism in order to understand each of the principles involved. Green and Gredler, (2002) compare the work of Piaget and Vygotsky and outline their similarities and differences. For instance, Piaget and Vygotsky both focus on the outcomes of student cognitive capabilities and reasoning; social and holistic constructivists consider classroom routines and learning foci, like creating discourse or developing ownership (Gash, 2015; Green & Gredler). Green and Gredler also highlight that Piagetian, social, and holistic constructivism requires students' self-awareness, while Vygotsky suggests that self-awareness should be taught.

In each case, there must be an expert in the subject matter who disseminates information in different ways. Piaget calls for teachers to select experiments and questions that will deepen students' thinking, while Vygotsky promotes teachers' developing connections between

information, ideas, and disciplines (Gash; Green & Gredler, Piaget 1973, Vygotsky, 1978). Piagetian, social, and holistic constructivists also urge teachers to foster and provide opportunities for interaction amongst peers in the classroom and require teachers to engage in careful thinking around prompting and asking questions to promote student learning (Brooks & Brooks, 1999; Smidt, 2009, Vygotsky, 1978). Holistic constructivists call for teachers to spend a large amount of time differentiating for the students in order to provide specific information and examples to help each student relate their work to larger learning goals.

Each of these theories relies on the expectation that learning is a universal process in the classroom; however, the application of instruction to support student learning can vary depending on the teachers' skills (Brooks & Brooks, 1999; Green & Gredler). Courses that provide more opportunities for students to discuss and teach information to one another foster greater learning opportunities than those that do not. Teaching that is founded in constructivism has a great impact on both classroom dynamics and how teachers present learning opportunities to their students (Brooks & Brooks; Green & Gredler).

Vygotsky's Zone of Proximal Development and More Knowledgeable Other

While the "zone of proximal development" (ZPD) was just a minor component in Vygotsky's work, much has been made of it and the notion of the ZPD had quite an impact on pedagogical thought. Vygotsky (1978) describes the zone of proximal development as follows:

> [T]he zone of proximal development … is the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers … The zone of proximal development defines

> those functions that have not yet matured but are in the process of maturation, functions that will mature tomorrow but are currently in an embryonic state (p. 89-90).

Vygotsky (1978) also wrote that because a child's developmental processes mature slightly behind their learning processes, it is important for teachers to support their development in both areas using scaffolding. Moll (2014) discusses that perhaps Vygotsky's writings on the zone of proximal development were beyond an "instructional heuristic," but were meant to place importance on the "significance of meaning in the cultural mediation of thinking" (p. 34). This implies that Vygotsky's work connects both the importance of symbols in language for meaning and for mental functions (Moll, 2014).

According to Smagorinsky (2013), a student's individual zone of proximal development related to a specific task depends on many factors including: (a) past experiences, (b) the degree to which educators understand past experiences, and (c) the students' and teachers understanding of a common goal. Smagorinsky posits that a student's zone of proximal development goes beyond teacher and student interactions; he suggests that differing cultures between students and teachers can further complicate the situation. Teachers who come from cultural backgrounds that differ from their students often expect that students will adapt their thinking and learning to fit the teachers. However, the reverse should be the case; teachers must understand their own culture, both implicitly and explicitly, and they must come to understand the cultures of their students so that it will be possible to adapt instruction to meet the needs of the students (Gallas, 2014; Smagorinsky, 2013).

Smidt (2009) writes that Vygotsky's ultimate goal was to deepen understanding of how children progress in their learning, including students' culture. Smidt reports that the most important part of the ZPD is the "potential" for the students learning (p. 85). What could

students do with this new information if we assisted them? Vygotsky (1934/1987) wrote, "Instruction is only useful when it moves ahead of development. When it does, it impels or awakens a whole series of functions that are in a stage of maturation lying in development" (p. 212; as quoted by Smidt, p. 83, 2009). To ensure that a learners' development remains in this zone of proximal development, educators must closely observe learners to understand what they are capable of doing on their own and how the teacher can scaffold their learning. This scaffolding process is "a highly skilled thing to do." (Smidt, p. 86, 2009) and leads us to another component of Vygotsky's work, the "more knowledgeable other."

The more knowledgeable other, "alongside a novice learner, paying close attention to what the child is doing or saying, can provide some support to help the child achieve what is just out of reach" (Smidt, 2009, p. 87). The more knowledgeable other can scaffold children's learning and position them within their zones of proximal development. While the more knowledgeable other does not always have to be an adult, Smidt (2009) outlines several suggestions for how educators can fill this role. More knowledgeable others must understand the knowledge and content they are teaching, understand a child's previous experiences, and have had experiences observing the child (Smidt, 2009). More knowledgeable others must also reflect on their learning experiences with students and keep documents and records related to the learning experiences educators are providing (Smid, 2009t). As previously mentioned, educators must develop these skills over time. Time is required in order to understand knowledge and learning, and specific learners. The opportunity for this kind of reflection on teaching and learning can be hard for teachers to find in U.S. classrooms. LS provides the opportunity for preservice and inservice teachers to take a step back and think about this kind of work in their classrooms.

Constructivism and Lesson Study

Adams (2006) analyzed the work of Hein (1991) and Tam (2000) and constructed a list of principles that are common to social constructivism, concluding that teachers should create classroom experiences around these principles:

1. Focus on learning, not performance.
2. View learners as active co-constructors of meaning and knowledge.
3. Establish a teacher-pupil relationship built upon the idea of guidance, not instruction.
4. Seek to engage learners in tasks seen as ends in themselves and consequently as having implicit worth.
5. Promote assessment as an active process of uncovering and acknowledging shared understandings (Adams, p. 247).

Based on these principles, LS can be viewed as a strategy that is founded within the context of constructivist learning (Adams, 2006; Brooks & Brooks, 1999; Gash, 2015; Piaget, 1973, Vygotsky 1978). During the process of LS, teachers work collaboratively, reflecting on their own knowledge and ideas while discussing lessons amongst other teachers (Gash, 2015; Piaget, 1973, Vygotsky, 1978). These discussions focus around students' known life experiences and cultures, social construction of knowledge, and with student zones of proximal development always central to plans for improving teaching and learning (Brooks & Brooks; Gash; Piaget; Vygotsky). These principles apply to both the process of LS for teachers, and to their teaching of students. Vygotsky's (1978) more knowledgeable other and zone of proximal development also apply to the LS process as they relate to teacher support for guiding the construction of knowledge by the student.

The Lesson Study Cycle

Introduction to Lesson Study in the United States

While LS has been present in Japanese schools for quite some time, it is still relatively new in the United States. The premise of LS in the U.S. was built upon the dissertation of Yoshida (1999), a videotape of a science lesson described by Lewis (2002) in two written works by herself, and the Mills College Lesson Study Group (2002). In 2003 there were around 335 schools that reported use of LS in 32 states (Brown, McGraw, Kox, Lynch, & Arbaugh, 2002; Chokshi & Fernandez, 2004; Fernandez, 2002; Lesson Study Research Group, 2004; Lewis, Perry, & Murata, 2006;Nation Research Council, 2002; North Central Regional Educational Laboratory, 2002; Perry & Lewis, 2004; Richardson, 2004; Stepanek, 2001, 2003; Wang-Iverson & Yoshida, 2005; Watanabe, 2002; Wilms, 2003). LS remains a strategy that is rarely used in public schools or in preservice teacher education in the U.S. and there is very little empirical research about it. Further, the LS cycle described by Lewis (2002) and based upon Japanese practices, is rarely used in its entirety in the U.S (Chokshi & Fernandez, 2004; Lewis, Perry, & Murata, 2006).

Understanding Curriculum

Lewis' description of the cyclical process of LS in Japan contains four common elements (Lewis, 2002; Lewis & Hurd, 2011). The first crucial component of the cycle is developing an understanding of the curriculum, the standards, and the students to be taught. These are common components for any teacher in a classroom; a defining difference in LS is that this process occurs amongst a group of teachers and not individually. An initial discussion helps everyone determine a common starting place for developing their "research lesson" which is the lesson the

group will create, teach, and examine. Japanese teachers choose goals for their students based on their long-term desires for them as productive members of society (unlike lesson planning in U.S. schools where teachers may focus on one small skill or activity). Much consideration goes into what these teachers want their students to accomplish and how to help them become lifelong learners.

Lewis (2002; Lewis & Hurd, 2011) brought to light the fact that U.S. teachers find the goal setting process somewhat intimidating because they so often focus solely on the content taught at a given grade level. It is difficult for teachers to think about how a specific skill or strategy ties to other concepts that students will be learning over the next several years. Lewis helps teachers to understand that they do not have to be experts in a specific curriculum; however, teachers must be able to find resources and examine areas of the curriculum about which they are unsure (Lewis, 2002; Lewis & Hurd, 2011). Having a group of teachers dissect and share the workload of investigating the material helps with time management and engages all of the teachers in the LS process.

The goal-setting component of LS requires the most time, planning, and gathering of resources. Teachers should review national curriculum standards, examine current research on teaching, and contact outside consultants who are experts in the field. Lewis (2002; Lewis & Hurd, 2011) shares several examples of this in her detailed description of many LS groups in the United States. There are numerous outside agencies (including universities, public services, businesses, and the like) who can bring their expertise and understanding of content to LS groups. Bringing in an outside consultant can deepen the teachers' understanding of content and curriculum, which should be an important characteristic of high-quality professional development. These consultants become part of the LS community.

When considering this stage of the process from a social constructivist lens, there is much evidence to support the theory. Teachers work together in a group to bring their prior teaching and learning experiences to lesson planning. As teachers spend time focusing on learners goals, the students' "zones of proximal development" come into play (Vygotsky, 1978). Vygotsky's work with the "more knowledgeable other" also applies to this stage of the LS cycle. Having an outside person to ask thought-provoking questions related to the teachers' "zones of proximal development" will also scaffold their personal learning through the process (Vygotsky, 1978).

Teaching the Research Lesson

The second step in Lewis' (2002; Lewis & Hurd, 2011) LS cycle is to have one teacher teach the research lesson while the other teachers in the group observe the students and collect data on the predetermined goals of the lesson. Takahashi and Yoshida (2004) believe LS should "respect the natural atmosphere of the class" (p. 441) and teachers should teach the research lessons in their own classrooms. Teachers who are observing these lessons should be silent observers and not engage in discussion with children or provide support for the lesson. This would detract from the lesson and goal of LS altogether. These clear expectations must be addressed prior to teachers entering the classroom (Takahashi & Yoshida, 2004).

All of the members of the LS team, principals, and outside consultants will observe the research lesson while another teacher implements it. In Japan, usually many teachers observe a research lesson at one time, so lessons may occur at alternate locations to accommodate all of these people (Lewis, 2002). Since LS research lessons and presentations are so highly valued, Japanese schools often adjust their schedules so additional teachers may attend by having early dismissals (Lewis). Lewis says it would be possible for U.S. schools to use early dismissal days for the teaching of a research lesson such that all the classrooms would leave except for the

students who would be involved. This could only be the case if LS were an integral part of a school's culture.

Reflection

In outlining the LS cycle, Lewis (2002; Lewis & Hurd, 2011) describes the third step of the process as reflection on the research lesson. Ideally, a post lesson debriefing would occur immediately after the lesson was completed, but this time constraint is often one of contention in U.S. public schools. During the debriefing process, the research lesson teacher shares her thoughts about the lesson first and then other members of the group provide their reflections and thoughts. Grohl (2011) and Chokshi & Fernandez (2005) suggest that, in debriefing sessions, a knowledgeable other may prompt teacher thinking. In addition, a facilitator could keep the discussion moving forward and remind teachers of their goals, and the focus of data collection.

According to Takahashi and Yoshida (2004), some members of the team should take on roles such as facilitator or note-taker, and these LS team participants can record important information about needed revisions to the research lesson. Further, there can be a final commentator to wrap up the entire discussion and set the tone for future meetings. Takahashi and Yoshida (2004; Takahashi, 2013) place great importance on the role of the final commentator. They describe the person as someone who is a mentor outside of the group of teachers. This mentor would be able to get a sense of the group, point out important and unaddressed topics related to the lesson, and serve as an essential learning member of the group. Takahashi (2013) and other researchers (Lewis, Perry, Hurd, & O'Connell, 2006; Lewis & Tsuchida, 1998; Takahashi, 2011; Takahashi & Yoshida, 2004; Yoshida, 1999) acknowledge that experienced knowledgeable others are extremely important to the success of implementing LS effectively. Their expertise is crucial to the success of LS. Currently, outside of Japan, it is

difficult to find members who can fulfill all of these roles because they are often inexperienced with completing the LS cycle (Takahashi, 2013).

During the reflection and debriefing part of the process, the teachers focus on the evidence of student learning collected during the lesson. They also discuss how to understand students' thinking. Lewis (2002) states that teachers should be able to address any parts of the lesson that the group believes need to be changed or that did not go as planned. This debriefing often requires a large amount of time in order to cover all the information absorbed by the team members during the lesson.

In an effort to decrease the debriefing time, Grohl (2011) made an adaptation, which was to videotape the research lesson and have the other teachers watch the video later. While it is not an ideal way to observe the lesson and focus on students, it does allow teachers the ability to stop the video and discuss issues or points and then continue once they have finished their discussion (Grohl, 2011). This method organizes LS experiences without having to interrupt classroom life. It makes it possible for debriefings to occur outside of the school day or during planning times. Grohl's (2011) method would also reduce some of the pressure on the research lesson teacher because there would not be as many observers in the classroom and it would reduce the impact of outsiders on the students.

Adjusting or Finalizing the Lesson

The final step is re-teaching the lesson to improve upon it or publishing/sharing the research lesson. Lewis (2002) discusses making final changes to the lesson and arranging the details of either re-teaching or sharing the lesson. The teachers are the ones who decide what the next step will be. Lewis (2002) provides many examples of teams that elected to continue LS and others who chose to finalize their research lesson with changes after just one cycle. An

important component in this part of the process is that, if teachers are going to finalize their lesson, they create a report that outlines their work and what they learned through the process along with their lesson plan. This reflection is evidence of how this process influenced their teaching. Teachers may choose to publish their research lesson or perhaps present it to the faculty at a staff meeting or local conference. This is clearly one of the many components of the process that support LS as a high-quality professional development.

If the team selects re-teaching, it provides teachers an opportunity to dive deeper into the lesson, study student learning, and fine-tune their craft of teaching this content. While a team may not always choose this path, Lewis advocates that teachers must follow through with this experience if they identify needed improvements in the lesson (Lewis, 2002). Teams may re-teach the research lesson as many times as they would like (Lewis, 2002).

Lesson Study Process and Constructivism

The LS process sits firmly within the constructivist framework for student and teacher learning. Each component of the LS cycle provides learning opportunities for teachers through collaboration and the co-construction of knowledge (Adams, 2006). There is also opportunity for teachers to examine students' zone of proximal development and, after determining that level, they may help students reach their "potential" by serving as the more knowledgeable other (Smidt, 2009; Vygotsky, 1978). Understanding how students contribute to learning in the classroom, along with how teachers contribute by working with one another, is key to making the process a success. All the members of the LS team should be focusing on providing guidance or scaffolding, not just instruction (Adams, 2006).

Social constructivists support the conclusion that "teachers should engage learners in tasks seen as ends in themselves and consequently as having implicit worth" (Adams, 2006, p.

247). The process of LS lends itself to this conclusion, because teachers are considering long-term goals versus short-term goals. As LS teams participate in this process, it is essential that they asses whether or not their short-term goals versus long-term goals align.. The data that the teams collect will provide evidence of students learning related to the specific goals of the lesson.

During LS, teachers should focus on student learning (Adams, 2006). The assessment component of LS, which was included in the research lesson, should promote the "active process of uncovering and acknowledging shared understanding" of students (Adams, 2006, p. 247). In turn, assessments of student learning provide further information related to the students' "zones of proximal development" and lend themselves to making changes in the lesson to strengthen student learning.

Creating Lesson Study Teams

Lewis and Hurd (2011) discuss the different types of LS they have encountered in their years of experience with the process. One type is small groups of teachers who volunteer to participate within their school or grade-level teams. These small groups often lead to bigger groups or increased interest among their peers. This is a more popular fit in U.S schools since LS is not common (Lewis & Hurd, 2011).

Another type of LS can occur during summer workshops. Lewis and Hurd share that teachers who participate in this type of LS can work in classrooms of school districts that attend school year-round. These summer workshops relieve teachers of their other school responsibilities so they can focus on LS (Lewis & Hurd, 2011). This type of LS is a little different because the teachers would not be working with their own students and would not have in-depth understandings or relationships with students.

Another type of LS occurs as part of a school system's professional development. In this case, teachers would be required to participate in LS during contracted professional development days. Similarly, schools may participate in LS as professional development for the entire faculty (Lewis & Hurd, 2011). School improvement teams could require faculty to address shortcomings in their students' achievement scores through LS. Further, this could be a means of teachers improving their instruction and their understandings of student learning.

There are other ways to engage U.S. teachers in LS depending on where the teachers are in their careers. Curriculum specialists or coaches could create LS groups to help foster their own learning and understanding of a content area (Lewis & Hurd, 2011). These educators could send a powerful message about the importance of ongoing professional development and continued learning in education.

Pre-service teachers may engage in LS with a cohort of their peers and mentor teachers. This type of LS engages the preservice teachers in both theory and practice, which has been identified as a characteristic of the most powerful professional development (Lieberman, 1996). Similarly, new teacher teams may participate in LS as a part of their professional development (Lewis & Hurd, 2011). By joining a LS team, new teachers could be developing their teaching craft and relationships with other teachers at their new schools.

Pre-service Teachers

Most of the work previously mentioned focused on practicing teachers in upper elementary or middle school science and mathematics settings (Amador & Weiland, 2015; Fernandez, 2010; Kotelawala, 2012; Sims & Walsh, 2009). However, pre-service teachers can also benefit from the LS process on a different level (Parks, 2009; Sims & Walsh, 2009). Parks (2009) wrote about LS experiences in working simultaneously with preservice and mentor

teachers. Some components of the process are likely to be a little more difficult for pre-service teachers, so they may need extra support. Pre-service teachers may need extra guidance in the development of student learning and scaffolding of curriculum between grade levels. The LS process could help pre-service teachers learn to reflect on their teaching. It could also help facilitate collaboration with fellow teachers (Parks, 2009; Lewis & Hurd, 2011).

Several researchers applied the practice of LS to their teacher preparation programs to provide preservice teachers with the opportunity to collaboratively focus on student learning and improving their instruction (Amador & Weiland, 2015; Carrier, 2011; Fernandez, 2010; Marble, 2007; Olson, White, & Sparrow 2011; Zillioz & Fernandez, 2004). Each of these researchers applied a different variation of LS and molded it to fit their teacher education program and their students. Yu (2011) asked preservice teachers to complete LS with small groups of students to develop their observation skills while others were teaching (Amador & Weiland, 2015). Fernandez (2010) focused on having preservice teachers use microteaching and they participated in repeated cycles with small groups of children (Amador & Weiland, 2015). This study provided preservice teachers with the ability to familiarize themselves with the LS process. Zilliox and Fernandez (2004) also carried LS a bit further by requiring preservice teachers to participate in the LS process-using peer teaching. In this case, preservice teachers taught their lessons to other preservice teachers in the cohort rather than in actual classrooms. Each of these examples were tied to professional development experiences with preservice teachers centered around actual teaching, which has been identified as one of the most successful ways of fostering effective teaching (Fernandez, 2002; Lieberman, 1996).

Timelines and Schedules

Some components of the LS process do not typically fit into the parameters of a public school schedule. One of the biggest challenges in creating a LS team is determining when and where the team will be able to meet to work together. In addition, there can be challenges with how long the process will take. Many different schedules have been recommended to help keep LS teams focused and on task throughout the process. Takahashi (2005) suggests many different options depending upon teachers' schedules. He also outlines a plan that would allow teachers to go through the whole LS cycle in about 5 weeks. This short timeline helps hold teachers accountable for their work with the team and does not drag the process out longer than necessary.

Keeping the suggested four-six week timeline in mind, Stepanek, Appel, Leong, Turner Managan, and Mitchell (2007) discuss strategies for school divisions to help schedule their LS work. One initial suggestion would be adjusting the amount of time children spend in school (Stepanek et al., 2007). Students could come to school later in the day to enable collaborative planning for teachers or else leave school a little earlier. This would, of course, require the support of the school division and the state; LS would need to be identified as a high priority professional development.

A second suggestion would be to conduct LS meetings during professional development days or during common planning times (Stepanek et al.). Lewis (2002) also discusses having teachers start the process over the summer or during a workshop and teach their research lesson once school has started. Stepanek et al. and Lewis recommend that teachers use their professional time wisely and be actively engaged in LS sessions so they should have a say in when and how the process occurs.

A third scheduling option discussed in the work of Stepanek et al. (2007) is utilizing specialist teachers, other grade-level teachers, or instructional aides to cover classes during the school day so teachers can meet in LS groups. This type of accommodation would work well in schools where there is more than one LS team and many specialists. An obvious choice for freeing up teachers to meet with their LS team would also be hiring substitute teachers (Stepanek et al.); however, that can be a costly accommodation with large teams or many teams within a school division.

Lastly, Stepanek et al. (2007) describes reallocating existing time by adjusting faculty meetings, or co-planning time for teachers. If schools have weekly staff meetings, two meetings a month could be dedicated to LS teams working on their research lesson. This seems to be a great option for many schools since professional development is usually a part of weekly or monthly staff meetings.

All of these options could possibly give teachers the ability to meet and work through the LS process together with little or no interruption to the school day. They would also prevent teachers from having to dedicate extra time to work in their classrooms or be away from their families. The majority of these options are cost efficient because they do not require hiring extra personnel. The cost-benefit analysis really depends on the ability of teachers and administrators to advocate for LS as a worthwhile endeavor.

Research on Lesson Study

Substantial amounts of Japanese research have not been translated into English language journals. Key LS researchers in the U.S. have been documenting their work, and they have developed a list of areas that have been positively impacted by the work of LS groups. Lewis, et al. (2006) call for more critical research related to LS and a few studies have been selected for a

deeper analysis as they pertain to this work; however, the work of Lewis is the primary knowledge base of this section.

Call for LS Research

Catherine Lewis, one of the seminal LS researchers in the U.S., has placed a call for additional research in three areas for the purpose of supporting LS work in our schools (Lewis, Perry, & Murata, 2006). Lewis, Perry, and Murata (2006) describe the first as a need for more research studies that focus on increasing the knowledge base on Japanese LS in the U.S. Presently, there are two instances of LS that Lewis et al. (2006) and other U.S. researchers have centered their research around. One is Yoshida's research completed as a part of his dissertation and focused on a mathematics lesson that occurred in a Japanese elementary school. The second is Lewis' work (2002; Mills College Lesson Study Group, 2000) which focused on videos made of lesson study occurring in science classes in Japanese elementary schools. Many U.S. researchers are interested in continuing authentic studies similar to these two examples; however, much LS research has been altered from the Japanese version to better fit U.S. schools, students, and teachers (Lewis, Perry & Murata, 2006).

Lewis et al. (2006) also indicate there is a need for more research that would "explicate the innovation mechanism" of LS (p. 5). The innovation of lesson study does not come from simply creating and revising lesson plans; instead this innovation should be based on student learning. Lewis et al. (2006) report the need for more "models" of LS that describe the innovation of what makes LS successful. Again, this is not just to replicate lessons that are deemed worthy of teaching, but to focus more on how and why LS can impact teachers and students.

The final need described by Lewis et al. (2006) is the need for additional "design-based research cycles" (p. 5). These cycles, similar to the second area, would provide researchers the opportunity to critically analyze the impact of LS on teachers and students. As teams refine the process, teachers will be able to develop a better understanding of how their instructional decisions and design can be adapted. More importantly, key findings from LS cycles can be carried through to other LS groups and influence their work as well. Bannan-Ritland (as cited in Lewis et al., 2006) states "Design-based cycles" may produce 'usable, actionable, and adoptable' artifacts that 'leverage learning' in other sites" (Bannan-Ritland, 2003, p. 24; Lewis, Perry & Murata, 2006, p. 5) Lewis et al. (2006) review calls for additional LS research to legitimize LS in U.S. public schools. Two studies have been selected for review related to implementing LS with preservice teachers as their work pertains to this study.

Microteaching LS and Preservice Teachers

Fernandez (2010) conducted a case study to investigate microteaching and the elements of Japanese LS study with 18 preservice teachers enrolled in an entry-level secondary mathematics education course. During the microteaching lesson, study (MLS) the preservice mathematics students spent time developing, analyzing, reflecting, and adjusting research lessons that they taught to their peers. The preservice students also focused on a specific process-learning goal assigned by the researcher to "develop students' mathematical reasoning and ability to study patterns in discovering relationships or constructing concepts through experimenting, analyzing, conjecturing, and defending or justifying mathematical ideas" (Fernandez, 2010, p. 353). During a four-week period, the 18 preservice teachers were assigned to six groups and given specific mathematics concepts about which to create lessons about. Each

member of the six groups taught their MLS lesson during the four-week period debriefing, revising, and reteaching as needed.

Data sources for this study included MLS lesson plans, videos of lessons, and transcribed discussions, field notes, surveys, and written reflective reports. Fernandez reported the MLS influenced preservice teacher content knowledge in math and as well as the designated process-learning goal of math reasoning. Other areas impacted by the MLS process were: "opportunities for active learning, reflection and collaboration, support from knowledgeable advisor, and increased knowledge of the learning process" (Fernandez, 2010, p. 359-361).

Fernandez' (2010) case study provides evidence that LS can have positive impacts on preservice teachers. The opportunity to collaboratively engage in planning, revising, and reteaching enables future educators to critically analyze the knowledge they have developed about teaching and learning. These findings provide a context that can be used for other studies related to the LS. Additionally, they provide evidence of how teacher education programs can rethink their current practices and experiences for preservice teachers.

Lesson Study and Preservice Teachers

Sims and Walsh (2009) conducted a two-year study that focused on implementing Japanese LS in an introductory course within an early childhood education program. This course aligned with the preservice teacher practica in local public schools. The focus of the LS was to encourage preservice teachers to pay attention to instructional strategies. Thirty-two preservice teachers participated in their project. One important component of this study was the researcher's desire for the "research lesson" to be taught in the real classrooms in which the preservice teachers were working. The preservice teachers were assigned to teams to create research lessons together based on Lewis' (2002) LS research. The preservice teachers planned

their lesson during the first several weeks of the course, before they met their students. After the preservice teachers started their practica, one teacher videotaped her lesson and then other members taught an adapted version of the lesson. After the team members taught their lessons, they met at the end of the semester to debrief. The preservice teachers watched the videotape of the lesson, discussed it, and made revisions.

After completing the first year of the process, the researchers identified a few areas of concern. The preservice teachers had struggled with; (a) planning for students whom they did not know, (b) drawing meaningful conclusions based on viewing the videotapes, (c) not being there to observe the actual lessons, and (d) perceiving this work to be just an assignment (Sims and Walsh, 2009). The researchers made adjustments to their model of intervention during the second year. The researchers decided to focus on helping preservice teachers develop observation skills, actually complete a LS cycle in real classrooms, and provide a facilitator.

The researchers' findings from the second year of implementation were more positive in nature. Based on the interviews the participants reported that the LS cycle helped them: (a) organize their thoughts around teaching and learning, (b) reflect and criticize their work in classrooms, and (c) develop their skills in anticipating responses and high-quality questions for students (Sim & Walsh, 2009). The research conducted by Sims and Walsh legitimizes LS as an instructional strategy for preservice teachers and can lead to preparing them for the rigor and expectations of teaching in public school classrooms in the United States.

Preservice Teachers Thinking about Student Learning

Reflection is a buzzword that travels through the education community. Professional development often focuses on encouraging teachers to reflect on their teaching and preservice teaching programs consider it an integral component. This research study has the goal of moving

beyond just reflecting and helping preservice teachers think about student learning. There is little research addressing thinking about student learning specifically. Encouraging preservice teachers to create student-centered approaches is a focus for researchers within teacher education programs.

Preservice teachers are continually required to reflect on their teaching in the classroom and their experiences working with students. However, their mentor teachers often spend the least amount of time sharing their own reflections or discussing why they make specific decisions in their classrooms. When cooperating teachers do not know what to expect themselves or are surprised by occurrences in their classroom (Schon, 1983). This is something cooperating teachers and university supervisors must find time to do with preservice teachers (Handal & Lauvas, 1987; White, 1999). Further, university supervisors tend to focus on giving preservice teachers feedback on "survival" or basic teaching techniques in the classroom while not reflecting specifically on student learning (White, 1999), while not reflecting specifically on student learning.

Cooperating teachers and university mentors should model reflection specifically by asking preservice teachers to observe student learning by questioning their observations, assumptions, expectations, and lesson planning (White, 1999). Handal and Lauvas' (1987) research supports that subjecting preservice teachers to this type of questioning better prepares them for teaching in their own classroom by allowing them to constantly modify their theory and practice based upon new evidence. This deeper understanding enables preservice teachers to not simply rely on gimmick lessons or quick fixes in the classroom (White, 1999). Reflection is incredibly important to teaching however; Grossman, Hammerness, & McDonald, (2009) argue

we must promote a pedagogy of enactment to help preservice teachers move from just reflecting to acting on their thinking about student learning (Sun & van Es, 2015).

Ball and Cohen (1999) encourage teachers and teacher education programs to promote student-centered approaches that differ from current practices within many public schools. However, this is something teacher education programs must prepare and teach our preservice teachers to do. These student-centered approaches encourage teachers to "design high-quality, cognitively demanding tasks and to facilitate meaningful discussions where teachers elicit student ideas, attend to and reason about student thinking as it unfolds during a lesson, and then use what they learn to make informed instructional decisions" (Ball & Cohen, 1999; Common Core Standards Initiative, 2011; Lampert et al., 2010; Levin & Richards, 2011; NRC, 2001; Stein, Engle, Smith, & Hughes, 2008; Sun & van Es, p. 201, 2015). So how can we facilitate this type of pedagogy amongst our preservice teachers?

Lampert, Beasley, Ghousseini, Kazemi, & Franke, (2010) discuss how preservice teaching programs can foster their use of high-leverage practices which involve using a set of teaching routines that occur in lessons that beginning or preservice teachers can incorporate into their instruction (Lampert et al., 2010; Sun & van Es, 2015). A second approach calls for preservice teachers to "learn in and from practice through systematic analysis of teaching" (Hiebert & Morris, 2012, Hiebert, Morris, Berk & Jansen, 2007; Santagata & Guarino, 2011; Sun & van Es, p. 201, 2015). This method immerses preservice teachers in developing instruction that provides meaningful insight into student learning and provides opportunities for them to use evidence of student learning to inform their instruction. Similar to traditional lesson planning, preservice teachers would identify a goal, collect evidence related to the goal, and examine how teaching may influence their goal and identify next steps. All teacher education programs

consist of this model with hopes of fostering preservice teachers' ability to rely on these steps and learn from their practice. Sun & van Es, (2015) state that both practices provide opportunities for preservice teachers' growth and develop opportunities for teachers to think about student learning.

Typical preservice teachers spend large amounts of their teaching time thinking about their practices, reactions, and actions more so than their students (Kagan & Tippins, 1991; Sun & van Es, 2015). Preservice teachers also have a small amount of time to observe other teachers in action before they are in classrooms of their own (Lortie, 1975). U.S. schools do not tend to focus on student thinking as much as Japanese schools; so they do not typically see this type of teaching in their classrooms (Stigler & Hiebert, 1999; Sun & van Es, 2015). Sun & van Es (2015) found that their work with preservice teachers that focused on developing attending to student thinking did have an impact on responsive teaching. The preservice teachers in their work made more time for students to share thinking as well as spent more time attending to student ideas and drawing student thinking into classroom discussions. Lastly, preservice teachers participating in their study began to look for examples of student thinking i.e. explaining, posing alternate questions, etc. (Sun & van Es, 2015).

Influence of Lesson Study

Beyond the work of the researchers mentioned above Lewis (2002) and then Mills College Lesson Study Group (2004) have continued to work with LS in public schools settings in the U.S. Lewis' early work, along with other researchers (Chokshi & Fernandez, 2004; Dudley, 2013; Fernandez, 2010; Lenski & Caskey, 2009; Lewis, 2002, Lewis et al, 2004; Sims & Walsh, 2009;Takahashi, 2013; Takahashi & Yoshida, 2004; Zilliox & Fernandez, 2004) give some insight into how LS can influence students and teacher as well as issues with implementation.

Some of the areas the participants have reported as positives and negatives of LS are: (a) community and collaboration, (b) stronger teaching networks, (c) professionalizing teaching, (d) increased ability to observe students, (e) connecting short-term and long-term goals, (f) improved motivation and self-efficacy, (g) quality of lesson plans, (h) observations, (i) knowledge of instruction, (j) lack of time, (k) lack of funding, (l) lack of student performance indicators, and (m) the contrived nature of LS.

Community and Collaboration

Since LS is not an activity teachers can complete entirely on their own, the process encourages teachers to work together as a community of learners (Lewis, 2002; Lewis & Hurd, 2011). Constructivists, like Piaget and Vygotsky, also highly value the opportunity for learners and teachers to participate in learning together. Working in a group facilitates the construction of children's knowledge and learning, and this applies to educators as well. Lenski and Caskey (2009) posit that real learning occurs when teachers engage in a community that examines their lessons together. These learning communities are entirely dedicated to the craft of building lessons, discussing student learning, and revisiting their prior experiences with learners. Many schools and districts have found that LS brings their faculties closer together. Teachers work with one another to plan and discuss lessons - identifying the strengths, weaknesses, and future directions of lessons collaboratively (Lewis, 2002). Anyone who has worked in a coaching or administrative role will quickly agree that creating a community of learners is a difficult task. However, many schools have found that LS has brought their staff members closer together and opened the door to the development of a more balanced learning community where everyone can contribute (Lenski & Caskey, 2009). LS also provides the opportunity for teachers to reflect upon their relationships with students.

Stronger Teaching Networks

Since the LS cycle encourages collaboration amongst educators, LS teams often share with teachers beyond their own schools to help promote this type of inquiry-based teaching. In Japan, many teachers participate in LS, so there is a vast support network and teachers are continually participating in these types of research lessons (Lewis, et al., 2004). Their classroom teachers foster this type of learning community year-after-year for the purpose of improving student and teacher learning. Kriewaldt's (2012) research supports that LS changes teacher learning by having teachers collaborate with one another based on actual instruction. It takes LS from an "individual to a collegial activity" (p. 36).

U.S. teachers are not often given opportunities to observe other teachers in classrooms (Darling-Hammond, 1997; Darling-Hammond & Ball, 1998; Lieberman, 2009; Lortie, 1975). By working together and observing one another, teachers forge bonds and create community among their staff that goes beyond the LS cycles. Lewis (2002) describes how teacher relationships continue to grow based upon discussions of past LS cycles and observations. Teachers remember conversations and advice and continue to seek out these professional relationships with their LS peers. Administrators and school divisions should be able to appreciate that a strong teaching team improves student learning.

Another component of building strong teaching networks is that relationships can be built with outside experts in fields related to education (Lewis, 2002). While a specialist may only participate in one LS cycle, this person could become a resource for other teachers in the school, provide PD for the school division, or bring new research and ideas to share with teachers. An outside specialist could fill the role of the previously discussed knowledgeable other.

Knowledge is always changing and experts can help keep teachers and school systems abreast of information related to curriculum and instructional materials (Takahashi, 2013) This concept is supported by Vygotsky (1978), who mentions how important a "more knowledgeable other" can be in a classroom when providing thought provoking questions or guidance for students. Takahashi's (2013) description of a knowledgeable other serves in this role to help guide the process and ask thought-provoking questions of the LS team.

For hundreds of years, teachers in the U.S. have worked primarily in isolation in their classrooms, making all daily decisions on their own (Lortie, 1975; Lieberman, 2009). Researchers past and present still comment on the fact that teachers rarely spend time collaborating and it is even rarer for teachers to observe one another teach in their classrooms and discuss the act of teaching (Darling-Hammond, 1997; Darling-Hammond & Ball, 1998; Lieberman, 2009). Many researchers have noted that U.S schools lack practice-based professional learning (Lewis, Perry, Friedkin & Roth, 2012, p. 371; Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009). LS breaks through these barriers and encourages teachers to observe and have positive discussions with one another about their teaching. While it seems it would not be a novel idea, many teachers find LS to be drastically different from the usual types of professional development they experience in school systems. In Lieberman's (2009) research, the participating teachers felt that the lessons they created with their LS groups were significantly higher in quality than lessons created solely on their own. This led the teachers to highly value the time they spent collaborating with one another, which was a positive effect noted about the LS process. This supports the call for collaboration amongst teachers suggested by Lortie (1975), Darling-Hammond (1997), and Darling-Hammond & Ball (1998).

Since LS focuses on working as a team, many schools choose to divide into grade-level teams or specific discipline areas. The teachers on different teams have a common purpose and a sounding board for reflection and discussion. When teachers are working together, they organize, share, and reflect on their lessons (Lenski & Caskey, 2009). One value of LS is the opportunity for teachers to interact with one another and process what they observe. Their reflections provide valuable information about student learning and improve instruction. Allowing teachers to work together as a community (versus attending a workshop) enables teachers to move away from traditional professional development models (Lenski & Caskey, 2009). Collaborative planning provides more depth to lessons and gives "research lessons" a central focus for specific student learning (Perry & Lewis, 2004). In a study by Rock and Wilson (2005), results demonstrated that teachers highly valued the process of LS. The teachers who participated indicated that there was significant impact in the areas of teaching confidence, peer coaching, and peer collaboration (Rock & Wilson, 2005).

Professionalizing Teaching

Many LS researchers feel that this process can change the profession of teaching by professionalizing it. Some compare the process to National Board Certification because it relies heavily on reflections about teaching; obviously, LS differs because it is a group-learning environment and the National Board process is individualized. LS could be more valuable than the National Board process because LS groups can continually adapt and grow beyond the timeline associated with National Board Certification (Chokshi & Fernandez, 2004). The most defining characteristic of the process of LS is that it focuses solely on students' learning and the evidence teachers observe, rather than focusing on a specific type of lesson plan or teaching pedagogy.

Lewis (2002) clearly points out that LS is not lesson planning. In fact, this is a narrow-minded view of the LS process and goes against everything it stands for. The process of LS heightens teachers' awareness of how teachers bring about instructional change and learning within their schools. Participants in LS focus on how to improve their instruction and impact student learning in every way possible (Lewis, 2002).

The Impact of Lesson Study on Student Learning

Increased ability to observe students. Teachers who are participating in a LS cycle become more aware of how are learning in their classrooms. Teachers understand students' prior knowledge, solutions, and the feedback they provide during their learning. Dudley (2013) reported, "Teachers gained important new knowledge about their pupils: how they learn and how their learning could be improved in the future" (p.112). Lewis et al. (2004) discussed that during a LS cycle, different teachers may focus on a unique type of learner to make sure the lessons are reaching all students and use this information to develop the LS research lesson. For instance, by having a specific member of the team focus on an ELL student, a student with a learning disability, or a gifted student, the group can ensure that the lesson represents all types of learners.

It is often difficult to keep students engaged and participating in lessons. Having extra eyes and ears in classrooms ensures that teachers are able to gain perspectives on all of the students and their learning, not just focusing on a single student who is answering one question. The LS team carefully chooses what data they want the team to collect and how evidence of student learning is to be documented. The data is the key component in determining what impact the lesson had on student learning (Lewis 2002, Lewis & Hurd, 2011).

Researchers interested in LS have had positive results from their work with classroom teachers and students (Lewis, 2002; Lewis & Hurd, 2011; Sims & Walsh, 2009; Yoshida, 1999).

During several projects, researchers felt teachers were successful in observing students and were able to consider learning from the students' point of view (Lenski & Caskey, 2009, p. 56). These observations are key to providing more effective teaching and learning experiences for students and for making accommodations to reach their zone of proximal development (Vygotsky, 1978).

University researchers have also taken to using LS with preservice teachers. Zilliox and Fernandez (2004) completed several LS research projects involving secondary and elementary school pre-service teachers. Each cohort of pre-service teachers worked in groups to complete a LS cycle centered on mathematics. Zilliox and Fernandez (2004) found that, as the lesson progressed through the cycles, it became less about the teachers' themselves and significantly more focused on the students and their learning. This supports the process of a teacher focusing on how students learn and react to their lessons versus teachers simply deciding what knowledge to impart to students. Zilliox and Fernandez (2004) also found that as their pre-service teachers completed the LS process they were better able to engage in decision-making processes that are constantly essential to teachers. Teachers need to be able to modify lessons and make decisions quickly by analyzing and reflecting on the students from moment to moment while teaching. Developing these skills early and continually engaging in discussions about the craft of teaching can better enable beginning teachers to meet students where they are and affect their learning (Hammerness, Darling-Hammond, & Bransford, 2005: National Reading Panel, 2000)

Connecting daily practice to long-term goals. In U.S. schools, teachers often focus on teaching one specific skill or strategy at a time without considering where they want their students to be in ten years. LS encourages teachers to think about both short-term and long-term goals related to curriculum and student character (Lenski & Caskey, 2009; Lewis 2002, Lewis & Hurd, 2011; Lewis et al., 2004). What kind of people do they want their students to grow up to

be? What can students learn about character and the type of learners they want to be? These types of questions should be discussed when teachers develop their LS team and they should carry over to their research lesson (Lenski & Caskey, 2009; Lewis, 2002, Lewis & Hurd, 2011, Lewis et al., 2004). Helping teachers establish priorities for students can become part of daily learning and practice, along with subject materials. This kind of planning promotes lifelong learning in and out of the classroom just as constructivist theory implies that teachers should be focusing on learning and not performance (Brook & Brooks, 1999; Adams, 2006).

Teachers specifically define how their long-term goals and short-term goals are impacted through their "research lesson" (Lenski and Caskey, 2009). They begin the inquiry process by considering what their students know, how they will think through their learning, and what the teachers can add to their knowledge base. Finally, teachers planned an actual lesson framework and chose the type of data collection needed to support their students' short and long-term goals (Lenski & Caskey, 2009).

The Impact of Lesson Study on Teaching

Improved motivation and self-efficacy. Teachers are expected to be held accountable for students' performance on cumulative tests at the end of most school years (NCLB, 2002). Teacher evaluations often depend on students' test performances, and when student scores are low, many teachers feel that they are not successful and their teaching is not making a difference. LS empowers teachers and helps them to see how they can better control what happens in their classrooms and affect student learning. (Lewis et al., 2004) A positive interaction with colleagues and students during LS often improves teachers' sense of self-efficacy and their motivation to develop high-quality lessons. Motivated teachers have motivated students and those students are empowered and engaged in their learning (Jones, 2009). LS can influence both students' and teachers' motivation and self-efficacy (Lewis et al, 2004).

Dudley (2013) reported that the process of LS empowers teachers because they design and implement learning cycles on their own. LS team members all have a common cause and develop social capital as they work toward supporting student learning (Dudley, 2013). There is increased buy-in from teachers who are on LS teams because they often volunteer. They want to be members of an LS community and contribute to improving learning. While there are aspects of teaching where teachers are not given choice and their input is not viewed as important, the process of LS is the opposite and this could be why many teachers find this kind of professional development experience to be so valuable. It influences them because it is personal to them (Dudley, 2013)

Quality of lesson plans. College students pursuing degrees in education spend extensive amounts of time learning to understand and develop lesson plans. After pre-service teachers enter the field of education, lesson planning takes on a different focus. Not every school district requires teachers to follow a specific format or to turn in their lessons to principals each week. Some teachers have rigorous lesson plan patterns to follow, as outlined by their division, or alternatively, there are teachers who are not required to present anything. When teachers meet together to create lesson plans, they tend to focus solely on the content of the lesson or a specific activity they would like to complete, as is the case with most grade-level teams (Lewis & Hurd, 2011). It is rare for teachers to spend time focusing on one objective or learning outcome related specifically to their own students and their learning needs. When teachers talk through plans for lessons, they are often thinking about what materials are needed in order to complete the lesson or just a common rundown of what they need to do to prepare. LS is an entirely different type of thinking about lesson planning. The lesson plans developed through LS require teachers to discuss more than the activities of the lesson with their teaching peers. Teachers must define,

examine, and discuss specific goals for students, evidence to be collected, and what goals are to be reached (Lewis, 2002; Lewis & Hurd, 2011; Lewis et al., 2004). For example, a focus could be for students to be highly engaged in the lesson. In this case, the goal would be to design a lesson and determine what high levels of student engagement would look like during this block of time. The teachers would discuss each component of the lesson to decide which instructional decisions would be important and how to achieve the desired outcomes. This type of collaborative planning helps each of the teachers to participate in the lesson plan development and encourages them to understand what they will be looking for when they observe their fellow teachers while they teach the "research lesson" (Lewis, 2002, Lewis & Hurd, 2011; Lewis et al., 2004).

Because the development of the research lesson is such an involved process, lesson plan quality is improved (Lewis, 2002; Lewis et al.). Teachers spend time becoming experts related to the content and many people contribute to creating high-quality lessons. Student strengths and weaknesses weigh heavily on the team while they are writing a lesson. It would be impossible for individual teachers to spend this amount of time on every lesson taught in classrooms; thus, LS helps teachers become more aware of what their knowledge level should be in ideal cirumstances, what students need, and how to understand evidence of student learning (Lewis; 2002; Lewis & Hurd, 2011, Lewis et al., 2004). Through LS, teachers are supported in developing habits of mind about their teaching are deeper and broader.

Observations. Another unique characteristic of LS is the observation of the research lesson. It can be quite intimidating to have other teachers enter one's classroom and observe a lesson designed with peers. One key component of the observation is the focus on the students' learning, as compared to focusing on the teacher and how she managed the lesson and the

instruction. Whenever a research lesson team is observing in a classroom, the focus is on the students. The team takes notice of student learning, engagement, and the other components of student achievement that the research lesson was designed to address. LS participants in Dudley's (2013) research study indicated that observations or rehearsals helped them understand that, while they assumed their views or perceptions of teaching practices were defined in the same way, they were actually quite different. That is, some teachers' definitions of "shared" or "guided" activities were in fact quite different (Dudley, 2013). Their experiences observing each other helped them carry new and different components over into their classrooms and later lessons.

Observation is an essential component in the LS cycle. Lewis, Perry, Hurd, & O'Connell (2006) conducted LS research at an elementary school over several years. They listed observation as one of the four primary keys to LS success and attribute the majority of the positive effects to the teachers' collaborative observations with one another (Lewis et al., 2006). During their longitudinal study, these researchers observed a shift in the objectives of teachers' lessons over time. Other members of the research lesson team helped the teachers see past the initial behaviors and engagement of students. Over time, they were able to focus on students' strategies for problem solving, organization of information, and student errors and their meanings (Lewis et al., 2006).

In the U.S., once teachers complete their pre-service work, there are often no other opportunities for them to observe practicing teachers in the classroom (Lortie, 1975). American schools expect pre-service teachers to learn from their mentors in college and, once this component of learning to teach is complete, it is assumed they are ready to take on all professional teaching responsibilities. As a result, teachers lose the opportunity to discuss and

formulate new methods of teaching practice. LS brings continued opportunities for teachers to learn and observe new teaching methods with real life implications and discussions (Takahashi & Yoshida, 2004).

Deepened understanding of content areas. Prior to developing a research lesson, teachers must engage in a study of the subject matter they will be addressing in collaboration with their LS team (Lewis, 2002). This usually involves spending time looking at textbooks, reference materials, teaching manuals, state curricula, and standards. In this phase of lesson development, teachers must understand what students have previously learned and how they learned the information. Typically, teachers are able to answer their questions about the subject matter and prior learning of their students, but if they are unfamiliar with the subject area, they may seek information from a knowledgeable other outside their group. In Takahashi's (2013) research, knowledgeable others helped make LS more effective and impacted teachers' understandings through their comments and the expertise they brought to content areas. LS researchers recommend that participants use reference materials and ask for support from an expert in the field related to the research lesson they are investigating (Lewis, 2002; Lewis & Hurd, 2011; Lewis, Perry & Hurd, 2004; Takahashi, 2013).

Increased knowledge of instruction. The process of LS also influences how teachers think about and implement their instruction. In Dudley's (2013) research on LS, participating teachers reported, "they had gained a significant new knowledge of how to teach writing or mathematics" (p.112).

While the lesson may focus on one specific subject area, teachers' growth related to instruction affects all areas of their teaching (Darling-Hammond & Ball, 1998; Darling-Hammond & Richardson, 2009; National Reading Panel, 2000). By engaging in the process of

thinking about the way they teach and how it influences their students, teachers are able to become outside observers and determine students' strengths and weaknesses. Teachers can also use this information to develop more appropriate and challenging lessons for their students. In Kriewaldt's (2012) research, the LS team found that teachers were able to go beyond just meeting a daily objective and better improve the learning process for their students.

When a team works with a knowledgeable other, another level of potential teacher learning related to specific subject matter is added to the LS process (Takahashi, 2013). As previously mentioned, most U.S. teachers are generally abreast of their grade-level skills in specific subject areas. However, their expertise often stops within the grade level they are teaching. Most elementary school teachers are not collaborating with middle or high school teachers. For instance, they do not examine how students' basic math skills build toward their learning in calculus or biology. Yet, LS encourages teachers to think beyond their "year of instruction" and come to understand how what they teach today will influence future learning (Lewis, 2002; Lewis & Hurd, 2011; Lewis, et al., 2004).

Drawbacks

As outlined in this document, LS has many positive attributes and has the potential to influence many students and teachers. However, there are also negatives that affect the implementation of LS in the U.S. and other schools outside of Japan. Time, lack of student performance indicators, lack of funding, and the contrived nature of Japanese LS the areas to be discussed.

Time. The amount of time needed for LS is one of its greatest drawbacks (Lenski & Caskey, 2009). LS is cyclical process, so in order for it to be successful, teachers need time to visit other classrooms as well as meet to plan and debrief about their lessons (Perry & Lewis,

2004). Anyone who has been in a public school realizes how difficult it could be to schedule times for other teachers to watch lessons and work with each other. Time is a rare commodity in schools, so some administrators could be leery of the logistics involved with implementing LS. Some researchers have mentioned videotaping lessons as a way to manage the time involved with LS (Fernandez, 2010; Grohl, 2011). This would enable teachers to gather at a specific time and talk through the videos; however, it is sometimes difficult to observe a students' learning through a video lens. Chokshi and Fernandez (2004) found that time could be arranged for teachers to participate in the process but it must be a priority for both teachers and administrators.

Student performance indicators. Sometimes there can be a lack of quantitative student performance indicators in LS (Chokshi & Fernandez, 2004). The process of LS does not lend itself to typical student achievement data. Rather than relying solely on quantitative results, teachers collect more qualitative information about their student's growth in LS. This is valuable information that influences teaching and learning. Some educators may be leery of LS because they cannot directly link it to quantitative views of student achievement (Chokshi & Fernandez, 2004).

Funding. As previously mentioned, LS requires groups of teachers to work together during the school day. This means monetary resources would have to be set aside to assure teachers could collaborate and work together. The amount of time required for the process requires that it be a "sanctioned" activity by administrators and understandably, they will want to decrease impact on instructional time among participating teachers. U.S. schools have monies available for professional development and LS has been proven to be a form of high-quality professional development; however, it is not a process that can be implemented without careful

planning and thought. Naturally, funding for substitutes or changes in the school day are likely requirements.

Contrived nature of LS in Japan. The foundations for LS were developed nearly a century ago in Japan, and the process has been refined and improved repeatedly across time. LS in Japan is considered appropriate for the schools in that nation, and it is viewed as extremely useful as a primary professional development strategy. However, there are stark differences between United States schools and Japanese schools.

In Japan, most students in a school may be released to go home while the students in a "research lesson" classroom for LS remain in school (Lewis & Hurd, 2011, Takahashi & Yoshida, 2004). Non-LS teachers in the school may also leave at this time. One teacher will instruct the students while 15-20 adult LS observers stand about, sometimes hovering over children to observe what they are doing. If a very influential knowledgeable other is involved, many additional teachers may be present, even as many as 100. At the end of the research lesson, the students go home and the LS group meets to discuss the lesson. In U.S. schools, situations of this kind would be viewed as disruptive, especially for parents and other caretakers, as well as school district transportation plans. The "hovering" of many adults would be considered extremely contrived, and any lesson taught in such an environment would be viewed as so far from normal U.S. teaching as to be ridiculous. Further, the releasing of some children and teachers while others remain for LS activities would likely be seen as unethical and inequitable in the United States context. Japanese LS obviously works well in the cultural context in which it exists, but successful LS in the United States must be redesigned and revised to suit the culture.

Current Trends in Inservice Teacher Learning

Lesson Study is a clearly defined type of professional development often used with inservice teachers. How does it compare to other types of inservice teacher learning? Currently each state and school division in the United States is allowed the freedom to choose what they will provide as professional development to their new and veteran teachers. Since the Federal Government enacted NCLB (2001), Title II has been funding many of the professional development initiatives (Jaquith, Mindich, Wei, & Darling-Hammond, 2011). Jaquith et al. (2011) analyzed data from four states reported to have successful professional development structures and found that each state had some common professional development practices that led to success. These four practices were infrastructure, leadership, resources, and the ability of outside agencies and innovators to influence professional development (Jaquith et al., 2011).

The ability of a state or school division to organize professional development as well as provide leadership in carrying out the professional development clearly indicates likely success. Teachers must also have access to the materials and resources needed to implement strategies. Further, they must have access to teaching assistants, coaches, etc. to help facilitate the learning that needs to occur. Lastly, professional development should be engaging and current. Divisions must allow innovators in the field of education to help impact and shape their professional development initiatives to ensure that best practices and current research are priorities.

Another area impacted, as mentioned by Jaquith et al. (2011), is clearly defined and meaningful teacher accountability when implementing professional development with students. Professional development sessions should be sustained and allow continued opportunities for teachers to engage in material. Schools cannot expect a one-day session of professional development to bring about gross change if teachers lack clear guidelines on how to apply the

information. This also applies to managing Title II funds by ensuring the money is well spent and used in meaningful ways that guarantee positive change.

In 1995, Darling-Hammond and McLaughlin determined that high-quality teacher professional development focuses on active teaching, reflection, observation, and assessment. "Effective teachers collect and interpret data, make judgments about student learning, invent new ideas and approaches, understand the context they teach and examine the effects of their instruction on student learning and motivation" (Darling-Hammond & Bransford, 2005; Lampert & Ball, 1998; Sims & Walsh, 2009, p. 724). Darling-Hammond and Richardson (2009) highlighted that professional development should be an engaging and active process focused on school reform, as well as using data. It is imperative that teachers understand why they are having professional development and how these changes will directly affect their students. It is also beneficial for teachers to have opportunities to work with their peers to implement changes in their teaching. Common planning times help foster learning amongst specific grades or content area teachers (Darling-Hammond & Richardson, 2009).

Another key component of Darling-Hammond and Richardson's findings is that teachers' work is more meaningful if it is sustained throughout the academic year and into the following years (Cohen & Hill, 2001; Darling-Hammond & Richardson, 2009; Garet, Porter, Desimone, Birman, & Kwang Suk, 2001; Weiss & Pasley, 2006). One-day workshops are not effective at bringing about long-term changes or fostering the kind of active learning we would like teachers to engage in related to their professional development experiences (Darling-Hammond & Richardson, 2009; Knapp, 2003). School systems must continue to provide opportunities to build on teacher learning capacity and create opportunities to put this learning into practice.

Darling-Hammond and Richardson (2009) clearly outline that professional development should include helping teachers to understand what meaningful student learning looks like. Teachers need time to reflect on their teaching to understand the impact they have on student learning and dispositions. They also need time to focus on the content they are teaching and consider how they can teach it most effectively. Sustained professional development naturally lends itself to allowing teachers these opportunities for reflection, assessment, and adjusting their teaching (Darling-Hammond & Richardson, 2009).

Another component of inservice teacher professional development relates to teachers' beliefs. If teachers believe there is a connection between professional development and their students' performance, they find it more engaging and valuable (Commeyras & Degroff, 1998; Doubeck & Cooper, 2007; Morewood, Ankrum, & Bean, 2010). When working with practicing teachers, it also imperative that teachers have a voice about the type and content of their professional development (Morewood, et al., 2010). If they do not believe the material will benefit their teaching or students, the follow through in the classroom will suffer.

Conclusions

The U.S. Department of Education relies on states to outline, support, and guide professional development for inservice teachers. They also depend upon teacher preparation programs to provide an educational experience that creates highly qualified teachers to enter the field of education. For decades, researchers like Darling-Hammond (2005) and Lortie (1975) have reported on opportunities to help our teachers and close the achievement gap. In addition, government policies such as Becoming a Nation of Readers (1985), NCLB (2001), Reading First (2001), National Reading Panel, (2000) and Race to the Top (2009) have put pressure upon education systems to improve upon student performance. LS provides a unique opportunity to

engage teachers in learning situations centered on authentic classroom experiences (Amador & Weiland, 2015, Lewis & Hurd, 2011; Lewis et al. 2004; Sims & Walsh, 2009; Takahashi, 2013; Yoshida, 1999).

The LS process can also provide meaningful experiences for preservice teachers. These preservice teachers are still new to classroom environments and are often lost in organization, behavior management, and many other daily tasks. Further, they are unaware of the role reflection should play in their teaching and learning. LS provides an opportunity for preservice teachers to practice utilization of their teaching knowledge (Amador & Weiland, 2015; Kotelawala, 2012; Lewis, 2002; Lewis et al., 2004; Lewis & Hurd, 2009; Sims & Walsh, 2009). These early learning experiences will prepare them for work beyond their practica and provide opportunities for transferability to other areas of teaching (Darling-Hammond & Ball, 1998; Darling-Hammond & Richardson, 2009; National Reading Panel, 2000).

LS is situated in constructivist theory and provides many opportunities for co-construction of knowledge, addressing the zone of proximal development for students and teachers, along with opportunities for educators to serve as the more knowledgeable other to students and teaching peers (Gash, 2015; Piaget, 1973; Vygotsky, 1978). Developing this knowledge and reflection on teaching provides better learning for students and higher quality teaching (Darling-Hammond & Ball, 1998; Darling-Hammond & Richardson, 2009; National Reading Panel, 2000); however, the U.S. needs to find ways to provide these opportunities to inservice and preservice teachers.

LS will allow preservice teachers to increase their teaching capacity and develop instructional habits that will continue to influence their students beyond their work in the teacher

education program. The research methodology selected for this study aligns with constructivist values and professional guidelines for high-quality professional development in the area of LS.

Chapter Three:

Methodology

Preservice teachers had the opportunity to participate in the Lesson Study process and to focus their thinking about student learning in elementary classrooms. Using a constructivist lens and a qualitative research case study developed through a FADE approach, the experiences and understandings of the preservice teachers were examined as they moved through the cyclical process of lesson study. The research question was:

- What is the impact of lesson study on preservice teachers' thinking about student learning?

Qualitative research methods lend themselves to discovering, exploring, and understanding the meanings that people assign to what they experience (Bogdan & Biklen, 2003; Denzin & Lincoln, 2003; Dodge, 2011; Stake, 1995). Denzin and Lincoln (2003) describe how qualitative methodologies allow investigation of the phenomenon in a natural setting. Merriam's (1988) view of the case is broader than that of other qualitative researchers like Yin (2009) and Stake (1995). This methodology allows the developing of understandings around thought, thought processes, and/or feelings, which can be challenging to tease out when using other research methodologies (Dodge 2011; Strauss & Corbin, 1998).

LS allows preservice teachers to focus on their student's thinking, and reflect upon their teaching in the moment, with familiar students. The research question, by design, requires a certain amount of exploration (Stake, 1995) and the Formative and Design Experiment (Reinking and Bradley, 2008) provides a framework that can be adjusted to different inquiry methods as needed.

Creswell (2005) outlines how the researcher is an integral member and active participant within the research study. I was the primary collector of data and the person who interpreted the findings. By submersing myself in the study and the data collection process, I was able to develop a rich understanding of both FADE and the case. Qualitative research methods align well with the research question. The following data collection methods were included: purposeful sampling, semi-structured group and individual interviews, reflective field notes, and document review.

Building upon the epistemological foundations of constructivism and qualitative research methodologies, a FADE framework and a case study approach were selected to develop an understanding of preservice teachers' thinking about student learning during their planning, teaching, and reflection through the lesson study process. This approach enabled me to examine both the phenomenon of lesson study and the preservice teachers' construction of meaning related to student learning throughout the study (Dodge, 2011; Jones, 2002). The opportunity to investigate the preservice teachers' lesson study process in context (while examining how they assigned meaning based upon their involvement) supported development of understanding of the phenomenon (Denzin & Lincoln, 2003; Esterberg, 2002; Dodge, 2011).

The goal was to use LS to support preservice teachers' thinking about student learning during instruction. The preservice teachers planned, taught, and reflected upon student learning. One of the most difficult things for preservice teachers to do is to ensure that students are actively learning and to plan instruction based on children's current developmental understandings (Sims & Walsh, 2009). This requires a high level of reflection on what the students say, do, and produce, and is based upon how teachers present this information. LS provides a blueprint for preservice teachers for reflecting and thinking about student learning in a

collaborative environment. Reflecting on their practice provides preservice teachers with the opportunity to construct meaning (Creswell, 2014; Green & Gredler, 2002). This research project was a case study involving exploration of the process of LS through the lens of a team (Stake, 1995).

Research Design

Case Study Research

Merriam (1988), Stake (1995), and Yin (2009) are considered the most prominent scholars in the area of qualitative case study research. Their definitions and suggestions for developing and administering case study research influenced the development of this study. For the purpose of this study, Merriam's work was the primary guiding framework and her view of the case study aligns with the research question. Merriam's view of the case is broader than that of qualitative researchers like Yin (2009) and Stake (1995).

According to Merriam (1988), the goal of qualitative research is to understand how people assign meaning and construct knowledge of their experiences in the world. The qualitative researcher "brings a construction of reality to the research situation, which interacts with other people's construction or interpretation of the phenomenon being studied. The final product of this type of study is yet another interpretation by the researcher of others' views filtered through his or her own" (Merriam, 1988, p. 22).

Merriam (1988) defines this methodology as "an intensive, holistic description and analysis of a bounded phenomenon such as a program, an institution, a person, a process, or a social unit" (p. xiii). In order to truly analyze and develop an understanding of the case, researchers must define how each case is bound by time and activity. Careful, detailed data

collection should occur over a sustained period of time. Yazan's (2015) analysis of Merriam's work describes several distinct characteristics.

> Case study methods are: (a) particularistic (it focuses on a particular situation, event, program, phenomenon); (b) descriptive (rich, thick, description of the phenomenon under study); (c) heuristic (illuminates the reader's understanding of the phenomenon under study) (Yazan, 2015, p.139).

This investigation was about the impact of lesson study on preservice teachers' thinking about student learning. Merriam (1988) calls for the identification of a unit of analysis. The unit of analysis for this case study was the preservice teachers engaging in lesson study during their coursework in a graduate program in the context of a collaborative group. Researchers utilizing the case study methodology carefully select data collection methods throughout a period of time. In this study, I collected data through pre- and post-interviews, reflective field notes, debriefing interviews, written reflections, and a "research" lesson plan.

Formative and Design Experiment (FADE) Framework

At the onset of my research process the FADE methodology appealed because it provided a blueprint to follow in examining the LS process. The FADE framework takes into consideration the participants, the research site, the data collection processes, and the types of data in the context of a specific framework that is both adaptive and iterative (Bradley, 2010; Reinking & Bradley, 2008). As Merriam (1988) has described case study research, it is adaptive and iterative as well. The FADE framework was a good foundation for starting this study because it fosters the development of practical and useful educational goals that can influence preservice teacher education. This research methodology also lends itself to authentic classroom teaching environments (versus extremely structured research settings). FADE frameworks apply

generalizations from many different examples (versus random samples) and make it possible to adjust the focus of the research and adapt the work environment to fit the participants' needs, including the needs of their classroom and other stakeholders such as cooperating teachers. Participants are able to give feedback and make adjustments as needed. FADE served as the blueprint for the step-by-step researcher process because it allowed me to develop an ongoing and deep understanding of the case. Thus, the data collection and analysis components of the research were designed around a case study methodology. FADE has seven characteristics (intervention centered, theoretical focus, goal oriented, adaptive and interactive, transformative, methodologically inclusive and flexible, and pragmatic). The seven characteristics are described as follows:

1. **Intervention centered.** Intervention in an authentic educational setting is the basis for any FADE. The FADE intervention must focus on an area of practice or pedagogy where there is a need for change and improvement. The intervention may be a well-known one, which has previously been found to be reliable and valid through other research methodologies, or a novel idea with clear goals that will address the problem areas. Either way, the intervention is investigated in an authentic learning environment (Bradley, 2010; Reinking & Bradley, 2008). Similarly, a case study approach also lends itself to investigations in authentic situations. The LS study was designed to occur in real-life classrooms in an elementary school. Preservice teachers reflected on current instructional practices and thinking about student learning, which made it possible to develop a rich, thick description of the case (Merriam, 1988).
2. **Theoretical focus.** FADEs are led by theory; however; they seek to develop theory about the "*process* of learning and the *means* that are designed to help facilitate this

learning" (Cobb, Confrey, diSessa, Lehrer, Schauble, p. 9, emphasis in the original, 2003; as cited in Reinking & Bradley, 2008, p. 18). The case was designed using a constructivist lens and provided preservice teachers with the opportunity to construct knowledge of teaching and learning. This co-construction of knowledge applied to both the development of the preservice teachers and the children in the classrooms. Case studies are designed to fully understand the meanings people assign to their experiences (Merriam, 1998) and constructivism and qualitative research methodologies provide this opportunity.

3. **Goal oriented.** FADEs are explicitly designed around an educational goal. The entire process focused on addressing one instructional area and, by bringing this issue to the forefront, it allowed the researcher to address deeper hidden values aligned with improving practice. During this study, the goal was for preservice teachers to reflect on their thinking about student learning and the data collected centered on this goal.
4. **Adaptive and iterative**. Unlike other contemporary research methods, the structure of FADEs and case studies allow research to occur much like actual instruction. Case study researchers like Merriam (1998) suggest that there must be some adaptability to fully understand the case. This study was adapted to fit the needs of the participants and their students through the LS group meetings and interactions with the preservice teachers. The process was modified as data were collected.

The iterative process within this research design allowed the researcher and participants to adapt the cyclical process of lesson study to meet preservice teacher learning needs. My observations of participant discussions and my recording of reflective participatory field notes during the planning and implementation phases

fostered decision-making that guided the case. Using this information, I was able to guide the discussions and questions of the participants' based upon their understandings, discussions, and reflections in our meetings. This iterative process added to the rich, thick, description of the case because the preservice teachers were continually immersed in the LS cycle. Each iteration provided more insight into the meanings they were assigning to their work.

6. **Methodologically inclusive and flexible.** FADEs and case study research may be adapted to differing types of data collection and analysis (Bradley 2010; Merriam, 1998; Reinking & Bradley, 2008). Any form of data collection or analysis can be justified to further the understanding of a case (Merriam, 1998; Yin 2009). It is important for researchers to remember that collecting data should be flexible and inclusive to align with research processes (Reinking & Bradley).
7. **Pragmatic.** The focus of FADEs is to define parameters where attaining goals can be successful (Reinking & Bradley). Practicality is at the heart of this research methodology. Improving instruction by developing "consequential validity" is the goal (Bradley, 2010; Reinking & Bradley, 2008, p. 22). Preservice teachers completed this study while they were full-time student teaching, so it was essential that the case study be both pragmatic and authentic. Completing this study in its real-life setting was also imperative to fully develop an understanding of the case (Merriam, 1988).

Case Study Context

The foundations of this study were developed through a FADE lens. However, it became apparent that this study was going to be incredibly unique. Therefore, the researcher decided it should be viewed as its own case to truly understand how participants thinking about student

learning developed through the LS process. Keeping this in mind, the study was designed to examine the LS process outlined by Lewis & Hurd (2011). In an initial meeting for the study, a group of four preservice teachers studied LS and each of its components. This session provided background knowledge about LS, as well as a timeline for implementing the LS cycle for this study. This initial session helped the preservice teachers develop a deeper understanding of the process and the goals of LS. In the following week, the preservice teachers participated in a pre-interview in which I gathered information about their perceptions of LS and their thinking about student learning.

In the second planning session, the group of preservice teachers selected and gathered information about their students' abilities and they developed goals for learning. The preservice teachers decided they wanted to focus on three different areas for long-term goals: creativity, problem-solving, and teamwork. These were all traits the preservice teachers believed their students needed to develop in order to become successful community members. During this session, the team selected a note taker who would document their work on the "research" lesson plan. The participants scheduled future meetings within the six-week timeline of the LS cycle. In this session, the researcher prompted and guided the preservice teachers to consider student learning. The preservice teachers were asked to define what student learning would look like and how they would collect evidence about it.

During planning sessions three through five, the preservice teachers focused on developing their lesson based on their goals for students. The preservice teachers followed the suggested "research lesson" planning guidelines as outlined by Lewis and Hurd (2011). They continued to gather information as needed to adjust their lesson plan. One key piece in this planning process was the preservice teachers' discussion about what students' had already

learned about this topic, as well as the pre-service teachers predictions of what the student responses or discussions could be. The researcher continued to prompt the preservice teachers to think about student learning and possible feedback from students. This anticipation of student learning helped foster their thinking about students' learning.

Once the initial "research lesson" has been designed, the team decided how they would like to collect data related to student learning. The team determined who would teach the research lesson first, as well as what data each team member would collect during the teaching of the "research lesson". Each preservice teacher was given a template for taking notes related to the learning goals and observations of student learning. Once team members determined all the logistical components related to teaching the research lesson, they set a day and time to teach the lesson. Each preservice teacher observed the lesson and completed a research lesson template focusing on their thinking about students' learning and the selected focus areas (creativity, problem solving, and teamwork) the lesson was designed around.

Immediately, after teaching the lesson and after all related data were collected, the preservice teachers met to debrief about their lesson. The debriefing sessions were audio recorded and transcribed. During these sessions, participants discussed their observations and strengths or weaknesses of the lesson. The team member who taught the lesson debriefed first, and then each team member was invited to share. After the initial debriefing was concluded, the participants discussed the data they collected and determined how they would like to adjust their "research lesson." The debriefing and lesson alterations did not occur on the same day. There was too much information for the preservice teachers to process and they were encouraged to continue thinking about their observations and discussions from the debriefing.

In the following session, the preservice teachers determined who would teach the lesson in its second iteration. Then the preservice teachers proceeded with altering the "research lesson" with this specific teacher and students in mind. The preservice teachers spent a great deal of time discussing the second group of students and their developmental understandings of creativity, problem solving, and teamwork. The preservice teachers were moving from first grade to kindergarten and they wanted to make sure they were able to consider possible problem areas.

Preservice teachers followed the same teaching, note taking, debriefing, and reflection process with another group of students in a different classroom. After they had developed a third iteration of the lesson plan, they decided that the lesson had reached its maximum capacity in addressing their goals. Although it was designed it was not taught a third time.

I conducted pre-interviews and post-interviews to compare the preservice teachers' experience during the LS process. I recorded reflective field-notes after each of our meeting sessions through every iteration of the process. The data for the study also included the notes from the note taker and the changes they made to their "research lesson". Each debriefing session was audio recorded and transcribed. Preservice teachers documented their observations during the teaching of the lesson on a note taking pages and completed a written reflection on the LS process at the end of the study.

Site Selection

I used purposeful sampling (Patton, 1990) to identify a site and preservice teachers who would participate in the study. I chose Southern University (a pseudonym) because I was familiar with the program and their work in local public schools. Southern University is an established land-grant university located in the Southeastern region of the United States. It is a

public university with about 30,000 students from 36 different states and 40 countries. Southern University is located in a small rural college town. The Elementary Education cohort (PK-6 licensure) at Southern University is comprised of 33 Master's level students (32 female, 1 male) who previously completed a Bachelor's degree program. The study took place while these students were in their final semester in the Master's program, which included teaching full-time as a student teacher in a local public school.

Participants

The participants were four preservice teachers who were student teaching at the same local public school. These preservice teachers participated in a six-week LS cycle focusing on planning, teaching, reflecting, and thinking about student learning. Some of these preservice teachers participated with me in a pilot study in the fall; thus, I already had a rapport with them. Since I had a pre-existing relationship with some of the preservice teachers, it could be assumed that is why some of them wanted to participate in this study. They also wanted to please their mentor teachers and university supervisors by implementing lessons deemed as high quality and worthwhile. Each of the participants completed his or her student teaching placements at the same elementary school in grades K-2. I did not collect demographic information from the participants. The following sections share more information about each of the participants.

Alice. Early on in the study, the preservice teachers selected Alice to serve as the leader of the group. She was a very "with it" student and her ability to organize materials and guide the discussions was admired by the team of preservice teachers. Alice also developed a deep understanding of the work required by the study and was able to transfer her experiences beyond the lesson study cycle to her teaching outside of the group. She was also able to articulate her thoughts and align her thinking with her peers quite easily.

Annalise. This preservice teacher was a bit more reserved. Annalise was always willing to contribute to the group and conversations but she often waited to share after her peers. She was also willing to teach the lesson for the group but was explicit that she did not want to teach the lesson first. She wanted to follow one of her peers. From my perspective, it seemed that Annalise was less confident than her peers but she was very excited about participating in the group and working with the other preservice teachers.

Kylie. The most positive preservice teacher was Kylie. She was always quick to find the good in each situation and planning meeting. Her positive attitude set the tone for the group and she was incredibly reflective throughout the entire lesson study cycle. Like Alice, Kylie was also able to generalize the work we completed in the group to her classroom practices beyond the lesson study team.

Sheila. Throughout the lesson study cycle Sheila was the team member who pushed back the most. She was unafraid to share her thoughts and hold the group accountable. She spent a lot of time considering the inquiry process the team developed for their students and her focus was often tied to differentiation for each of the students in the different classrooms where they taught and observed the lesson.

Phases of the Formative and Design Experiment

I used Reinking and Bradley's (2008) formative and design framework as a blueprint to design the study initially. Reinking and Bradley designed six phases of a FADE.

Phase One: The initial stages of planning the experiment in which I recruited participants, discussed goals of the project, as well as limitations. Stakeholders (preservice teachers, university supervisors) had input as to how the research study could be adapted to their needs (i.e. specific meeting days, content area interest, grade levels, etc.)

Phase Two: I collected about the school, classrooms, preservice teachers, mentor teachers, and students. This provided the opportunity to get a clear picture of the authentic learning environment and to begin to develop an understanding of the case. I also interviewed each of the preservice teachers as baseline data for the study.

Phase Three: The preservice teachers completed the initial LS cycle and I collected on-going data (reflective field notes, notes from the preservice teachers, debriefing interviews, and changes in "research lesson" plan).

Phase Four: I compared the baseline data to the first iteration as it was collected and adjusted the study as needed to foster preservice teachers' thinking about student learning and to develop a deeper understanding of the meanings the preservice teachers' were assigning to their experiences as part of the case study.

Phase Five: After all iterations were completed, data were compiled and coded.

Phase Six: The findings were summarized and implications for further research were determined.

(Reinking & Bradley, 2008)

Phase One:

The initial phase of this study required locating a site for the research study, identifying participants, outlining participant responsibilities, and selecting goals for the research study (Reinking & Bradley, 2008). These initial steps also helped to define the parameters of the case in question. Southern University was selected based upon the current curriculum of the seminar courses for preservice teachers and the common goal of improving the instruction of preservice teachers. This teacher education program had previously used LS as a course requirement for preservice teachers. I conducted a pilot study in this context as a precursor to the research. The

faculty and preservice teachers expressed interest in continuing their work around LS. The common goals selected for the study were to: (a) provide preservice teachers the opportunity to participate in a second cycle of LS, and (b) provide preservice teachers additional support in completing the professional development component of this program. The program coordinator and researcher believed these opportunities would strengthen the preservice teachers' ability to develop lessons that have a greater impact on student learning by supporting the preservice teachers in reflecting on their teaching and analysis of evidence of student learning. An audit trail is provided with a timeline of this process (Table 3).

Phase Two:

All of the Elementary Education preservice teachers in the Elementary program were invited to a voluntary meeting to discuss the goals of the project and research outline. They were offered the opportunity to complete informed consent forms and reminded they could exit the study at any time. Purposeful sampling (Patton, 1990) was used to determine small groups of preservice teachers who were teaching in the similar grade levels (K-2) at the same elementary school. I selected one group of four preservice teaches for the study because they volunteered, signed informed consent and student taught in K-2 levels in the same school were selected for the study. I met with the preservice teachers who completed the informed consent to establish a timeline for the project and participate in the initial interviews related to their LS experiences and their thinking about student learning. This initial 20-30 minute interview served as the baseline for the case study and the first in depth analysis of the case. Later, this information was used to examine the possible impact of lesson study on the preservice teachers' thinking about student learning.

In phase two, the preservice teachers focused on developing their "research lesson." Preservice teachers were asked to consider students' short-term and long-term goals. As part of the study, the preservice teachers were asked to discuss what their students already knew about their focus area of instruction along with what they wanted them to know when they completed the lesson. I prompted the preservice teachers to think about student learning in these discussions. This part of the LS process was designed to have them think about their students' learning and how they could gather evidence of it.

After each meeting of the planning process, I completed participatory reflective field notes (Abraham & Barksdale, 2018). From my perspective, I wrote down the things that occurred and that they discussed. At the end of each planning session, the preservice teachers summarized their work on the "research lesson" plan. The participatory reflective research field notes and "research lesson" plan were analyzed after each session to support the iterative process of this case study. The information provided by the preservice teachers was evidence of their thinking about student learning and allowed the researcher to guide them to think about how the lesson could influence their students' learning.

Phase Three:

During phase three of the process, the preservice teachers implemented their "research lesson" as designed by the team. The LS team members each had a copy of the "research lesson" plan to document their observations during the lesson. I attended the lesson along with the LS team. Once the lesson was taught in its first iteration, there was a debriefing session. During this session, each member of the team shared strengths and weaknesses the preservice teachers' noted during the lesson. Whoever taught the lesson shared first, then the other team members shared their ideas. I asked open-ended questions that encouraged preservice teachers to

talk about their students' learning and focus on the evidence of student learning collected related to their instructional goals (Table 1). This open-ended questioning occurred after all of the team members had shared and discussed their observations.

The team (with guiding questions from the researcher) adapted the lesson plan to strengthen the lesson based on observations of student learning and the context in which the lesson would be taught next. I analyzed the reflective participatory field notes, LS team observation sheets, iterations of the lesson plan, and transcriptions of the debriefing. Each document was analyzed independently and then compared in order to identify common themes.

Phase Four:

In phase four, the lesson study intervention was repeated (similar to phase 3). The team moved from a first grade classroom to a kindergarten classroom. A second preservice teacher taught the research lesson and the other team members observed. After they completed the "research lesson" the preservice teachers determined modifications. The lesson study cycle was repeated as part of the ongoing process until the preservice teachers finalized their lesson plan. They were asked to complete written reflections about this process.

Phase Five:

In phase five, I analyzed the qualitative data as a case study. The purpose of viewing this research through a case study lens was because it is a product of inquiry (Creswell, 2014; Denzin & Lincoln, 2003; Merriam, 1988; Yin, 2009). I viewed as an intrinsic case, meaning that this group of preservice teachers were given a unique opportunity to engage in LS as participants in a research investigation that afforded "extra" learning related to being members of a team with the researcher (Stake, 1995). I was able to develop an in-depth understanding and description of the

case by collecting data from each of the sources (interviews, reflective field notes, written reflections, research lesson observations, etc.) (Creswell, 2014).

Phase Six:

The analysis procedures made it possible to examine how LS impacted the preservice teachers' thinking about student learning. The data were read repeatedly, coded, and checked for triangulation using the data sources. I analyzed the interview and debriefing transcriptions, written reflections, field notes, and the research lesson plan separately and comparatively. This analysis was not intended to generalize beyond the case, but rather, to understand the complexity of the case (Creswell, 2014). I will identify an overarching learning about this unusual case of lesson study. The overall meanings derived from the case or "assertions" (Stake, 1995) are representative of the general lesson learned from this specific case study (Creswell, 2014, p. 99).

Data Sources and Collection:

Preservice teacher pre and post-interviews. I selected interviews for this case study because they support the research goal of understanding how lesson study influenced the preservice teachers' thinking about student learning. By providing open-ended, conversational interviews, participants were able to expand upon their work as a group in a one-on-one environment with the researcher. Interviews provided the opportunity to study "people's understanding of the meaning in their lived world" (Kvale, 1996, p. 105). In an effort to develop a rich, thick description of the case, interviews also provided the opportunity to develop transferability and triangulation of results (Merriam, 2002; Stake 1995). Every preservice teacher was interviewed at the beginning and ending of the study. The pre-interview served the purpose of supplying baseline data focusing on the preservice teachers' thinking about student learning. The post-interview provided data about the preservice teachers' thinking about student learning.

Each participant selected a location that was comfortable, quiet, and convenient. The interviews occurred at the elementary school where they were completing their student teaching. The interviews lasted about 20-30 minutes and each interview was audio recorded, with approval from the participant. After the interviews were recorded, they were transcribed. The interview questions were designed in concert with the research question. The pre-interview meeting occurred before any lesson planning sessions. The post-interview took place after the finalization of the "research lesson." Each interview utilized open-ended questions to allowing participants to respond as they saw fit (Bogdan and Kihlen, 2003; Dodge, 2011; Esterberg, 2002; Kvale, 1996). Probing questions were used as needed to clarify or encourage participants to continue their response (Denzin & Lincoln, 2003). Table 1 contains interview questions and prompts.

Debriefing interviews. After the lesson was taught in a classroom, the preservice teachers met immediately to debrief and discuss the data the team collected. The preservice teacher who taught the lesson debriefed first and then each member of the team shared. I prompted the discussion to focus on the evidence collected about student learning. These debriefing interviews were audio recorded and transcribed to support the iterative nature of the intervention. I analyzed the interview data and it was coded as it related to the research question.

Reflective participatory field notes.

After each session, I recorded reflective participatory field notes (Abraham & Barksdale, 2018) in order to process and document important ideas discussed during the team meetings. These field notes served as research evidence that supported reflection, reflexivity, and a source of accountability for me as a researcher.

Research lesson plan. The research lesson plans were created jointly by the participants. At the onset, the group worked together to design a first draft of the lesson plan. In future meetings, revisions were made based upon the collaborative conversations, and the researcher's guidance and prompting to think about student learning. Each iteration of the draft was recorded and saved. Then, after the first teaching adjustments were made based on the reflection and continued until the participants were satisfied and ready to finalize their "research lesson."

Written reflection. Once the LS cycle was complete and the final "research lesson" plan had been shared, the participants wrote a reflection summarizing their perceptions and experiences about the LS cycle. No specific guidelines were given to the participants related to length, style, or content. The written reflections were analyzed in relation to the research question.

Data Analysis

The pre-interview data represented the notions that participants brought in about LS and their thinking about student learning. These data, along with the debriefing sessions, were transcribed, analyzed, and coded as part of the case study. A holistic analyses was used as a foundation for development of a rich description of the case (Stake, 1995; Yin, 2009). The other qualitative data (field notes, "research lessons", and written reflections) were also collected, analyzed, and coded. As a part of the data analyses, a rendering of the case was developed (Creswell, 2013; Stake, 1995). All of the data were collected and analyzed for themes to fully understand the case. Table 3 provides an outline of the connection between the research question and data sources.

Role of the Researcher

Throughout this intervention, I saw myself serving as the knowledgeable other and facilitator (Lewis, 2002). Although it would be ideal to have an outsider fill this role, finding someone with knowledge, experience, and time available to participate in all components of LS was not possible. The entire framework of this study was built upon the work of Lewis (2002); her book was used as a resource to facilitate all discussions and interviews. The experience of examining the LS research in great depth made me feel competent in serving in the role of knowledgeable other. My experience with teaching and student learning was an important factor to consider in this research project. In order to better understand how my biases and experiences impacted this project, I wrote a reflexivity report prior to collecting initial data from participants. This written reflection will allow me to orient myself related to the phenomena being studied and provided an opportunity to identify any preconceptions that might have influenced my analyses. As with any qualitative research study, the triangulation of data ensured the consequential validity data collection and analysis.

Goodness and Trustworthiness

Qualitative researchers must be highly engaged in data collection and analysis in order to interpret and assign meaning that is both credible and valid (Stake, 1995). It is imperative that the researchers' assumptions be acknowledged and that data be interpreted through the lens of a participant. This allows true "triangulation" of the data (Stake, 1995, p. 109).

In order to ensure that this study's finding are in fact trustworthy, I carefully followed the recommendations of Merriam (2002) to: (a) triangulate data by using multiple sources to confirm findings; (b) complete member checks by having participants review transcriptions; (c) request peer review of findings while under development; (d) provide an audit trail to detail the

procedures and decision-making in the study, and (e) develop a rich, thick description so that other researchers might truly understand the research context in relation to their work.

Researcher Positionality

As a qualitative researcher, I have to acknowledge my distinct role in this study. While viewing this work through the eyes of a constructivist, I must recognize how my experiences and thinking influenced this work. It is important to define my own biases, limitations, and understandings to acknowledge the impact they it will have on this work (Merriam, 1988). The first step in this process is stating my biases fully. In order to fully understand my work and experience in education, I will outline information pertinent to the case study.

For the last 11 years, I have been working in public education as both a classroom teacher in elementary schools and a literacy coach. During this time, I have mentored preservice and inservice classroom teachers as well as reading specialists. Thus, this experience provided a broad range and deep understanding of classroom instruction and administrator expectations. While my full-time position has been affiliated with public education, I have acquired other experience as an adjunct professor for local universities where I have the opportunity to observe the transfer of educational theory into practice. The combination of these opportunities allow me to understand how preservice teachers move through education programs and then move into classrooms of their own. There is "gradual release of responsibility" as they move from student teaching into their own classrooms within my school division.

All of my education experience has been in the same physical area. I attended a local college and have only taught within this school division where the college is located. I also completed my students teaching within this division so I have a deep understanding of how the

universities curriculum transfers into the school division; however, this also influences how I will interpret and develop an understanding of my data collection.

It is also important to note that I have been a graduate student for almost seven years. As a person who highly values education and learning, I believe there is always something to improve. However, in working with other educators in public schools has taught me that this may not be true for every teacher.

Chapter Four:

Research Findings

The purpose of this study was to examine the experiences and perceptions of lesson study on preservice teachers planning, teaching, and reflection on thinking about student learning. The research question was: What was the impact of lesson study on preservice teachers' thinking about student learning? During pre and post interviews and debriefings, preservice teachers described their perceptions and experiences of teaching and reflecting through lesson study. They also described how the intervention of lesson study affected their teaching in the classroom. The findings outlined in this chapter were developed based on the data analyses of pre and post interviews, debriefing interviews, participatory reflective field notes, written reflections from the preservice teachers, and the completed "research lesson" plan.

Background

The identified participants in this study were four preservice teachers completing an initial licensure graduate program at Southern University. Each of the participants were involved in a pilot about LS during the fall semester of the program. They were all female participants and no other demographic information was collected from them. Each of the preservice teachers was completing their student teaching at the same elementary school, but in different classrooms and grade levels. This was the last semester of their coursework and participants identified it as a "busy time." They were each "full-time teaching" which means they were responsible for planning and teaching all subject areas in their field placement classrooms.

Interviews

Four participants were interviewed for this study. Each of the study participants were interviewed once before the lesson study cycle was completed and at the end. There were about

6-7 weeks between these interviews, depending on the participant. An audio recording was made during each of the interviews to ensure accurate transcription. Interview questions were carefully designed in a semi-structured interview approach (Merriam, 2002) using a set of open-ended questions. This framework allowed the preservice teachers an opportunity to share information about the LS process based on their knowledge, insight, and understanding of the process. The transcription process was completed after each interview. I reviewed each transcript while listening to the recording and participants reviewed the transcripts to verify accurate transcription

Additional Documents

Interviews were the primary data source; however, to ensure a thick description of the case additional documents were collected and reviewed (Esterberg, 2002; Merriam, 2002). These documents were used to verify and substantiate statements made by each of the participants throughout the study (Glaser & Strauss, 1967). They included:

1. Research Lesson Plan

2. Participant Field Notes - These were notes recorded by the participants when they were observing the research lesson. The preservice teachers referenced these notes during the debriefing sessions.

3. Reflective Participatory Field Notes - Field notes were completed after each meeting with the preservice teachers.

4. Written Reflections-At the end of the study, the preservice teachers completed a 2-3 page written reflection about their lesson study experience.

Data Analysis Steps

Step 1: Transcribe audio tapes from the one-on-one interviews and debriefing interviews into Word documents. After each transcription was completed, I recorded my thoughts and feelings about that transcription.

Step 2: Read through each transcript, reflective field notes, participant field notes, and written reflections. After spending time immersed in the data, I spent some time reflecting on the big picture and ideas conveyed by this work.

Step 3: Begin analysis and coding process. I carefully read each of the transcripts and began to analyze segments of the data into idea units (Hycner, 1985). I used the participants' language to create labels for each of the units.

Step 4: After each transcript was analyzed to segment the idea units for analysis, these units were separated into themes. The themes were analyzed, and categories were developed.

Step 5: Once the categories were defined, I created a narrative to demonstrate the connections between the themes and the participant' responses.

Step 6: In the final step of the process, I analyzed each category to determine the meanings of the data as assigned by the participants. As part of the process, I had to reflect on my own experiences with thinking about student learning and planning for this type of work with my peers.

The Research Lesson Plan

To situate the reader in relation to the findings of this study, it is important to understand the research lesson and what the preservice teachers identified as goals for their lesson. Each of the preservice teachers were student teaching in grades K-2. The participants wanted to

incorporate STEM into their classrooms. As with any licensure program in the United States, the preservice teachers had a specific lesson plan template they wanted to complete so they could use this project as a part of their capstone Master's degree. They were also supplied with a LS planning template form and we used this as our initial template and then modified this document. Lastly, the preservice teachers formatted it to fit within the Master's program lesson plan template. This template helped guide the team through the process of developing the lesson but all of the materials and the goals they selected were identified by the group. As a more knowledgeable other, I prompted them to think about their goals through the lens of their students learning. What would creativity or problem-solving look like in a kindergarten classroom? A second grade classroom? The group also developed the overall format and sequence of the research lesson. The team decided who would teach each lesson and what order they would follow.

Their lesson was built around providing the opportunity for students to develop problem-solving and creativity. In addition, students were to use teamwork to build a model house that would withstand a burst of wind from a hairdryer. A central picture book used to guide through this process was *The Three Little Pigs.* This house would be an opportunity to save the pigs from the "Big Bad Wolf." In order to foster these skills through an open-ended inquiry process, the preservice teachers wanted to make sure they did not model too much for students. The students were able to use their own problem-solving, creativity, and teamwork skills from beginning to the end. Each iteration of the lesson plan was highlighted in a different color to compare the changes as it developed through the LS process. (See Appendix D)

After the students listened to a version of *The Three Little Pigs* they were challenged with the task of creating their own house for the pigs in small groups of three or four. Each group

received a design page to draw a preliminary house plan and sketch, then given marshmallows and toothpicks to build the house based on their design. There was only one design and one model for each group. The children were allowed to try multiple designs and make any modifications they wanted once they put their initial design on paper. The lesson took over 60 minutes to complete.

The team taught their lesson two times and then decided they did not need to continue modifying the lesson. One of the preservice teachers stated:

> Yeah I think with thinking about second graders I don't think we would be facing issues with them not understanding design and all of that but I think it would be the teamwork. I think we addressed the problem with teamwork issues in the discussions. So a part of me feels like I think the major issues we would to discover we sort of discovered them on both ends. I don't feel like we need to teach it again. I think we found a broad range of improvements that if we were to teach it again it would need to be changed for the students in the class. Um but for the lesson in the way it applies to students, in general I think we've adapted it and found the areas we need to change.

This statement served as the groups rational for not continuing their work around this lesson. The group felt that any additional changes to the lesson itself would be based on the students' developmental level or specific accommodations based on the students' they were teaching.

Study Findings

The research question for this study was: What was the impact of lesson study on preservice teachers' thinking about student learning? In response to this question, several themes were identified across data sources.

Preservice Teachers' Growth in Thinking about Student's Learning

Initially, when we were moving through the LS process, the preservice teachers explicitly wanted to focus on the activities, worksheets, assessments, and specific standards they were teaching. During our first three planning sessions, they carefully considered student-learning goals, and spent a lot of time discussing what student learning would look like. When examining the data for this study, it was apparent that their discussions about student learning moved from not considering their students learning to be able to explicitly identify and speak to their learning. As they moved through the process, the preservice teachers developed a sophistication in their thinking about student learning.

Some examples of their early thoughts will be discussed first and then examples of how their thinking developed will be shared. Many of these initial data examples are from the first interviews and planning meetings. Sheila described her early experiences of how lesson study influenced her teaching from the previous semester:

> I guess…what also changed is my pre-assessments. I look at them more as how they are going to do on the post assessment too, and I didn't really do that as much last semester as I should have. So the lesson study really helped me realize that the pre-assessment is the main key to seeing how exactly we should go about changing the lesson to better the students.

At the start, Sheila was very focused on required pre- and post-assessments in her lessons and her thinking about student learning was quite limited. While pre- and post-assessments have their place in the classroom, they should not be the first and only component considered in students' learning. In addition, the first iteration of the "research lesson" plan contained very

little about the data they wanted to collect from students or ways that they could gather evidence about their students' learning.

Similarly, when Annalise shared her early work with lesson study she provided a step-by-step description of what the students did, not what the students learned or what she learned.

> So they were really focused on, like, doing it with real-life experience, because we were in math but math can get very routine and boring, especially if you're in a school where they are like really, really stressing like about testing and like the SOLS and teaching for the test. So we wanted, like, to still be able to do that but also incorporate something where they could see the meaning of it and get meaning out of it. So we um, cut out like pictures from like ads from Kroger and Walmart and then we had different food items. And then the first time they did it, we had the students in fifth grade, and they were going to cut out things they chose and then add them together and they were, um, like calculating the total price of the items they bought, so adding decimals.

This is a lengthy example of how the preservice teachers spent a large amount of time discussing the activity and its selection versus what students learned. They were focused on what they would be doing as the teacher and the steps they would need to complete to get through the lesson. There was little discussion about what the students would be doing during the lessons.

In comparison, across the LS process the preservice teachers spent a lot more time elaborating on evidence of student learning specific to this lesson. In the first debriefing, Alice shared one of her first observations of student learning. She started with an example of what

they originally planned as "telling" students something and then realized that learning was in the hands of the students and her role was to guide them through this process:

> I think in our lesson we said we would tell them this was an opportunity to do teamwork. Teamwork is important in engineering. I think it would have been great for them to come up with reasons why teamwork is important. Just so that they recognized it and even had it on the smartboard so I could reference it during some of those challenging moments when they were not wanting to work together or kind of doing their own thing, I could have referenced back to that. Um, so that's kind of what I started to realize about my students in that moment was that I think they work really well when they have a reference to something I can point back to. Um, but also just in general, instead of telling them "this is a teamwork activity," having examples of what I'm looking for in their teamwork. That, I think could have just made it more of an aid in their ideas of how to work together.

Kylie elaborated on Alice's comments in relation to transferring the responsibility and ownership to the students. In a comment during this same conversation, she stated:

> Like you said, you had wished you had thought of, but you still asked them to come up with how teamwork looks. So they were still coming up with what teamwork looks like, so they were still thinking of that before they ever started. So that was really great and I think that's what we want. We want them to come up with the ideas.

Both examples show their consideration of the students' thinking once they were prompted to reflect on what they taught during the lesson. These comments from their debriefings continued to develop and grow as we moved through each iteration of the lesson. Each time they met to debrief or further their work on the lesson, they added more modeling

opportunities as well as open-ended questions that could prompt student thinking or help move the children along if they were stuck during the implementation of the lesson. The thinking of the preservice teachers gradually changed from a general focus on what the activities would be to more specific thoughts about what their students would need in order to be successful. The preservice teachers were thinking about how they could adapt their lesson to the students' thinking. The "research lesson" plan is included in Appendix D.

Once the preservice teachers were able to identify what their expectations for seeing student learning were, they could elaborate more specifically. Alice talked about specific examples of student learning in her debriefing interview after she taught the first iteration of the "research lesson." In this lesson, the students were asked to build a house for the three pigs Alice recounted some of the examples of student learning she observed in the lesson by describing what the children said and did:

> [The children were] Holding up things, talking about "how does this work" and they were asking one another questions "How does this make it better? How do we make it stronger? Oh. this is falling down." So them kind of talking about the structure and their ideas. They weren't just thinking in their head. It was all verbal. I saw their teamwork through their verbal communication about what they were doing.

Once the preservice teachers identified their expectations for student learning, their thinking and ability to expound upon it continued to grow. The preservice teachers focused on three different goals for student's learning during the lesson. The following section includes examples of how they explicitly identified student learning in their lessons related to their learning goals. These excerpts also provide evidence of their

developing sophistication around thinking about student learning as they moved from general descriptions to specific examples thinking about student learning.

Creativity. The preservice teachers had the greatest difficulty considering and labelling what creativity might look like in their students. Annalise felt as though they were able to see creativity through how students individualized the products in their lesson. "I think creativity comes with things that are different than others. Those are your own unique twists. Additional things added." Kylie elaborated on this by stating, "None of them [the houses] were the same. None of them were the basic house structure. They all added onto them and I think that's where I saw creativity." These two comments show that the preservice teachers are relating creativity to being unique or different. This is a developmentally appropriate goal for young children. The preservice teachers did not want to show students a model of the houses they were going to build because they felt it would hinder their creativity. In the field notes, interviews, and debriefing interviews there was discussion about student learning and how the preservice teachers could scaffold instruction to meet their goals as a team.

Alice felt that students were able to quickly get started and that their creativity was apparent through experimentation with their house. "By watching them design and redesign I could feel their creativity and see it. It's hard to think about their thinking of creativity, but I know I saw it." It would appear that Alice was connecting their excitement with the project and ability to quickly get started with students' ability to be creative. The children were able to determine how they wanted to start and then jump in. Alice felt that their repeated attempts at strengthening their house showed how they were internalizing the task as well as problem solving.

In the second iteration of the lesson, the preservice teachers struggled with creativity again. This was in part because they moved from first grade students to kindergarten students. The kindergartners struggled more with the design of their house. Shelia commented that the design component of the lesson was the trickiest spot for the students. "With the groups I observed, it was apparent that the design process was the hardest. If we had extra prompting questions it would have helped." This shows that the preservice teachers were thinking about what they could have done to support students in this difficult part of the design process to help keep the children moving forward. Kylie added onto Sheila's observation by saying, "Their redesigns were really similar to the first. So they didn't grasp the redesign and they didn't really grasp the idea of building up and around the house." Later in the debriefing session, Kylie came back to this component of the lesson and said, "I was thinking about the creativity piece. They didn't really say anything like that would have made me think it was their creative juices flowing, but they did answer the problem solving part." These reflections on thinking about student learning show that the preservice teachers have moved from general statements to specific examples. They also spent a great deal of time discussing developmentally appropriate instruction in relation to creativity.

These reflections were opportunities for the preservice teachers to specifically identify their students' thinking, discussion, and observation of their learning in relation to the goals of the lesson they designed. This is an area of the lesson where they felt that prompting questions would support the children and help keep them from becoming "stuck." For this reason, they added several prompting questions into their "research lesson" plan.

Teamwork. The second goal of the lesson focused on teamwork and this concept was easier for the preservice teachers to identify and foster with the children; however, it took some

time for them to think through how students might view and define teamwork. Alice reflected on the realization that perhaps the LS group needed to spend more time thinking about teamwork. In her debriefing from the first teaching of the lesson she said: [Part of this quote was also relevant to collaboration and was used previously]

> That's kind of what I started to realize about my students in that moment was that I think they work really well when they have a reference to something I can point back to. Um, but also just in general instead of telling them this is a teamwork activity, having examples of what I'm looking for in their teamwork. That I think could have just made it more of an aide in their ideas of how to work together.

This comment showed that as Alice was teaching the lesson she realized the team probably did not spend enough time "frontloading" or teaching students about teamwork and what it could look like. Further, they had not spent enough time reflecting on students' thinking about teamwork and how this should affect their lesson. Alice elaborated more on this issue later in the debriefing by saying:

> …talking more about the strength of teamwork and what it looks like beforehand, so we could reference the students back to that. I didn't really have anything to reference them back to when I was seeing them not working as a team. That was problematic.

Alice knew this was something that was lacking in the lesson and attempted to start thinking through how she could help her students function as a team and build their capacity around teamwork in their small group setting. She was able to identify a problem based on her observations of students in the lesson and reflect on how she could support their learning by adjusting the research lessons. Later in the debriefing, the other preservice teachers built on by

discussing their analysis of teamwork amongst the students. Kylie talked about two different examples:

> There are different examples, positive and negative ones. Negative ones that I observed with teamwork was in one group one of his friends shut down completely and even started crying. Because his idea was that they build three separate houses and we had to keep reminding him that they were building one house together and he did not like that idea.

Kylie was reflecting on two different questions, did students know what teamwork meant? And was the students' definition different than the teachers and their peers? She continued to elaborate on her observations by sharing a positive scenario of teamwork: [Part of this quote was used earlier]

> I saw some of them holding up pieces. Holding up things talking about, "How does this work?" They were asking one another questions, "How does this make it better? How do we make it stronger? Oh, this is falling down." So them kind of talking about the structure and their ideas. They weren't just thinking in their head. It was all verbal. I saw their teamwork through their verbal communication about what they were doing.

Kylie described that some students were able to facilitate a group project together and work as a team while others may not have had a clear understanding of expectations or what they were supposed to be doing. Either way, the team decided to spend a lot of time rethinking this part of the lesson and they ended up including both a video that illustrated teamwork and a group discussion for students to share their thoughts about what teamwork looked like in the video and could look like in their small group. In the latter iterations of the lesson, their observations showed that these were good decisions.

Alice talked about her reaction to adding scaffolding to the lesson to help develop the children's understanding of teamwork:

> I thought the discussion that you lead was really great, incorporating the video and I think things like that were good visuals. And good to have that at the forefront of this activity. Yes, we are building, yes this is fun, but we are working as a team and this is not an individual thing. So good to bring it back to that was really successful.

Kylie supported Alice's comment by reflecting on one specific group that she observed where a student was really focused on the teamwork aspect of the lesson. Kylie said, "He did a really good job of saying, what do you think about this? Are you sure? Is this what we should do? He kept asking those prompting questions. I was really impressed with a kindergartener." She felt he had an exceptional understanding of how this collaborative process was supposed to work. He was encouraging his peers to provide feedback on their work together and including them in the process whenever possible.

During the second iteration, Annalise was teaching the lesson and at the end she prompted the students to reflect on their work as a team. Alice observed the following:

> At the end, she asked them how did you guys work as a team? The student said, "She helped me and the house got better. She made parts and we all helped. I told her that was a good idea. So we worked as a team."

Later, Alice continued to elaborate on her explanation of why this was such a stellar example:

> Overall, I feel like what I saw was a really great example and was more advanced than I was expecting, but I think it was because that one leader had prior experience so she kind of went into it very confident and I think that made them confident too.

These examples of preservice teachers' thinking about student learning are far more specific than their initial reflections and discussions around what teamwork would and could look like with their students. They identified other opportunities for learning, but felt that as they moved through the process, they were able to meet students where they were with the development of teamwork.

Problem-solving. Initially, the preservice teachers thought problem-solving was going to be the most difficult part of the process; however, they felt creativity ended up being the more difficult goal to foster in the students. They were pleased with their initial observations of students using problem-solving in the design and building process. Annalise described a moment of "seeing problem-solving click" in her students after they completed and tested their first design:

> I think after they tested their first design, they had a new interpretation of what it meant to have a strong house. So they kind of communicated with each other and what that meant, doubling up toothpicks, making an x to make the walls stronger and they were more open to new ideas.

Annalise's reflection on the students' ability to try a solution, test it, and reflect on their attempt provided a specific learning moment for a group of students. Alice talked about how her groups of students were really interested in what other students were building and how this impacted their design process:

> Well, I am trying to think if this would actually be part of it too. I didn't expect this to happen, but they all, I could tell this from a few examples, but they really liked watching the other houses get tested. I think from that they were watching and observing and I saw some of them go back and try to use some ideas they saw. And, I don't think that's bad.

Alice further described what she felt students were learning through this process by how these observations helped move them along in their own design process:

> One group added a bunch to the edges so it would stay. It was cool to see some of them start making connections as they observed that and I was not expecting that to come, but obviously they were interested and fascinated first-graders. I think the testing process is fun.

Kylie also wanted to add her thoughts on the observations of the students and how she thought it impacted their design process:

> I am glad you brought that up. At first, I wrote that down as a distraction. Everybody is turning around away from their own, but that's a good point. They looked and they were like, "Oh, okay that worked." I really think they were thinking about it because then they would go back and touch their own. So I don't think it's a bad distraction. Plus, engineers use designs that have been around. They try to make them better, the whole redesign thing.

Kylie saw observations of their peers testing their designs as a learning opportunity and a chance for them to reflect on their design process. She connected the real-life application that engineers use to develop ideas and bring their work to fruition. There was a good amount of discussion about whether or not these observations would stifle children's creativity and prevent them from trying their own ideas. However, Alice helped the group come to terms with their curiosity and described it as:

> My gut instinct was to tell them that only the people who have built could stand around, but I was like, you know. Like, this is part of the design process, even observing others, how others, and I don't want to take that away and it was fun for them to watch. I saw on

> some of their faces really watching and thinking and running back to their desks. I think that was proof of them really thinking through.

Alice's comments gave the team an opportunity to think through this one small component and provided evidence of how attuned the preservice teachers were to the students' and their learning throughout this process.

Observing and Thinking about Students' Learning

Throughout the process of lesson study, the preservice teachers discussed their ability to observe their students and identify their students' learning. In each of our sessions, they mentioned times during the day when they reflected on their observations of students and what they had taken away from their classroom teaching opportunities. The process was permeating through their work with students and when asked to reflect on it in their post interviews, Sheila talked about her perceptions of the overall process and how it influenced thinking about student learning:

> So it kind of make me think, like how to really get students' to focus on what we need them to start thinking about and how to use language to direct them and the way to start thinking about the goals we want them to reach. I was looking for that in my students.

Similarly, Kylie reflected on what she felt like was important throughout the process and how it influenced her thinking about student learning. Kylie shared:

> What do I want kids to take away forever, and what's really going to matter? I feel like by looking at those long-term goals, like teamwork and creativity. They are gaining a skill that is going to benefit them in any subject, in sports, in all facets of life. I feel like I am teaching them something that is far beyond the academic part of school. So, that's

> how it's changed my thinking about teaching my students, their learning, and my planning.

When Alice was asked to reflect on how her practice had changed throughout this process she was quick to articulate, "I am watching the students a lot more." She continued to elaborate and discuss students' learning as a challenge and how it is more involved than just considering objectives. Alice stated:

> I think it's helped me think more about actions that I can observe in students' learning … I can't open up their brain and see what's happening. It's actually out of their thinking that actions will flow, so students' learning is something that can be observed, but there has to be actions that we are looking for … I'm thinking about what I want to observe in my students and taking that greater approach of watching what they are doing.

Valuing Lesson Study Teamwork

These preservice teachers highly valued the opportunity to work together in a collaborative environment on a long-term LS project. This collaboration promoted the development of preservice teachers' thinking about their students' learning. Each of the preservice teachers described (a) positive experiences of working together as a team of preservice teachers and (b) how this taught them to value the collaborative process of working and thinking about student learning together (versus on their own). Although these two subthemes were distinct, they have been discussed together because they were intertwined within the data.

Each member of the LS cycle was excited about their opportunities to meet together as a team. This appeared several times in my participatory reflective field notes; however, it could also be attributed to the rapport and relationships the team and researcher already had amongst

one another. Alice described this in her pre-interview when she was discussing their work with lesson study the previous semester:

> Through the process of working as a group, I've learned even more about the value of collaborating and how I think, if I were to go into my teaching, I would make it a priority of let's teach a lesson and let's take time to go in to observe it and use that model as a way to improve lessons and think about student learning. I don't think I would have seen the value of that immediately and now that I am experiencing that, it has taught me the value of doing that.

Not only did Alice explain how this work was influencing her as a preservice teacher, but also how she could continue to include these kinds of opportunities in her future work as an educator. Prior to her experience with LS, Alice felt that she would not have realized what she was missing if she had not had the collaborative work experience.

Alice's description of the use of LS teams as an opportunity to further investigate student learning through group discussion and reflection shows the team had the opportunity to grow and value this process. Similarly, Sheila shared that "collaborating with my cohort members; it's just really nice to hear some of their ideas." With further prompting, Sheila elaborated by saying, "Since I'm relatively new to teaching and didn't get to teach a lot during my blocking, I also didn't really get to collaborate with other teachers as much and think about what my students' were doing." This comment supports the position that opportunities to share in the planning process and thinking about her students' learning in collaboration with other teachers was something that was previously lacking in her student teaching opportunities. She also tied this opportunity back to thinking about her students specifically and what she could learn about her students' thinking.

Annalise had similar feelings about the opportunity to collaborate and work as a team. She commented on how excited she was to work with her teammates during several of our meetings, during her interviews, and in her written reflection. Annalise also discussed how this collaborative opportunity improved their research lesson as compared to creating a lesson on their own. She described her LS experience by talking about her learning:

> To work as a team and then take everybody's individual strengths and put them into your lesson. You have something that you may have never thought of and get that from a group member. It's really great to communicate with people who have different ideas and you can…use the feedback from different perspectives to improve the lesson for your students.

Similarly, Kylie discussed how the chance to work together created stronger lessons and positively influenced her students. "I feel like it was a stronger lesson in nature because of the way that we designed it, if that makes sense. I know the other girls feel the same, and I think they would tell you the same thing after we took the time to revise it and reflect on our student's thinking." Her reflections on her work with lesson study deepened her understanding of collaboration. "It's not just about me and what I need to accomplish, but kind of the whole system, and how we can better students and their learning in that way." This comment suggests that LS study had an impact beyond this one lesson and learning opportunity for students and can be applied to her work as an educator as a whole.

Annalise also described her feelings about the collaboration involved in the LS process. "Just working with other people makes a lesson much more successful than just working by yourself. I really appreciated being able to work with other teachers and seeing my students' learning through their eyes." Annalise felt that her ability to participate in the process was

effected by the collaborative nature of the preservice teachers building their work off one another, and as well as their discussions on the students' learning. My field notes provided documentation of many occasions where the preservice teachers were encouraging each other to think outside of the normal strategies when developing their lesson.

One of the best summaries of the preservice teachers' views on collaboration and thinking about student learning comes from Alice. Not only does she comment on how the collaborative process of LS influenced her as teacher, but also she used examples of thinking about her own students' learning specifically. She stated:

> I think collaborating with teachers and realizing that's really important to me and that's affecting where I would want to teach one day, is that the community there is willing to collaborate and work together; this idea of having a lesson and developing it to meet the needs of students. Overall, I think it has changed my expectations of the school that I go to, but even the expectations of myself, as a teacher and not just recycling things each year and teaching because it is what I had planned the past year, but even thinking about, how can I meet the needs of these students specifically? Where are these students at? Where do I want them to get at the end of this lesson, or the end of this unit? I think overall it has changed my view and approach in planning and collaborating.

The broad sweeping questions that Alice identifies are the types of questions educators should be asking themselves as they reflect on their student's learning and practice in the classroom. Continuing to describe her overall reflection of her work, Alice further explored how the LS process influenced her thinking about student learning in her written reflection at the end of the study:

> The strength of this process was that as a group, we were able to take a lesson and work together, using all of our gifts and ideas, to improve and strengthen the lesson to meet the needs of the students. This process really allowed us to zero in on how we wanted to see the students show evidence of learning the concepts this activity was teaching them.

Sheila echoed Alice's sentiments by stating in her final reflection that:

> There were many strengths of the lesson study with the value of working collaboratively being the first. Working together as a team allowed us to brainstorm the best ways to meet the needs of students more effectively by thinking about their learning.

When reviewing all of the data, the theme of collaboration was one of the most evident. The preservice teachers were continuously talking about their work together and how it was influencing the teaching methods utilized in this project and in the classrooms where they were student teaching. Further, their ability to consider how this work would apply to collaboration outside of this project and in their future schools and classrooms shows the potential for their learning to transcend this specific case.

Responses to how Lesson Study Team Members Taught

The entire premise of LS is to focus on planning, teaching, debriefing, and reflection on student learning. However, as preservice teachers' who have been in a limited number of classrooms, there was a significant amount of dialogue relating to the perceptions and observations of the preservice teachers reflection on the teaching of their peers. Every time we met together, they would talk about what they observed each other doing and they shared only positive comments related to their observations. In the first interview, Annalise reflected on her earlier experiences with lesson study and she looked forward to the feedback she received from her peers about her teaching.

> Just working with other people makes a lesson much more successful than just working by yourself. I really, really enjoy having that feedback from people. Sometimes I mean we didn't just talk about how the lesson itself went but how I am doing as teacher.

The goal of the LS process is to spend time thinking about the students' learning and not their performance in the classroom. However, they had such limited experience in public schools classrooms they are drawn to watching their peers and the preservice teachers wanted to them. An example would be Kylie's comment about Alice's first teaching during the debriefing on the lesson:

> First of all, I thought you facilitated super well. Just complimenting you. All of your directions were so clear. I feel like they knew exactly what they were to do and when they were to do it. Um, down to the design first and then build what you designed.

When the preservice teachers were discussing problems with the lesson, they were very quick to let their peers know it was not a reflection on their teaching. For example, when discussing how some of the groups of students were not working well during the lesson, Kylie said, "I'm not saying the groups were poorly set; I'm just saying I could see how that personality would clash…" When Alice shared that she felt like time management was an issue in their lesson, Kylie supported her by saying "You didn't seem like it though, you really did a good job. I kept thinking man; she is really holding it together. I rush around. I'm like asking myself, what's the time?"

After the second iteration of the lesson, the preservice teachers again felt it was necessary to comment on their peers' performance in the classroom. When Annalise taught the lesson, Alice commented on Annalise's classroom community after she observed the lesson. "You can tell that you have a solid classroom community because they work really well together." These

positive comments showed up continuously in our planning, debriefing, and interview sessions. It was as if the group felt that they had to be especially supportive of each other.

Individual Preservice Teachers

Throughout the lesson study cycle, I had the opportunity to consider the four participants as individuals. Each had different perceptions about student learning and thought differently about student learning as well as specific opinions about the lesson study process. Each of the preservice teachers will be discussed in terms of their work in the lesson study cycle and their thinking about students learning. Each of the previously identified themes was applied to each of the individual participants throughout the lesson study cycle.

Alice. Her ability to verbalize her thinking through the process and to discuss her students' learning was really quite sophisticated. Alice described her work with LS and how it influenced her observations of her cooperating teacher.

> I've been able to observe a lot more. And I'm really watching the students a lot more now which is cool because I've been focusing on her the whole time, but now watching the students, it feels like that's really changed my approach. It's hard to watch the students while you're teaching but we can be more purposeful now because we've learned to do that.

Alice continued to describe how LS had changed her classroom practices. "I've now added an observation component to my lesson. What do I want to observe students doing? What will that look like?" Alice had a natural ability to take the work of the team and apply it beyond this specific LS activity.

Alice also described the process to her cooperating teacher who was very interested in the work the preservice teachers were doing:

> So I think, even talking to my cooperating teacher, she was kind of fascinated by it cause she even was asking questions of like, "How did they say, how did your team members say you did teaching it?" I was like, that's not actually, they were not focused on how I was teaching it; they were really watching the students. And she was like "Oh ,well, how did they the kids do?" I think that even our thinking as a culture; it just showed me that this is something that's a foreign idea, like it's not the common idea and culture of education. Which now, being thrown into the world of teaching, I am grateful that I am equipped in that and it gave me that experience.

Annalise. Throughout this process, two of the preservice teachers had a tendency to hold back. They were not as quick to offer their input to the team. Annalise was one of those students. Not only was she reticent to make comments in the group discussions she also selected to follow her peers in teaching the "research lesson" during our cycles. She reflected on her work with LS the previous semester. She stated:

> I think that if I had been the first person to do the lesson, it may not have been as successful as it went. Because I did it the second time, so if I didn't have the grid paper, I could really, really see some of my students may have struggled with it more. I liked that we were able to revise our first draft and think through the details to be able to modify the lesson to fit the needs of my students.

Annalise appreciated that she had the opportunity to observe students and think about what could have been improved with the lesson before she taught it the second time with her own students. When asked to think about how LS had improved her teaching she offered the following, "I think I'm like more, I don't know, more open to asking people in the room questions now, because I know they have really great feedback and we are all going through the

same thing." In addition to feeling like she had more to contribute after completing this process she said, "I think it influenced me in that way and for being ready to expect the unexpected." Annalise was referring to thinking about her students' learning and how they may respond during lessons. She often talked a lot about specific trouble spots she felt that students could encounter.

At the end of the LS cycle, I asked Annalise to think about how lesson study had influenced her students' learning. She offered the following:

> So it kind of made me think like, how to really get students to focus on what we need them to start thinking about, and how to use language to direct and starting to think about the goals we want them to reach.

Annalise's comments reflected what preservice and inservice teachers need to consider when planning and implementing lesson in their classroom. While Annalise was hesitant to offer some of her ideas and may not have felt as confident in her teaching the process aided here in refining her ability to think about students' learning in the LS process and her own classroom.

Sheila. When I initially met with Sheila she was extremely excited about the opportunity to participant in a LS cycle and she was eager to talk about her previous experiences. At the end of the LS cycle, she was still just as excited about their work. She said, "This spring was a lot different than the fall in a good way. It was just very positive. It was fun and I really enjoyed working with the group of girls that I was working with".

When I asked Sheila to reflect on her work with lesson study and how it has affected her practice, she responded:

> I've done way more prompting questions because I've realized just how much I like student-lead lessons, and to just think about every single type of question that I should ask before teaching the lesson, and also realizing the lesson may not go exactly the way

> that I have it planned out. So, to realize that when I'm teaching it, I might have to be a little flexible and think about all the possibilities that could happen.

Sheila offered insight into how she is thinking about student learning and how she could get students to engage and respond through open-ended questions. Sheila's reflection on this facet of her thinking about students' learning also demonstrated that she realized that the students should be doing the "heavy lifting" in the classroom.

Kylie. At beginning of the lesson study cycle, Kylie reflected on her first impressions of the LS process and what she was anticipating what it would be like:

> At first I am not going to lie, I thought well, this is just another time that we are all going to have to get together. But when we did and when we put in the time, we all looked back and I think we all benefitted from it because we had learned things from each other that we had not known.

Her hesitations at the start were understandable because some group opportunities at the college level can go awry. Her previous experiences with managing group learning opportunities with field placements and coursework were a bit overwhelming. However, after participating in a complete cycle, Kylie offered the following reflection on her time with LS:

> I feel like I'm just naturally a little more reflective now. Before I would just do a lesson and kind of move on, but now I really truly think about it a little bit more. Like, what did my students take away from that beyond just a formal post assessment? What did they really gain from the experience? I feel like I'm more reflective in nature.

Kylie described how this process influenced her opportunities to reflect and that was something she was not anticipating from the process. In a later interview, she also discussed

how this process taught her to slow down and more fully consider her students' learning in the classroom. Kylie stated:

> I think before, it was really easy to get caught up in all of the objectives and just meeting every standard, kind of by the book. Just because that's the nature of being in that area, during that time of benchmarks and all of that sort of pressure. But, as far as student learning, I realize that well, (a) it's not all about that, and (b), what is something greater that we want students to get out of a lesson? Do we just want them to know what a simile and a metaphor is, or do we want them to have some real-life application? Like how can I search for these when I'm reading or use them when I'm writing? I think just like looking for a bigger idea that students can take away. I feel like that benefits their learning and makes me a better teacher as a result.

Kylie was always positive in her comments and interactions with the entire LS team. Many of the comments she shared had an encouraging undertone and her peers responded to her in similar fashion. Kylie's ability to articulate the stress they were experiencing and the feelings of having to move so quickly throughout the day from one task to another was reciprocated by everyone on the LS team.

Conclusions

The LS cycle provided a new opportunity for preservice teachers to think about planning, instruction, and reflection in the classroom and additional insight into how this process influenced their thinking about student learning. This collaborative learning opportunity with a knowledgeable other allowed them to take a step back from the rigorous pace of classroom teaching and spend additional time thinking about their students learning. The data compiled from interviews, debriefing sessions, reflective field notes, and the "research lesson" plan

provided insight to the meanings the preservice teachers were assigning to the process throughout the LS cycle.

Each of the preservice teachers described how the collaborative process influenced both the quality of the lessons and provided them an opportunity to learn from their peers as they moved through the LS process. The iterative nature of the study allowed them to deeply reflect on their students thinking and their "research lesson". As the preservice teachers continued to move through the LS cycles, they were able to provide specific examples of student learning and were more attuned to thinking about their students learning. Lastly, as they developed a sophistication in discussing and identifying their students learning they were also able to clearly define the key components of their "research lesson" and identify clear examples of how the students' responded to their goals of creativity, teamwork, and problem solving during their lesson. The preservice teachers described their work as a positive experience and this study provides evidence that there is potential for LS to further impact preservice teachers, inservice teachers, and other educators in the United States.

Chapter 5:

Conclusions

The purpose of this study was to examine the impact of lesson study on preservice teachers' thinking about students' learning. A formative and design experiment (Reinking & Bradley, 2008) was used in the beginning phases of this study and the data were analyzed as a case study. In this final chapter, I will summarize, analyze, and discuss the findings of this study and what it contributes to this field. The research question was: What was the impact of lesson study on preservice teachers' thinking about student learning?

The preservice teachers in this case study provided a distinct opportunity to examine their thinking about student learning in the context of lesson study. LS impacted the preservice teachers' thinking about student learning through collaborative learning, developing their awareness about what's important, and their ability to specifically identify and discuss evidence of student learning. These preservice teachers demonstrated growth in the sophistication of their thinking about student learning through the LS process. At the onset, their focus was based on task completion versus their students' learning. A phrase that is representative of this case study is: "You don't know, what you don't know, until you know it."

"You Don't Know, What You Don't Know, Until You Know It."

A phrase that was representative of this case study is: "You don't know, what you don't know, until you know it." This phrase illustrates alterations in the preservice teachers' thinking about student learning in the LS process. When educators' study learners of any age, it is important to consider their life experiences, connections, and views of the world (Smagorinsky, 2013). These assertions help orient learners in relation to their known experiences and life around them. As they continue to grow and learn, these basic assumptions build upon one

another and knowledge is constructed (Adams, 2006; Green & Gredler, 2002, Piaget, 1973; Vygotsky, 1962). Constructivism provides a framework for understanding the preservice teachers' thinking about student learning in the lesson study process.

From a constructivist perspective (Piaget, 1973; Vygotsky, 1962) teacher education should provide a variety of experiences that allow beginning teachers to develop basic understandings of student learning, then form more complex understandings over time (Darling-Hammond et al., 2009; Rock & Wilson, 2005; Smidt, 2009). Preservice teachers often struggle in this area due to their limited teaching experiences (White, 1999). Some understandings about teaching transfer easily from higher education classrooms to preservice teachers' work with students; however, the ability to plan for, adapt, and continually consider students' reactions and responses during their learning is more difficult (Darling-Hammond et al., 2009; Schon, 1983; Sims & Walsh, 2009). This study provided insight into how preservice teachers can move along this continuum.

When the preservice teachers in this study started their work together, this researcher misjudged the participants' readiness to transfer the LS professional development process to their own teaching and learning. This should not have been assumed as many researchers have highlighted the importance of knowing students' past experiences and common understandings of a common goal (Smagorinsky, 2013); however, it was still surprising. This specific group of preservice teachers had participated in professional development sessions on LS and had completed one initial cycle on their own during the previous semester. Even after participating in these opportunities, their initial interviews were focused on worksheets, activities, and basic classroom practices, giving little thought to the children's learning. Not only did they focus on unsophisticated assumptions about what teaching is, but they also seemed surprised when I asked

them to think or provide evidence of their students' background knowledge or prior experiences related to our lesson planning together. They conducted pre-assessments for all their lessons and all they seemed to understand was the pre-assessment data.

Furthermore, when pushed to consider developmentally appropriate milestones for children, they had difficulty thinking about learning beyond the task. Their inability to pinpoint and describe their own thinking about students' learning led me to believe that this was a skill they were still developing (ZPD); rightly so, as learning is such an intricate process (Smidt, 2009; Vygotsky, 1978).

At the beginning of the study, the preservice teachers could answer vaguely and discuss some ideas related to their thinking about students' learning, but they did not demonstrate the ability to put these into practice. These observations aligned with another study where preservice teachers were asked to reflect on their thinking about student learning (Carter, Rogers, Amador, Akerson, Pongsanon, 2016). This was not yet a concrete understanding for them but something that needed to be refined. Participation in the LS cycle moved this group of preservice teachers forward on this continuum. LS provided a unique opportunity for these preservice teachers to connect every part of the teaching process to theory and practice (Carter et al., 2016).

Ability to Determine What is Important

Being able to participate in every part of the learning cycle (from initial planning through teaching, debriefing, and adjusting the lessons) enabled the preservice teachers' to develop deeper understandings' about student learning. This aligns with the experiences of other researchers in supporting preservice teachers in the LS process (Carter et al., 2016). It also enabled preservice teachers to become aware of student learning in different ways. Their

awareness's and the ability to define student learning grew with each iteration of the lesson study cycle. Further, because their "research lesson" occurred with entirely different groups of students, they were able to compare and identify student learning across grade-levels.

One important thing to note is that because the lesson plan was repeated, the preservice teachers were able to focus on the children's learning rather than new teaching material. The preservice teachers were not adjusting what they were looking for in their students; rather, they were developing their capacity to observe and define students' learning. Typical elementary teachers are constantly adjusting expectations and lessons based on the materials, tasks, and student learning goals (White, 1999). The iterative nature of the LS process (Lewis, 2002; Lewis & Hurd, 2011) allowed the preservice teachers to better understand their students and their learning. This process provided them with supports that made it possible for them to finally "know it" regarding evidence of student learning during lessons. Many researchers have described how the ability to foster high-leverage practices can benefit preservice teachers' ability to reflect on student learning and their practices in the classroom (Ball & Cohen 1999; Grossman et al., 2009; Kagan & Tippins, 1991; Lampert et al., 2010; Levin & Richards, 2011; Stein et al., 2008; Sun & van Es, 2015).

By using the LS cycle, the preservice teachers were able to go through the process one component at a time. LS provides a practice-based professional development opportunity, which researchers have identified that United States schools lack, and these opportunities have the ability to impact teachers practice (Lewis et al.,, 2012, p.371; Darling-Hammond et al., 2009). They identified and considered their students' learning every step of the way. My work in providing constant prompting created a juxtaposition between what the preservice teachers' knew and what they needed to know, allowing them to continually construct their own

knowledge together (Lenski & Caskey, 2009; Vygotsky 1978). The preservice teachers were not only thinking about students' learning; they were predicting and testing their assumptions about students' learning. The iterative nature of the process of asking preservice teachers to consider a component of the lesson and then test it provided for quick feedback and created immediate opportunities to look at the relationship between theory and practice (Bredo, 1994; Darling-Hammond et al., 2009; Green & Gredler, 2002; Lewis et al., 2012; Perkins, 1999).

Learning Together

One of the most important components of the lesson study cycle is the opportunity for preservice teachers to work as a collaborative group (Darling Hammond & Ball, 1998; Lewis, 2002; Lenski & Caskey, 2009; Lewis & Hurd, 2011). If we revisit the earlier discussion of constructivism, it is apparent that collaboration enables preservice teachers to participate in the co-construction of knowledge (Bredo,1994; Perkins, 1999; Piaget, 1973; Vygotsky, 1978). This co-construction played an integral role in moving preservice teachers along the continuum of complexity of thinking about student learning (Vygotsky, 1978). Participating in this small group influenced the participants in multiple ways. The preservice teachers had a community of peers who were in similar places in relation to mastering the practice of teaching (Lewis, 2002). They shared their excitement about being able to go through this process together, as a collaborative group. Throughout the study, the preservice teachers only viewed this work as positive. During every activity in the LS cycle, the team was excited to work together and whenever they were presented with an opportunity to comment on a peers' work, it was always highlighted in an encouraging and affirming manner. The preservice teachers were even surprised by how much they enjoyed this process and repeatedly commented on it during the debriefing and final interviews.

In student teaching, beginning teachers initially spend a great deal of time observing the cooperating teacher and thinking about their own actions as teacher (Kagan & Tippins, 1991; Sun & van Es, 2015). At this stage in learning to teach, the focus of an observation is usually on how the teacher teaches the lesson and how the children respond to it—with much attention to behavior management (Darling-Hammond & Richardson, 2009; White, 1999). In LS with these preservice teachers, there were opportunities to design lessons collaboratively such that the responsibility for the successes and failures within the lessons were not wholly "their fault." Rather, they were the responsibility of everyone as a group. This lessened the burden for whomever was teaching the "research lesson" while the peers observed; it was their failures and successes. While this was happening for the one who was teaching, the peers had a chance to closely observe the effect of the teaching upon the children. The peers each observed separate groups for the "research lesson" and for the first time, they looked directly at how children responded to every component of the lesson. I had prepared the participants to examine student learning throughout the lesson, and with this frontloaded expectation, the participants were able to see and hear learning occurring in ways in which it had never before been apparent to them.

The observers did not have to decide what to do next in each moment of the lesson because they were not teaching. Once they understood what was important in their collaborative and individual thinking about students' learning, they were given the specific task of identifying evidence of their students' learning. After they were able to distinguish student learning on their own, they were able to compare their noticings to their peers and consider them from different perspectives. These repeated situations allowed them to foster these skills and provided opportunities for richer descriptions and more astute observations each time (Dudley, 2013; Lenski & Caskey, 2009; Lewis, 2002; Rock & Wilson, 2005)

Building upon these interactions with peers provided a chance to co-construct knowledge around theory, practice, and thinking about student learning (Adams, 2006; Lenski & Caskey, 2009). They were involved in a constant state of disequilibrium, which continued to push them across the continuum of developing their ability to identify, reflect upon, and foster student learning. The iterative nature of this study also provided sustained conversation around this work; this aligns with much of the established research around the collaborative aspect of LS (Dudley, 2013; Lenski & Caskey, 2009; Lewis, 2002; Lewis et al., 2004; Lewis & Hurd, 2011; Sims & Walsh, 2009; Yoshida, 1999; Zillioz & Fernandez, 2004).

Assertions of the case

This research project provided an in-depth opportunity to consider a unique, collaborative learning situation with preservice teachers in the context of LS. All learning is an extremely specific and co-constructed process for both the teachers and the students (Smagorinsky, 2013). Therefore, this is an essential understanding for preservice teachers to internalize in order to become successful educators (Darling-Hammond & Bransford, 2005; Darling-Hammond & Richardson, 2009). This case provides insight into the understandings of and the need for developing preservice teachers' abilities to think differently and with greater complexity about student learning. Through the collaborative process of LS, these preservice teachers developed a sense of sophistication in both identifying the student learning and using these observations to inform their practice. These developing skills provided further insight into how teacher preparation programs can foster preservice teachers' abilities to connect theory and practice.

Methodological Critique

More participants. As with most studies, it would have been beneficial to have more LS teams completing the cycle simultaneously. With multiple groups of preservice teachers,

there would have been additional opportunities for triangulation of data to support these findings. On the other hand, it would have been difficult to serve as a knowledgeable other across multiple groups at the same time due to time constraints.

More lesson study cycles. Similarly, completing additional iterations of the "research lesson" would have provided further insight into how to "explicate the mechanism" (Lewis, Perry & Murata, 2006) to develop a deeper understanding of the most significant parts of the LS process (planning, teaching, debriefing, and adjusting the lesson) with preservice teachers. The beginning of the study required additional background and training to develop the preservice teachers' knowledge of the LS process, which took additional meeting time; thus, not every preservice teacher was able to teach the "research lesson." Having each preservice teacher go through the process of teaching the lesson could have provided additional learning opportunities and could have deepened their understanding of thinking about students' learning (Lewis, 2002).

Flexible and iterative. One of the greatest strengths of both the FADE and case study methodologies is that they are flexible. In this study, it was imperative that the preservice teachers be able to adjust the LS cycle timeline and "research lesson" to meet their students' learning needs. Knowledge is constructed, and builds upon itself; thus, this study was designed to support this understanding in a LS cycle context. It was imperative that the work align with real teaching and learning in public school classrooms as closely as possible.

The methodology allowed me as the researcher to adjust my prompting questions throughout the study (Brooks & Brooks, 1999; Gash 2015; Piaget, 1973). Further, the flexibility and iterative nature of the methodology provided opportunities for me to scaffold the preservice teachers' in actively thinking about student learning. After each session, I was able to reflect on the strengths and weaknesses of the collaborative discussion and adjust the plan for the next

meeting and, likewise, the next iteration of the "research lesson." The freedom to develop the lesson (as the preservice teachers' deemed appropriate) allowed them to co-construct their knowledge about students' learning together.

Knowledgeable other. For the purpose of this study, I served as the LS knowledgeable other. There were positive and negative factors associated with taking on the combined roles of a researcher and LS knowledgeable other. One positive is that by serving in both roles and having the opportunity to be present during every single part of the process, I was able to develop a deeper understanding of this case, thus providing a context for understanding all conversations as well as every revision the preservice teachers made (Lewis, Perry, Hurd, & O'Connell, 2006; Lewis & Tsuchida, 1998; Takahashi 2011; Yoshida, 1999). This was enhanced because I also provided the initial training for the whole group of preservice teachers and I had completed a pilot study on LS with them during their fall semester.

One negative factor of serving in the role of both researcher and knowledgeable other is the challenge of being vigilant at acknowledging my own biases and staying neutral about the work in question. Each time I completed participatory field notes, I reoriented myself in relation to the work. This ongoing reflection allowed me to critically analyze where the preservice teachers were in this process and the role I played in moving them through the LS cycle and thinking about their students' learning.

Lesson study cycle. When reflecting on the methodology, there were several adjustments that could have been helpful. Some areas that could be improved included: (a) initial group planning, (b) "research lessons" (lesson plans), and (c) debriefing interviews.

The initial group planning sessions were an opportunity for me to develop an understanding of what the preservice teachers knew, or thought they knew, about lesson study

(Smagorinsky, 2013). After the first session, I realized the preservice teachers did not have an accurate understanding of LS or what we would be doing throughout the process. The preservice teachers assumed that they would be using the elementary program format for their "research lesson" and that the process would be about the same as any other previous lesson plan. However, this was not the case.

While this preservice teacher education program had been requiring preservice teachers to participate in lesson study cycles for several years, the instructors had not fully explained the process or helped the preservice teachers to buy into the complexity of the process. Being told and taught to do something are two separate things, and this was one of the first issues I encountered. Likewise, the preservice teachers were completing the cycles without the support of university personnel or knowledgeable others; thus, their previous understandings of the process were inaccurate. More "frontloading" could ensure that the preservice teachers have a deep understanding of how this process is similar and different to what they have previously encountered. In addition, a video explaining the lesson study process would be a great way for preservice students to visualize the process in the early stages (Lewis, 2002).

In some cases, video recordings (Fernandez, 2010; Grohl 2009) might be beneficial when preservice teachers teach their "research lessons." There were several times, as a knowledgeable other, that I wished I could refer back to a video so that the preservice teachers could revisit or reconsider some of the information they were offering as evidence of student learning. It could also be useful for the preservice teachers to be able to view the teaching of lesson components several times in order to deepen their understandings of specific components of the lesson. As a researcher, these videos could provide "new opportunities" to compare what I considered important evidence of student learning with the perceptions of the preservice teachers.

Researchers like Grohl (2011) and Fernandez (2010) applied this modification to their work in order to save the teachers' time and provide opportunities for additional reflection on their work. This could provide additional insight into their levels of development and thinking about student learning.

After the preservice teachers completed their "research lessons," they moved directly into debriefing about their work together. Initially, I selected some possible semi-structured interview questions and prompts to help them through this process. However, once we started the debriefing sessions, the meetings took on a life of their own. The sessions lasted longer than I anticipated each time, so we had to plan multiple sessions to complete the debriefing on each "research lesson." Originally, I felt that the debriefing and adjustments of the "research lesson" could be done simultaneously, but that was not the case. The preservice teachers had so much to process after a lesson was taught that we were unable to move from debriefing into adjusting the "research lesson" in one session. It was a great opportunity for them to share their thoughts; however, it was difficult to keep them focused on one topic at a time. We needed more time to consider specific questions, prompts, and scenarios.

Lastly, as we continued to move through iterations of the "research lesson" cycles, the preservice teachers started to grow tired and their work sessions shortened. They were nearing the end of both their student teaching and their Master's program, so they were looking forward to a summer of rest. The preservice teachers were also involved in completing their final capstone project for their degree and they were interviewing for future classroom positions in public schools. It was an exciting time and their attention to detail within the process gradually weakened as their focus was pulled in multiple directions. Completing the cycles earlier in the semester could improve some of these areas of concern.

Implications

Implications for preservice teacher education. This research study has much to offer preservice teacher education programs in regards to supporting the development of preservice teachers' thinking about student learning. The lesson study cycle provided guided opportunities to scaffold preservice teachers' thinking about student learning. It would be helpful to have higher education faculty serve as knowledgeable others, guiding preservice teachers explicitly through this process, and highlighting components of their current college course curriculum. This would provide the faculty with opportunities to directly connect coursework to the field and build capacity for bridging the gap between theory and practice (Lenski & Caskey 2009; Takahashi, 2013). Another suggestion could be to allow cooperating teachers to serve as knowledgeable others and support LS teams in schools where preservice teachers are completing their field placements. A third possibility would be to invite content specialists to participate in the role of knowledgeable other to build preservice teachers' understandings of how to examine preservice teachers learning related to a specific field (Amador & Weiland, 2015; Carrier 2011; Fernandez; 2010; Marble, 2007; Parks, 2009; Sims & Walsh, 2009; Zilliox & Fernandez, 2004).

If lesson study is to become part of a teacher preparation program, there has to be a commitment. LS must be a sustained, systemic part of a schools' culture. Preservice teachers should become familiar with LS research to develop buy in and they should learn about the LS process early in the program. They should also complete multiple cycles. Ideally, preservice teachers would participate in a cycle each semester, but especially during early field placements and full time student teaching placements. Refining their skills and participating in the process repeatedly would continue building their ability to think like teachers.

In addition to providing opportunities for preservice teachers to participate in LS cycles, teacher preparation programs should also consider what LS offers preservice teachers in relation to collaboration. This study provided evidence that the ability to observe students while other preservice teachers were teaching allowed the practicing educators to gain powerful perspective and insight into students' learning. Most teacher preparation programs allow ample time for preservice teachers to visit in classrooms, but they often do not provide a structure and format for reflection that focuses on the students' learning (not the cooperating teachers teaching). Reflection and debriefing conversations should be centered on evidence of student learning (Lewis, 2002; Sims & Walsh, 2009). If teacher preparation programs rethink what they are asking preservice teachers to do while they are in a schools where they can easily enter other classrooms, some of the stigma and culture around observations in classrooms might change. Inservice teachers consider most observations to be largely evaluative and Lortie's (1975) description of observation and teaching practices are still relevant to today's public schools.

Furthermore, as someone who has spent a large amount of time with preservice teachers, it is apparent to me that they spend most of their time reflecting their performance as teachers and not what the students' did as learners. This study provided evidence of this at the onset and through the LS group opportunities, the preservice teachers were able to look outward to the other occurrences in the classroom (Dudley, 2013; Lewis, Perry, Hurd & O'Connell, 2006; Sims & Walsh, 2009; Sun & van Es, 2015) Many preservice teachers are just trying to survive and find the balance between all the decision making that occurs throughout the day (White, 1999). LS allows preservice teachers to slow the decision making process down and have peers working alongside them beginning the gradual release of responsibility of understanding how LS can support them in thinking about students' learning.

This study did not provide a full gradual release of responsibility, but it did allow the preservice teachers the opportunity to walk through this iterative process. Each iteration of the lesson was an improvement upon the last and their ability to look for evidence of student learning became more sophisticated (Lewis, Perry, Hurd & O'Connell, 2006). These qualities needed to be fostered; and traditional teacher preparation programs are largely evaluative and not focused on an instructional coaching model (Sanchez, 2018). LS could provide additional opportunities for college educators to identify issues with preservice teachers who are struggling and build their capacity in areas of weakness while still moving them through the planning, teaching, and reflecting process. When considering teachers who developing at an acceptable rate in their educational program this will continue to foster and enhance their experiences in the classroom.

Lastly, one of the most effective components of the LS cycles was that they occurred in real classrooms with the students of the preservice teachers (Lewis, 2002). There are many instances during the data collection process when the preservice teachers had to adapt their teaching or were able to pinpoint specific moments in lessons when they needed to make a change or identified how a change would be beneficial for their students. I do not believe that this type of learning or reflection on students' learning can occur in simulated learning settings (Fernandez, 2010). Preservice teachers need to participate in these cycles with real children, not in college classrooms with peers pretending to be students. Preservice teachers are unable to react and respond as children would and the preservice teachers would not be pushed in their pursuits of thinking about student learning because there are no real students involved.

Implications for schools. There has been a call for high-quality professional development amongst public school educators for decades (Darling-Hammond, 2006; Darling-

Hammond & Bransford, 2005; Darling-Hammond & McLaughlin, 1995; Darling-Hammond & Richardson, 2009; Darling-Hammond et al., 2009; Desmonte, 2015). Researchers have defined high-quality professional development and LS contains each of the components (Lewis, 2002; Lewis & Hurd, 2011; Lewis, Perry, & Murata, 2006).

LS cycles also present opportunities to engage teachers in coaching cycles. Similar to the possibilities with preservice teachers, inservice teachers could enhance their instructional practices and influence student achievement by participating in professional development cycles around lesson study. This research can be applied to both inservice and preservice teachers. It is imperative that every teacher is supplied opportunities to further their thinking about student learning through high-quality professional development opportunities like LS.

Furthermore, inservice teachers are the more knowledgeable others for all preservice educators. Every teacher preparation program pairs preservice teachers with cooperating teachers who have been deemed "highly-qualified." These cooperating teachers may not understand the role they play in developing our future educators and may not be able to speak to the planning, teaching, and debriefing process like higher educators. These cooperating teachers are the facilitators in moving the preservice teachers along the continuum of thinking about student learning in the real life context. As someone who works with inservice and preservice teachers in this capacity, there is much to be desired, partly because inservice teachers are not often as current in relation to research and best practices. Therefore, there is potential for teacher preparation programs to collaborate with local schools and jointly create LS cycles with inservice and preservice teachers participating at the same time. This would allow cooperating teachers an opportunity to scaffold preservice teachers thinking about student learning and build their own capacity to assist them as a more knowledgeable other.

Implications for future research. Collaboration and teacher professional development are not new concepts. PLCs, collaborative planning, and even LS have been around for many years (Darling-Hammond et al., 2009; Lewis, 2002; Wenger, 1998). There is continued potential to learn more about what makes group-learning opportunities successful (Darling-Hammond et al. 2009). One effective literacy intervention developed by Marie Clay, Reading Recovery ®, provides continuing contact professional development where reading specialists observe highly structured reading lessons and offer feedback to peers on their students' learning. In their professional development learning cycles, reading specialists observe lessons and discuss student learning in a collaborative setting. As this study unfolded, I began to think of the model created by Clay and wondered, how does LS compare to Reading Recovery ® continuing contact professional development? A comparison between Reading Recovery ® and LS might provide additional insight into what makes collaborative professional development sessions so successful.

As previously mentioned, another facet of the LS cycle where there are still opportunities to further investigate teachers' thinking about student learning could be from running groups of preservice and inservice teachers simultaneously. Through careful documentation of the participants, researchers could compare what both inservice and preservice teachers identify as evidence of student learning. This would also provide opportunities for both sets of teachers to discuss through their observations and thinking about student learning. Would preservice and inservice teachers notice the same things? How would their observations differ? What would be the impact on one another's thinking about student learning?

This study answers some questions about how these specific preservice teachers' thinking about student learning was impacted, but what happens next? Will this process make our

preservice teachers better at thinking about students' learning when they are inservice teachers? How can educators use the gradual release of responsibility provided in the LS process and apply it to their everyday classroom decisions and planning? Each of these questions would provide additional opportunities to further investigate and develop high-quality professional development within schools.

Lastly, many states have adopted EdTPA as a path to initial licensure for teachers in the United States and it is built around the premise of reflection on thinking about student learning in the classroom. Since it is a new path to licensure, comparing this process to LS may provide additional insights into how to adjust teacher preparation programs to facilitate and foster this process. Another question that could contribute to our teacher preparation programs would be to consider how does this process compare to EdTPA?

Concluding Remarks

The findings of the study indicate that there is a place for collaborative Lesson Study cycles within preservice teacher preparation programs. These cyclical, professional development processes provide opportunities for preservice teachers to engage in practical, real-life experiences around planning, teaching, debriefing, and adjusting lessons based on their thinking about student learning. Participation in Lesson Study cycles allows the preservice teachers a chance to construct their own knowledge around teaching and thinking about student learning while in a highly-supported context that facilitates their ability to connect theory to practice and provides a more knowledgeable other to guide them through this process.

Researchers such as Lortie (1975), Vygotsky (1978), and Darling-Hammond et al., (2009) have provided cases for how collaborative learning provides ample opportunities to professionally develop educators and improve their abilities to connect this work in the context

of their own classrooms. However, this study provides evidence that scaffolding preservice teachers' thinking about student learning with a knowledgeable other (Takahashi, 2013) can also provide additional opportunities to deepen preservice teachers' understandings of thinking about student learning in relation to classroom practice.

Preservice teachers will be participating in professional development throughout their careers (Desmonte, 2015); however, teacher preparation programs set the stage for success in classrooms. It is imperative for teacher preparation programs to consider the same high-quality professional learning expectations that are set forth by the United States Department of Education. Further, consideration of this study prompts a call for more instructional coaching and the gradual release of responsibility of connecting theory to practice for preservice teacher programs (Knight, 2009). When examining how LS impacts preservice teachers' thinking about student learning in this specific study they were provided the support of an instructional coach through my role as the knowledgeable other. By scaffolding their instruction and incorporating the gradual release of responsibility, it was evident that the researcher was able to help the students' ability to transition into deeper thinking concerning their practices, as well as their understanding about their thinking on students learning. This essential component is imperative in professional development for both inservice and preservice teachers. Moving teacher preparation programs from evaluative to more instructional coaching cycles would ensure that preservice teachers have the opportunity to take what they are learning in classroom and move into their practice (Knight, 2009).

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Appendix A

Interview Questions and Prompts

Research Question	Interview Questions and Prompts (s):	
Primary Question: What is the impact of lesson study on preservice teachers' thinking about student learning in language arts?	● Describe your experiences with lesson study. ● Describe what you have learned through lesson study. ● How has your own practice changed since completing lesson study? ● Tell me about how lesson study has influenced your students. ● Tell me about how lesson study has influenced your teaching. ● Tell me about how lesson study has impact your thinking about student learning.	Pre-Interview
	● Describe your experiences with lesson study. ● Describe what you have learned through lesson study. ● Describe the changes you made to the research lesson from the first teaching. ● Why did you make those changes? ● How has your own practice changed since completing lesson study? ● What instructional changes in have you made since completing lesson study? ● Tell me about how lesson study has influenced your students. ● Tell me about how lesson study has influenced your teaching. ● Can your work with lesson study be applied to other areas of your teaching?	Post-Interview
	● What went well during the lesson? ● What did not go well? ● What do we want to change? ● What evidence from our lesson helps guide our change? ● How do we know what was effective? ● What other important information did we observe?	Debriefing

Appendix B

Dates:	Action Taken:	Data/Materials Collected
March 17	Meet with course professors and preservice teachers to establish goals. Compile list of participants who agree to participate. Select 4-6 teachers	Receive IRB approval for data collection
March 20	Establish calendar of meeting dates.	Complete and transcribe pre-interviews with individual teachers
March 22	Pre-Interview Student 1	Complete pre-interview and begin transcription
March 24	Pre-Interview Student 2 Pre-Interview Student 4	Complete pre-interview and begin transcription
March 26	Pre-Interview Student 3	Complete pre-interview and being transcription
March 27	Collaborative planning meeting. Collect data on students, teachers, short-term goals, long-term goals. Identify area of literacy intervention for research lesson. Select resources to use for background knowledge. Select note taker	Complete reflective field notes. Collect notes from note taker. Collect "research lesson" plan
March 28	Collaborative planning meeting. Share background knowledge resources. Begin to construct lesson.	Complete reflective field notes. Collect notes from note taker. Collect "research lesson" plan
March 29	Collaborative planning meeting. Share background knowledge resources. Continue to construct lesson. Finalize lesson, Determine teaching logistics, and data collection for team members.	Complete reflective field notes. Collect notes from note taker. Collect "research lesson" plan.
March 30	Observe "research lesson". Debrief once the lesson is complete and adjust lesson as needed. Plan to finalize lesson or plan for date for reteaching.	Complete reflective field notes. Collect notes from note taker. Audio record debriefing session. Collect "research lesson" plan Collect "research lesson" notes
April 10	Collaborative planning meeting. Share thoughts on "research lesson". Adjust lesson plan.	Complete reflective field notes. Collect notes from note taker. Collect "research lesson" plan.
April 13	Collaborative planning meeting. Share thoughts on "research lesson". Adjust lesson plan.	Complete reflective field notes. Collect notes from note taker. Collect "research lesson" plan.
April 18	Observe "research lesson". Debrief once the lesson is complete and adjust lesson as needed. Plan to finalize lesson or plan for date for reteaching	Complete reflective field notes. Collect notes from note taker. Audio record and transcribe debriefing session. Collect "research lesson" plan Collect "research lesson" notes
April 20	Meet to adjust the lesson plan based on debriefing. If lesson is finalized plan for sharing information related to LS. Share at class session in April	Complete reflective field notes. Collect notes from note taker. Audio record and transcribe debriefing session. Collect "research lesson" plan Collect "research lesson" notes Complete and transcribe post-interviews.
April 28	Post-Interview Student 2 Post-Interview Student 3	Complete post-interview and begin transcription

Appendix C

Research Questions and Data Sources

Questions:	Data Source (s):	Collection:
Primary Question: How does the process of lesson study impact preservice teachers' thinking about student learning?	• Pre-interviews • Post-interviews • Participatory reflective field notes • Notes from note taker • Research lesson plan • Written reflections	• Initial meeting • Last meeting • Each meeting • Each meeting • Each iteration • Last meeting

Appendix D

Final "Research Lesson" Plan

Lesson Study

Black: First Lesson Plan

Blue: First planning meeting/revisions

Green: Second planning meeting/revisions

Purple: Third planning meeting/revisions

Orange: Fourth planning meeting/revisions

Grade	1st/Kindergarten
Subject	STEM, Literature
Objective	The students will design, build, and measure a house made out of provided materials such as toothpicks and marshmallows. The student will use problem-solving strategies and scientific reasoning to redesign their house by filling out a worksheet and verbally answering questions about their design process. Provide creative opportunities that will build student's excitement and confidence to explore new approaches in problem solving through team building.
SOL/ACEI	SOL: ● Literacy: ○ SOL 1.1 The student will continue to demonstrate growth in the use of oral language ■ Listen and respond to a variety of electronic media and age-appropriate materials (read-alouds daily) ● Mathematics

	○ SOL 1.9 The student will use non-standard units to measure **length**, weight/mass, and volume. ● Science ○ SOL 1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which (e) Length, mass, volume, and temperature are **measured** using nonstandard units. (i) **Observations and data are recorded**, analyzed, and communicated orally and with simple graphs, **pictures,** written statements, and **numbers**; ACEI Standards: ❑ STEM ❑ 2.1 Literacy ❑ 3.3 Critical Thinking and Problem Solving ❑ 3.4 Active Engagement in Learning
Materials	● Book *The Three Little Pigs* ● Blow Dryer ● Toy pigs ● Toothpicks ● Marshmallows ● Youtube video: https://www.youtube.com/watch?v=w9j3-ghRjBs
Description/ Lesson Procedure	**Intro/Hook (5 minutes) :** Read the book titled, *The Three Little Pigs* to capture students' attentions and set up the purpose behind the STEM activity. Stop reading the book at page 10 and state that we are doing a teamwork activity to decide what they would do to help the pig's house not be blown down by the big bad wolf. Explain "I want you all to share some ideas about what you think teamwork look like. What would it look like for you to work as a team? What are some examples of what teamwork DOESN'T look like? What kind of team would make you frustrated to be apart of?" Write responses on the SMARTboard. Example of statement leading into the activity: "Now it is your turn to create a house to protect the three little pigs from the big bad wolf! You will work as a team to design the safest house for the pigs. For your house you will only have toothpicks and marshmallows, and a paper plate to build upon. Use your creativity and building skills to come up with a house design that will not fall down when the wolf blows! Teamwork is VERY important when we do an engineering activity because we all have ideas and talents to share and contribute." **Activity Procedure (30 minutes):** Inform the students that they will be the engineers and will be designing houses for the

	3 little pigs to protect them from the big bad wolf that will try and blow it down. Model for students what an appropriate drawing would look like (i.e. sticks and circles for toothpicks and marshmallows). ~~Discuss as a class some ideas about how to make their house strong.~~ The students will be in groups of three for the activity. Emphasize that they need to work as a group and not individually to build the house. Send the students (in groups of three/ or with a kindergarten class, groups of two) to their desk and hand out the activity worksheet. Have them sketch their first draft of their house before building with the materials. After their have designed their house on their worksheet, hand out the materials that they can use to start building their house. After the students measure their first house using the unit blocks, they will come to the teacher's table for the first trial of the "Big Bad Wolf" hair dryer attempting to blow the house down. The students will then return to their desk to redesign their second house in the next box. After they have drawn out their redesign, they will create their house with the building materials and then test it out with the hairdryer. **Debrief/Closure (5 minutes):** At the end of the activity, gather students on the carpet and discuss: ● Raise your hand if your redesign worked better/not better ● For those of you who had a stronger house in your redesign, what made it better? ● What were some of the hard things about working as a team? ● What were some of the positive things
Assessment	● We will collect the worksheet that the students fill out during the house building activity and assess them by their ability to design and measure the height and length of their house accurately. A student will have succeeded in this objective by participating in the activity and doing their best to draw, build and measure their house. ● We will walk around and listen to the students' discussions and scientific reasoning for how they will remodel their house. I will stop to ask each group questions about their house and how they made changes during the redesign

	process. ● A student will have succeeded in this objective by fully participating in the activity and doing their best to design and redesign their house. ● We will informally assess at the conclusion of the lesson whether or not the students worked together as a team. These are ways that we could prove if the students met the teamwork objective: participation, group discussions, inclusion amongst teammates, etc, ● Universal prompting questions: ○ What made you choose/think to do this? (Creativity/Problem-solving) ○ Do you think you all are working as a team? How do you know? (teamwork) ○ How could you change your design to include everybody's ideas? (teamwork) ○ Your design is 2D on paper, but how can we make sure your structure is 3D? (Problem-solving/clarification) ○ If a team is struggling to actually work as a team: "Can you all talk about your ideas first before each doing your own part?" Hopefully this way, students will be more inclined to work together as a team rather than divide and conquer. (Teamwork) ● Team Share-outs? Gallery walk ● Allow more time for share-outs and gallery walk. Possibly do the gallery walk later in the day or the week to revisit. ● Add to the SMART Board document in reference to what teamwork actually looked like (one word-- picture)
Notes	● Teacher should take time to think through which students work best together and will help each other succeed in the objective ● **More ways to see what the kiddos are taking away-- see if your objectives are matching the student's' objectives/takeaways too (did we go over teamwork enough during the week? Etc.) ● To sum up, ask questions about what they learned about teamwork from their experiences and how they can use these experiences for the rest of the year for their class. Examples: How did your friends make you feel more confident about participation? How did they help you and guide you along? Etc.

Activity Worksheet

Build a House for the Three Little Pigs!

Name_____

1. Design your first house by drawing what it will look like in the box.

Now create your house to protect the pigs!

How many blocks long is your house?

_____

How many blocks tall is your house?

_____

2. Redesign your house to improve it by drawing it in the box.

Now create your new house to better protect you pigs!

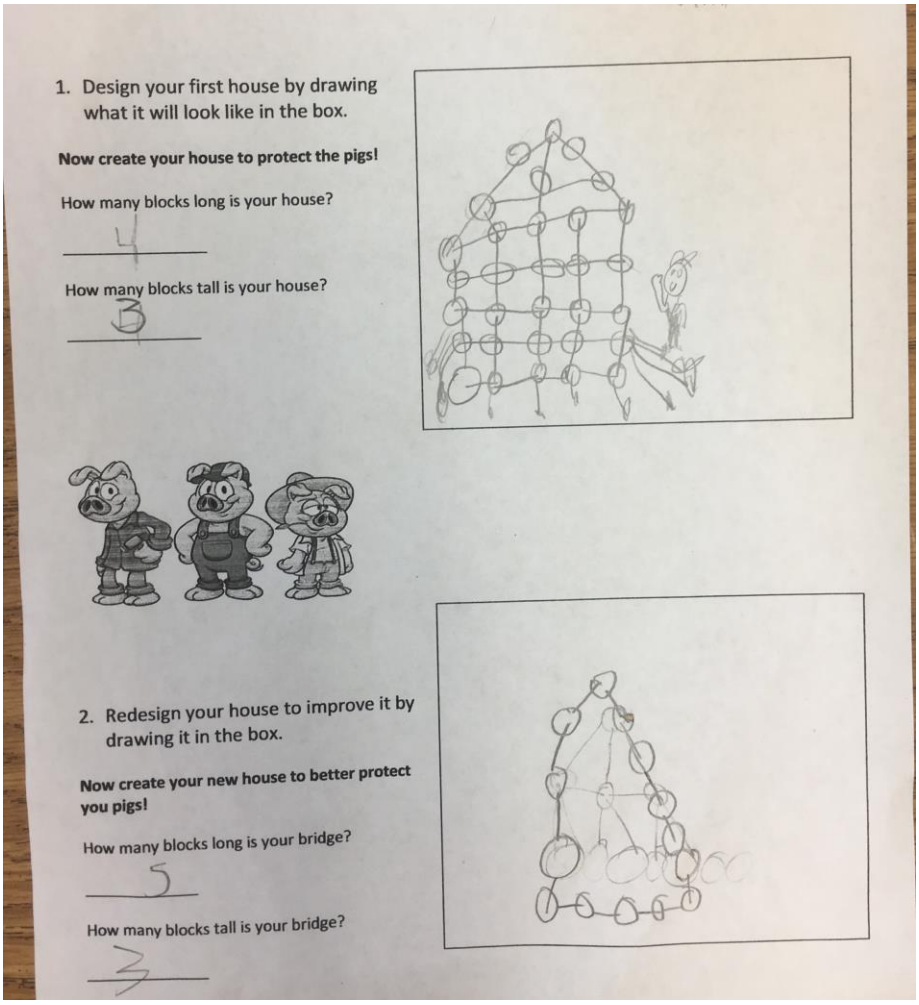
How many blocks long is your bridge?

_____

How many blocks tall is your bridge?

_____

Student Artifacts/Assessment Tools



1. Design your first house by drawing what it will look like in the box.

Now create your house to protect the pigs!

How many blocks long is your house?

4

How many blocks tall is your house?

3

2. Redesign your house to improve it by drawing it in the box.

Now create your new house to better protect you pigs!

How many blocks long is your bridge?

5

How many blocks tall is your bridge?

3