

LESSON STUDY: TEACHER SUPPORT AND IMPLEMENTATION

by

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Dedication

To my loving and supportive parents, thank you. Who would've thought I'd be able to survive seven years living in the United States? I couldn't have done it without your constant encouragement, continuous inspiration, and assistance! I hope I make you proud.

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Abstract

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Lesson Study is an emerging professional development program in the US which engages teachers in a collaborative and long-term lesson planning process. Lesson study may be effective because of the supports it offers teachers. This study aims to explore three main components: teacher social, emotional, and instructional supports received during Lesson Study, barriers to Lesson Study implementation, and in-person and video-based modalities of Lesson Study. Sixty classroom teachers, ELL teachers, special educators, math coaches, and specialists from within the Northern Virginia area were asked to participate in an online 40-question survey. Findings from this survey revealed that teachers and coaches did feel socially, emotionally and instructionally supported during Lesson Study. Participants also experienced higher levels of social, emotional, and instructional support during in-person Lesson Study, in comparison to a video-based Lesson Study iteration. Additionally, this study's results suggest that teachers from varying schools can join Lesson Study teams and still perceive similar levels of support

as those who joined a Lesson Study team with a colleague from their own school. This study's findings also suggest that time is the most frequently cited barrier to implementing Lesson Study.

Chapter One – Introduction

One common way schools and districts try to improve teacher instruction is through professional development. These programs often involve irregular and brief teacher workshops (Chung Wei, Darling-Hammond, & Adamson, 2010). Despite the vast amount of time and money invested in such professional development programs, rates of improvements in student learning are often doubtful and teacher burnout remains high (Chokshi & Fernandez, 2004). High quality teacher professional development helps create more effective teacher-child interactions, and research has found that these teacher-child interactions have the potential to improve classroom and developmental outcomes of children (Curby, Brock, & Hamre, 2013; Whitaker, Kinzie, Kraft-Sayre, Mashburn, & Pianta, 2007). Stigler and Hiebert (1999) have argued for the importance of continued investigation into professional development methods that may improve teacher instruction, which benefits children's learning and the education system as a whole (Borko, 2004). One promising professional development method worthy of additional investigation is Lesson Study.

Lesson Study is a long-term, teacher-directed professional development program. When teachers are engaged in Lesson Study, they gather in small teams (typically, in person) over the course of a semester or year to collaboratively design, deliver, and

evaluate lessons on a topic of mutually-agreed importance. For example, a group of teachers may focus on developing or refining a lesson on multiplying fractions.

Lesson Study has some evidence of success in building collaborative teaching communities and supporting positive student outcomes, such as increased knowledge of mathematics (Lewis, 2002; Lewis & Perry, 2015; Perry & Lewis, 2009). Lesson Study may provide a sustainable professional development approach that reduces stress, improves teaching, and increases student learning (Chang, 2009). Although there is some evidence of its effectiveness, the experiences of teachers participating in Lesson Study are not well understood. Lesson Study can be thought of as providing a series of supports to teachers: social, emotional, and instructional. Each may be an important mechanism by which Lesson Study affects teachers and teaching. The purpose of this thesis is to explore teachers' perceptions of Lesson Study implementation. Specifically, this study focuses on teachers' perceptions of the supports they experienced while working in a Lesson Study group, the barriers they experienced while working in the Lesson Study group, and the extent to which teachers' perceived supports differed when participating in Lesson Study in-person and then via video

Chapter Two – Literature Review

Professional development for teachers is an integral aspect of supporting teachers, schools, and education agencies (ESSA, 2015). Providing a clear and objective definition of effective professional development encourages the successful implementation of such programs nationwide. According to the Every Student Succeeds Act (ESSA, 2015), researchers, and other private organizations, successful professional development is focused on sustainable, collaborative, teacher-directed, student-focused activities based on data (Desimone, Porter, Garet, Yoon, & Birman, 2002; Labone & Long, 2016; Learning Forward, 2015; Smith, 2008).

Professional development can focus on providing different supports to teachers. Some professional development may focus on teaching teachers pedagogical approaches to teach a particular skill or concept. A different approach is to empower teachers to determine their own best pedagogical approach. Consistent with this latter approach, Lesson Study can be seen as potentially empowering teachers by providing social, emotional, and instructional supports to teachers. These supports, in turn, may improve student–teacher interactions, which positively influence student outcomes (Whitaker et al., 2007).

There may be barriers to the implementation of such professional development methods, such as; time (Smith, 2008), financial resources (Chokshi & Fernandez, 2004),

and fear of being critiqued (Coe, Carl, & Frick, 2010). The use of technology and online software, such as Edthena and Blackboard, have the potential to overcome potential barriers to professional development implementation (Wang & Hartley, 2003).

Professional development

Professional development is training provided to teachers by a school or district, usually during in-service days before or during the school year. The Every Student Succeeds Act (2015) defines professional development for teachers as activities which are long-term, collaborative, student focused, and driven by evidence. However, states can develop their own continuing education (i.e., professional development) and recertification programs required for their teachers (Blank, 2013). For example, per the Virginia Department of Education's Division of Teacher Education and Licensure (2012), an individual must complete a state-approved program in order to become a licensed educator in Virginia, and this professional license must be renewed after the teacher has gained "180 professional development points within a five-year period." These points can be accumulated through eight different activities, including, but not limited to, college credit (for example, one semester credit is equal to 30 points), attending professional conferences, publishing research, or other professional development activities.

Effective teacher professional development has been found to impact teacher knowledge, practice, and efficacy, as well as student outcomes (Ingvarson, Meiers, & Beavis, 2005). Reviews of the teacher professional development literature (Desimone et al., 2002; Labone & Long, 2016; Smith, 2008) suggest that there are six traits shared by

all high quality professional development programs for teachers. These traits are also commonly agreed upon by private organizations, such as Learning Forward (a professional association dedicated to developing and implementing sustainable, high quality professional development) (Learning Forward, 2015). Lesson Study is characterized by the six traits which lead to successful professional development programs for teachers.

First, high quality professional development must be reform oriented (Smith, 2008). Pedagogical reform introduces innovative teaching methods to classrooms and may have a significant influence on teacher knowledge and competency (Labone & Long, 2016). Examples of reform activities that encourage innovative teaching methods can be teacher study groups, collaborative networks, mentor partnerships, internships, and resource centers (Desimone et al., 2002). Reform-focused activities encourage teachers and students to interact with and experience classroom knowledge by being fully immersed in the learning environment and by proposing solutions to classroom activities/problems (Draper, 2002). Lesson Study is reform focused through the development of teacher networks in teams, and encouraging teachers to engage with their colleagues and students in the classroom (Lewis, 2004). These reform-orientated activities are in contrast to traditional, brief lecture methods of teacher professional development which have failed to significantly impact teachers' practice (McConnell, Parker, Eberhardt, Koehler, & Lundeberg, 2013).

Second, professional development must be of a relatively long duration (Smith, 2008). One-time, workshop-style trainings have been found to be ineffective, but over

90% of teachers in the United States still participate in them (Darling-Hammond, Chung Wei, Andree, & Richardson, 2009). Long-term and sustainable professional development with teacher engagement is required for successful teacher behavior change (Bayar, 2014; Holm & Kajander, 2015; Smith, 2008; Ward Parsons, Parsons, Morewood, & Ankrum, 2016). This kind of sustainable professional development for teachers has been related to improvements in student achievement and is vital to improving the quality of education in schools (Darling-Hammond, Chung Wei, Andree, & Richardson, 2009). By requiring teachers to set long-term goals with colleagues, Lesson Study helps unify teachers in a sustainable manner (Lewis, 2004).

Third, professional development must be a collaborative or a collective effort among participants. Teachers often report dealing with classroom-related problems in isolation (Coe, Carl, & Frick, 2010; Fiorilli, Albanese, Gabola, & Pepe, 2015), which has been attributed to teacher burnout (Kahn & Antonucci, 1980; Zinsser & Curby, 2014). Key features of successful professional development involve consistent and collective participation in practice-based work which help build learning communities (Birman, Desimone, Porter, & Garet, 2000; Lumpe, Czerniak, Haney, & Beltyukova, 2011; Perry & Lewis, 2009). Lesson Study engages teachers in regular team meetings that encourage the development of relationships and the exchange of ideas (Watanabe, 2002). These collaborative programs allow teachers to not only gain knowledge and skills but build supportive social networks (Fiorilli, Albanese, Gabola, & Pepe, 2015). This collaborative effort can occur through several avenues; in person or via social network sites, which

means this collaboration can occur between schools as well as within (Kelly & Antonio, 2016).

Fourth, professional development must involve active learning and have a high level of teacher engagement or teacher direction (Perry & Lewis, 2009; Smith, 2008). The effects of professional development on teachers' instruction is increased through active learning (Desimone et al., 2002). Given the unique features of any given collection of students in the classroom, teachers often have difficulty implementing new teaching practices (Perry & Lewis, 2009). One way to counter this problem is to have teachers intricately involved in their own professional development, where instead of being given an immediate solution, they set their own goals and determine the methods needed to meet them. Teachers have a desire to engage in professional development as equals with coaches and or administrators (Thomas, Bell, Spelman, & Briody, 2015). Lesson Study allows teachers to work with their colleagues to select goals and thoughtfully plan lessons to achieve said goals (Lewis, 2004). This process not only actively involves teachers in the professional development process, but it binds teachers together in a collaborative process. Examples of active learning can include reviewing student work as a group or receiving feedback from fellow teachers.

Fifth, effective professional development must have a focus on content and curriculum-based learning (Smith, 2008). Many teachers across grades and schools, feel they are unprepared to teach new content to their students (Bailey, Berrell, & Gibson, 1991). Even though higher levels of exposure to mathematics instructions has been found to predict mathematical skills (Ottmar, Decker, Cameron, Curby, & Rimm-Kaufman,

2012), teaching mathematics has been found to be related to significant levels of teacher uncertainty and doubt (Frykholm, 2004). For teachers to create constructive and supportive classrooms that encourage student learning and development, teachers need to be knowledgeable in their subject matter (Holm & Kajander, 2015). Through thoughtful lesson planning, Lesson Study requires teachers to think deeply about the curriculum and develop their understanding of its implementation in the classroom (Lewis, 2004). . Without content knowledge, teachers are unable to address student needs and engage in problem solving behaviors in the classroom. Therefore, it is essential that professional learning groups address content knowledge and classroom instruction.

Finally, effective professional development requires support for the creation of learning communities to allow for follow up, and develop some sort of coherent connection across other forms of professional development (Smith, 2008). The promotion of coherence and progression across forms of professional development enables teachers to align their goals and tasks with state-mandated standards and particular assignments. By incorporating and building upon previous teacher experiences of professional development, Lesson Study encourages communication and contributes to the establishment of these communities and increases the number of learning opportunities (Desimone et al., 2002).

Lesson Study

Lesson study is a long-term method of professional development for teachers that meets all the requirements of effective professional development programs identified above. Although relatively new to the United States, it has been used in Japan since the

1900s (Fernandez, 2002). Japanese classrooms acknowledge that student learning is strongly influenced by peer relationships and other support systems, and this notion is carried on into the teaching environment (Lewis, 2004; Myers, 2012).

Traditionally, Lesson Study has been implemented in mathematics classes. However, at least conceptually, there is no reason this procedure couldn't be applied to any subject that uses an inquiry-based learning process (Lewis, Perry, & Murata, 2006). Thus, teachers and faculty from many content areas and different levels of education are able to share ideas and critically examine lessons and methods of instruction.

To improve lesson instruction and student understanding, Lesson Study relies on groups of teachers to collaboratively plan and research. School-based Lesson Study is when participants from one individual school create a team (Lewis, 2016). This school-based team membership, also referred to as collective participation within schools, allows faculty and administrators to set school-wide research themes, and to observe and discuss results throughout the school (Fernandez & Yoshida, 2004). School-based Lesson Study joins teachers together in investigating the influence of their daily instruction on the school's long-term development (Lewis & Hurd, 2011). This collective participation may also contribute to teacher professionalism within a school by allowing colleagues to share goals, lesson plans, classroom activities, and classroom problems and solutions with one another (Birman, Desimone, Porter, & Garet, 2000). However, non-school-based Lesson Study is also possible. For example, teachers from a variety of schools may come together to create one Lesson Study team.

The broader study in which our survey was combined with primarily focused on mathematic education from grades five to nine. Grades five to nine are known to be the transition years for students in which they develop perceptions of their individual mathematic abilities (Schielack & Seeley, 2010). These transition years have the potential to impact a child's academic outcomes, attitudes, and interests toward mathematics (Schielack & Seeley, 2010), which can also influence the choices they make later on in life, including later math classes as well as occupations.

Lesson Study's four key steps

There are four key steps in which each Lesson Study group engages: (1) set Lesson Study goals, (2) plan a lesson, (3) teach/observe the lesson, and (4) debrief and reflect (Doig & Groves, 2011). Teachers generally work in teams of four to six (Hurd & Licciardo-Musso, 2005) to set specific lesson goals and plan classroom activities while predicting student thinking. Lesson Study gives teachers the opportunity to set their own goals and agendas for their professional development, and also to create positive learning communities with one another. For example, one long-term Lesson Study goal may be to improve student attitudes toward learning, while another goal could be to investigate how to improve the instruction of a specific concept, such as measurement (Takahashi & Yoshida, 2004).

Once the Lesson Study goals have been chosen by the team, the second step is to plan an individual lesson, or a short series of lessons. The planning process depends on the goal which the team has selected, but requires a substantial amount of research. Teachers investigate textbooks, review curriculum, and explore previously planned

lessons and student work, all while attempting to focus on student thinking (Lewis, Perry, Hurd, & O'Connell, 2006). For example, teachers may explore past exams to find common solutions used by students to solve measurement problems. The discoveries from these resources are used to strengthen teacher instruction and content knowledge and allow them to determine key questions to ask students, create classroom activities and anticipate student responses in relation to the Lesson Study team's goal (Doig & Groves, 2011). Their collective experiences are combined with their new observations and discoveries to create a common lesson plan that represents their best plan for teaching the content.

The lesson is then taught to a class by one 'host' teacher, while other members of the Lesson Study group observe and take notes of student reactions. Observing and recording student reactions allows teachers to gain a greater level of understanding of student thinking, and incorporate necessary changes into future lessons, if necessary (Doig & Groves, 2011). Once the lesson has been completed, student work is collected, and teachers meet once again to debrief. In this meeting, teachers discuss their observations of the students during the lesson, provide the host teacher with feedback, and address possible improvements or concerns. For example, the teachers may reflect on how a student (or students) reacted to, and solved or struggled with an exercise related to addition and subtraction, and how teacher instruction could further assist their process of understanding (Lewis et al., 2006).

Traditionally, to complete a Lesson Study 'cycle', this entire process of planning, teaching, and debriefing is repeated. Completing two iterations allows teachers to adjust

the planned lesson, receive feedback, and make improvements based on the initial observations and debriefing session. This second iteration may happen in another classroom with a different teacher.

Due to various time and financial constraints, which will be discussed later in this thesis, the full cycle of Lesson Study is often unachievable within the United States' education system. Teachers have multiple roles and responsibilities in a school environment, and time is rarely designated to professional development. Similarly, providing substitute teachers can be an expense many schools are unwilling to pay for. Thus, many Lesson Study teams do not complete the second iteration with their team. Instead, they may separate from their team and each teacher reteaches the revised lesson by themselves. However, internet-based resources such as Blackboard and Edthena, are often utilized for the second iteration of Lesson Study as a cost and time-saving measure. These internet-based resources allow teachers to video record and upload their lessons to a team website to receive feedback, comments, and ideas on their lesson.

The collaborative process throughout Lesson Study is often completed with the assistance of teacher coaches and/or field experts (Doig & Groves, 2011; Perry & Lewis, 2009). These experts/coaches act as advisors to the Lesson Study team by providing subject-specific expertise, as well as techniques for the improvement of teaching instruction (Myers, 2012). Advisors provide vital feedback to teachers and ensure teachers remain responsive to student needs in their classrooms (Fernandez, 2002; Smith, 2008). Advisors typically participate in all team meetings, and are chosen based on their

subject and pedagogy knowledge and experience, as well as their familiarity with current curricular content (Fernandez, 2002).

Five key elements of a successful Lesson Study cycle

A successful Lesson Study cycle is characterized by being: teacher-led, student-focused, research-focused, reflective, and collaborative (Hart, Alston, Murata, 2011; Murata, 2011). These elements align with the professional development guidelines established in ESSA (2015). The process of empowering teachers by focusing on their students, and their interests in a reflective learning community allows individuals and groups to explore all elements involved in their teaching, including curriculum and instruction (Watanabe, 2002). Successful implementation of Lesson Study is built upon these elements and is critical for teacher professional development, student learning, and improving the success of schools.

Teacher-led

Lesson Study is fundamentally a professional development program run by the teachers that it is for (Hurd & Licciardo-Musso, 2005). Involving teachers in the design and creation of their own professional development leads to empowerment, and allows them to decide on the goals of their particular Lesson Study cycle (Takahashi & Yoshida, 2004). These goals are generally based upon the group members involved, their classroom needs, teaching practices, and the content areas being explored in their classrooms. Teachers aim to create lessons based on their group's needs and the problems they are facing in their own classrooms, which not only helps address issues, but also

maintains teacher interest across an extended period of time. Therefore, teachers who teach similar classes often generally join together to create a Lesson Study team.

Lesson Study encourages teacher empowerment because the program is directed by the teachers themselves, and therefore helps them identify as being professionals (Smith, 2008). Empowerment can be developed through developing decision making skills (Schulz et al., 1995).

Student-focused

The definitive focus and goal of Lesson Study is student understanding and development (Lewis, 2004). One of the primary steps in building a lesson plan within a Lesson Study cycle entails the consideration of the current status of students and their development goals (Murata, 2011). Lesson Study requires teachers to direct their thinking towards students, and to view the classroom and a lesson from the point of view of the students (Hurd & Licciardo-Musso, 2005; Perry & Lewis, 2009). Lessons are designed to encourage students to expand their knowledge and gain confidence in a specific subject through the use of classroom activities and scaffolding (Murata & Takahashi, 2002). In many cases, the goals of these research lessons are often linked to institution-wide student learning goals (Cerbin & Kopp, 2006).

To investigate student learning, Lesson Study teams focus on student thinking, how they react to classroom activities, and the difficulties they faced during the lesson (Cerbin & Kopp, 2006). Observers often use rubrics and checklists to record and document student progress and engagement throughout the process. Many Lesson Study debriefing sessions revolve around these checklists and observations of the students

(rather than the teaching directly), in order to further understand their learning throughout the planned lesson.

Research-focused

Lesson Study is commonly described as a form of collaborative teacher research (Lewis, 2002). Lesson Study cycles revolve around an agreed upon goal. This goal is often referred to as a “research focus” or “research theme” (Lewis, 2004). The most beneficial environment for teachers to learn is one which allows them to verbalize and practice their newly learned knowledge (Rock & Wilson, 2005). The key components of Lesson Study align with the role of a teacher–researcher (Stenhouse, 1998).

Participating in Lesson Study allows teachers to develop evidence-and-research-based strategies for instructional practices in the classroom (Smith, 2008). Lesson Study relies on evidence to support the research process (Fernandez, Cannon, & Chokshi, 2003) and encourages teachers to critically explore and analyze their teaching practice (Lanski & Caskey, 2009).

Reflective

Teaching can leave teachers with very few opportunities to reflect. An important component of Lesson Study is reflective practice and feedback (Fullan, 2001). Self-reflection allows teachers to monitor their own levels of stress, as well as their teaching methods (Chang, 2009). The debriefing sessions and student documentation encourage individual and collective reflection through monitoring and research, and allows a greater awareness of their teaching methods and student understanding. Reflective practice encourages teachers to further understand how student questions emerge, and which

strategies should be used to solve them (Dannels, 2015). Without reflective practice, teachers are less likely to understand their teaching practices and adapt in different classroom settings. This reflective process within Lesson Study can support teachers to identify areas in their teaching that may need to be improved.

Lesson Study aims to engage and develop reflective teaching practices in the same context in which it is applied (the classroom). This process is known as situated learning (Suh & Fulginiti, 2012), which has been a model of teacher instruction since the 1980s (Herrington & Oliver, 1995). Situated learning has the potential to influence teacher attitudes towards their practice (Kopcha, 2012), and benefits those who are participating by allowing teachers to combine the knowledge that they are learning and implement it in authentic scenarios. Similar to student-learning, teachers “learn best through active involvement and by thinking about and articulating what they have learned” (Lieberman, 1995, p. 68), and this framework is supported during Lesson Study.

Not only does the Lesson Study procedure encourage teacher development, but the heavy documentation of teacher observations and student reactions and work involved also provides evidence into the depth of comprehension from students. In comparison to basic examinations, evidence from Lesson Study such as classroom observations and recordings of student reactions can help to investigate the dynamic nature of student understanding (Chokshi & Fernandez, 2004).

Collaborative

Developing collaborative and professional learning communities is a key element involved in Lesson Study teams. Professional learning communities have been defined as

a group of people working toward a common goal while critically exploring shared goals in a collaborative, long-term, and reflective process (Mitchell & Sackney, 2000).

Collaboratively planning, teaching, observing, and debriefing lessons encourages teachers to reflect individually, as well as collectively (Suh & Parker 2010).

As discussed by Lieberman (2000), and seen within Lesson Study groups, learning communities tend to incorporate new teachers and not only address long-term goals, but also the everyday burdens of teaching. Learning communities are key outcomes from the implementation of Lesson Study and provide teachers with positive interactions, as well as intellectual and emotional support (Chang, 2009). Within Lesson Study groups, teachers support one another through shared long-term goals, cooperation, productive criticism and the belief that collaborative effort can improve the teaching profession (Doig & Groves, 2011). Collaborative effort in a long-term, sustainable learning community has been noted in previous research as an important feature of professional development for teachers (Labone & Long, 2016) and encourages the exchange of ideas, fears, and teacher concerns (if present).

Teachers have reported that the most important factor in their professional development was the emotional and instructional support from colleagues (Singh & Billingsley, 1998). Coburn, Russell, Kaufman, and Stein (2012) also found that through professional interactions, teachers are able to “learn from one another, deepen their practice and coordinate action” (p. 138). Elements present in Lesson Study can promote professional relationships amongst colleagues, which research suggests may reduce teacher isolation and attrition (Heider, 2005).

Learning communities require teachers to engage in substantive teacher-related discourse within a group (Putnam & Borko, 2000). These learning communities and Lesson Study groups can be formed within schools, but also across schools. As previously mentioned, Lesson Study is a method of professional development which can involve teachers from many different grades and levels of experience. Technological advancements assist this process of building communities across and within schools, as teachers can now access multiple platforms to communicate and share, such as email, Skype, Blackboard, and Google Drive.

Building learning communities and encouraging a systematic approach toward teacher collaboration is required in order to successfully improve the instruction of individual teachers (Coe, Carl, & Frick, 2010; Smith, 2008). Communities of inquiry, also known as learning communities, encourage teachers to recognize different instructional components of their teaching which may have previously gone unnoticed (Levine, 2010). Collaborative teacher professional development supports teachers to develop practical curriculum knowledge and instruction, while the development of a social community helps encourage teacher reflect upon their own practices.

Supports

Support to teachers engaging in professional development can occur in multiple forms and can improve the quality of teaching within a classroom. Three different kinds of supports teachers may be particularly salient during Lesson Study: social, emotional, and instructional.

Social support

Professional development requiring teachers to work together helps promote improvements in student achievement and classroom management (Holm & Kajander, 2015). Teaching is a profession involving large amounts of social interaction with peers, students, administrators, and parents (Roeser, Skinner, Beers, & Jennings, 2012; Curby, Rimm-Kaufman, Abry, 2013; Fiorilli, Albanese, Gabola, & Pepe, 2016). Teacher social relationships have been found to play an important role in enabling teachers to better implement education reforms and increase their curriculum knowledge through social support and feedback (McLaughlin & Mitra, 2001). Previous research about collective participation within schools suggests that teachers benefit from being able to rely on one another in the workplace (Desimone et al., 2002). Through social networks, teachers are also better able to adapt to new student needs and changing education policies (Coburn, Russell, Kaufman, & Stein, 2012).

The goal of Lesson Study is to not only increase the understanding of student learning, but is also to break down isolation between teachers and build active networks for communication. These teacher networks allow for constructive feedback and to promote the exchange of ideas, while also improving teacher morale. Receiving the support of those within the same profession is critical for the development teachers (Kelly & Antonio, 2016). Without social support, teachers are often isolated (McLaughlin & Mitra, 2001), which has been linked to higher rates of teacher dissatisfaction, burnout, and attrition (Kahn & Antonucci, 1980; Zinsler & Curby, 2014). To explore the strength of ties amongst groups of teachers, Coburn, Russell, Kaufman, and Stein (2012) explored the frequency at which teachers interacted with one another. Coburn, Russell, Kaufman,

and Stein (2012) defined teachers as having strong ties with one another if they spoke to colleagues in regards to pedagogy, instructional practices, student thinking, or mathematical concepts greater than twice a month. Groups which are most conducive to the professional development of teachers create deep ties through regular interactions with one another and share high levels of knowledge. These social groups within the workplace support greater curriculum understanding, flexibility, and implementation in classrooms (Coburn, Russell, Kaufman, & Stein, 2012).

Emotional support

Teaching can be a stressful profession (Chang, 2009) and stress and low job satisfaction are very common contributors to teacher attrition and burnout (Zinsler & Curby, 2014). Occupational-stress-related attrition rates up to 46% for those in their first 5 years on the job (Roeser et al., 2012). Teachers are, however, more inclined to stay in the profession if they feel supported, empowered, and that they have influence over their workplace (Weiss, 1999).

Teachers feel intense, sometimes negative, emotions inside and outside of the classroom (Kelchtermans, 2005) and they play an important role in the personal and professional development of teachers (Brown, Horner, Kerr, & Scanlon, 2014; Day & Leitch, 2000). If left unmanaged, negative emotions have been associated with teacher burnout, absenteeism and attrition, as well as decreased well-being (Roeser et al., 2012). Stress has a negative relationship with an individual's self-esteem, perceptions of self-value, and effectiveness at work (Kyriacou & Sutcliffe, 1979; Roeser et al., 2012). Being able to share emotions and experiences with colleagues allows for the burden to be

shared. Colleagues can provide emotional support to their peers during lesson study through listening, esteem, affect, trust, and concern (Kelly & Antonio, 2016). Teachers can successfully cope with work-related stress by engaging with colleagues and sharing ideas and activities (Zembylas, 2003).

Teacher beliefs and feelings have a significant influence on how they act in the classroom, which in turn, contributes to student attitudes and outcomes (Chang, 2009; Zembylas, 2003). To fully understand teaching as an emotional practice, one must consider emotional labor theory. Emotional labor is the idea that some professions require workers to use acting and other strategies to display workplace-appropriate emotions (Brown, Horner, Kerr, & Scanlon, 2014). For example, call center employees are expected to remain calm even in the face of belligerent and angry customers. With respect to teaching, a teacher is also expected to emotionally labor. A teacher, particularly an elementary school teacher, is expected to suppress his or her negative emotions while working with students. Providing teachers with emotional resources can be achieved by implementing supportive frameworks which enable them to deal with workplace-related stress (DiPardo & Potter, 2003).

Instructional support

Due to teachers being the facilitators for student understanding, it is important for teachers to continuously enhance both their curricular and pedagogical knowledge (Meyer & Wilkerson, 2001). Instructional support from colleagues and coaches helps teachers to challenge their teaching assumptions, and eliminate ineffective teaching practices (Thomas et al., 2015). A key component of instructional improvement is the

study of classroom data (e.g., student work) to adjust teacher strategies accordingly (Gibbons, Lewis, & Nguyen Batista, 2016).

Discussion with fellow teachers, and a commitment to implementing new instructional strategies has been found to lead to instructional improvements (Gibbons et al., 2016). Instructional support can be provided through the establishment of and collaboration on a variety of teaching strategies (Erickson, Brandes, Mitchell, & Mitchell, 2005). Unique questions and thoughtful discussions have also been found to support an increase in teacher content knowledge (Meyer & Wilkerson, 2011). Instructional support is provided through meaningful conversation amongst colleagues about student achievement and classroom learning targets (Thomas et al., 2015). An additional method of supporting instructional improvement is to explore research in regards to student thinking and teacher pedagogy (Gibbons et al., 2016).

Creating an open and communicative environment in which teachers feel comfortable to discuss different teaching styles and strategies supports instructional improvement (Goddard, Neumerski, Goddard, Salloum, & Berebitsky, 2010). Lesson Study often involves teachers discussing multiple ways to teach a given topic or lesson, particularly for students who have different misunderstandings or prior knowledge. This not only helps to address any teacher misunderstandings and lack of efficacy, but it helps offer instruction that is tailored to the students' needs. This differentiated instruction creates organized and adaptive activities that help students develop the skills and knowledge necessary to meet grade-level standards (Hurd & Licciardo-Musso, 2005).

Video-based professional development

Video tools (for example, video discussion and video self-reflection) have been found to provide significant opportunities for teacher development (Cullen, 1991), and align with key components of high quality teacher professional development such as, collaboration and situated learning (Arya, Christ, & Chiu, 2016). Successful teacher training involving video coaching and video annotation tools assists teachers to observe, learn, and critically reflect on their instruction and strategies they use in the classroom (Lynch, Moyer, Frye, & Suh, 2002; Masats & Dooly, 2011; van Es, Tunney, Goldsmith & Seago, 2014). Videos can also capture the complex and diverse nature of teaching and learning (Gilmore, Adolph, Millman & Gordon, 2016). Through video, teachers are able to view their own teaching, their colleagues' videos, and other published videos relating to their classroom instruction (Zhang, Lundeberg, Koehler, & Eberhardt, 2010).

Videoing and analyses have been previously used in research projects, such as the Methods of Effective Teaching (MET) project. The MET project involved videoing more than 20,000 lessons across six school districts in the United States (Gilmore et al., 2016). This research explored many possible uses of video recordings to support education advancements, and provided valuable resources for teachers to determine what teaching methods work in the classroom (Bill & Melinda Gates Foundation, 2016).

Edthena is an online tool that can be commonly used within learning communities to support professional development through video recording and conferencing (Edthena, 2016). This reflection-supporting video software allows experts, coaches, and other teachers to provide feedback to teachers by 'tagging' specific points within videoed lessons and leaving comments related to their instruction (Cassidy, Ortlieb, & Grote-

Garcia, 2016). Video annotation tools such as Edthena have been found to advance teacher observation, evaluation, and in some cases, recertification (Gilmore et al., 2016; Rich & Hannafin, 2009).

Similarly, MyTeachingPartner (MTP) is a combination of professional development programs aimed to improve teacher-student interactions using online tools (MyTeachingPartner, 2016). One aspect of the program requires teachers to record their classroom instruction and send these recordings to a coach (or team) for feedback.

Similar to Edthena, videos are annotated and key moments are identified. The use of such tools has been found to improve teacher instruction and curriculum knowledge, as well as teacher-student interactions (Hamre et al., 2010; Kinzie et al., 2014).

Video-assisted professional development for teachers has been found to focus teachers' efforts toward understanding student thoughts (van Es et al., 2014), which is a key component required for successful Lesson Study. With the rapid growth in teacher responsibilities, and the increased strain on available resources, video-based development offers an alternative to time consuming, in-person meetings.

However, little research currently exists on the benefits for a teacher to both review their own teaching video and discuss it with colleagues. Teachers do not simply gain awareness or new knowledge about teaching by watching a video (Brophy, 2004). Discussions through online platforms and videos with little guidance from experts is often not meaningful to instruction improvement (Calandra, Gurvitch, & Lund, 2008). A lack of familiarity with technology and difficulty analyzing videoed lessons may be additional barriers to video-based professional development (Zhang, Lundeberg, Koehler,

Eberhardt, 2011). Further research is needed into the how these tools should be used in relation to the implementation of Lesson Study.

Barriers to Lesson Study implementation

Teachers and school administrators often experience barriers to the implementation of professional development programs. Lesson Study programs are no exception. First, implementing a Lesson Study program takes financial resources. These financial resources are needed to fully implement Lesson Study. Teachers need to be able to observe in other classrooms (at least during the initial demonstration phase), but this then requires financial resources to cover substitute teachers (Chokshi & Fernandez, 2004; Groves, Doig, Vale, & Widjaja, 2016). Not only do substitute teachers need to be hired, but coaches and/or experts are often included in a Lesson Study cycle. Furthermore, teachers may have to stay after school to meet as a Lesson Study group, but this may very well be uncompensated, which then makes meeting less feasible.

Second, teachers may lack the time to participate in collaborative exercises with colleagues. Having an allocated time to plan lessons is required to allow teachers to collaborate in teams (Groves et al., 2016). Time was found by Smith (2008) to be the most frequently cited barrier to teacher participation in Lesson Study. To meet during the day, teachers need to be provided with a common time to meet, which may interfere with teaching schedules. This may push Lesson Study groups to meet at times when they are not being compensated – but this necessity makes their participation a lower-priority and voluntary – or at times when teachers may feel rushed or distracted. In order to be

implemented well, Lesson Study needs a mutually agreed upon time that is compensated, and this can be difficult to reconcile within groups of teachers from a variety of schools.

Third, in many cases, a lack of administrative support can prevent or hinder teachers' ability to participate (Chokshi & Fernandez, 2003). Teacher education and improvement needs to be made a priority by school administrators to support continuous teacher development (Ward Parsons et al., 2016). Principals play an important leadership role in motivating teachers, establishing school cultures, and supporting professional learning communities (Kincaid, 2013). Not only do administrators determine scheduling and funding, but their enthusiasm and beliefs about improving instruction can have effects on what teachers view as a priority.

Lastly, teachers may feel hesitant about receiving critiques from peers within the Lesson Study process (Coe, Carl, & Frick, 2010). Overcoming nerves or fear of opening their classroom to colleagues is vital for teachers to fully participate in successful Lesson Study teams (Stewart & Brendefur, 2005). In many cases, these barriers impact the implementation of all methods of teacher professional development; however, greater research should be completed in order to educate those in the education system and assist the breakdown of these barriers.

Chapter Three - Methodology

The purpose of this study is to explore teacher support in relation to Lesson Study as a method of teacher professional development and its implementation in various schools in Northern Virginia. This study aims to explore three main components: teacher support during Lesson Study, barriers to Lesson Study implementation, and modalities of Lesson Study.

Research aims and hypotheses

Aim 1: Understand levels of perceived support in Lesson Study

1. Overall, how supported do teachers who participate in Lesson Study feel in terms of social, emotional, and instructional support, and do those levels relate to one another?

Hypothesis: Teachers will feel supported during the Lesson Study program on all scales. Teachers will generally show that feeling supported in one area will be associated with feeling supported in other areas.

2. How do levels of support differ based on whether or not teachers have colleagues from their school within their Lesson Study team?

Hypothesis: Lesson Study groups with teachers from one school will have higher levels of supports than groups made up from multiple schools.

Aim 2: Understand barriers to implementing Lesson Study

1. What did teachers perceive as the barriers (e.g., administrative, technological, time) to fully implementing Lesson Study?

Hypothesis: Teachers will perceive time as the biggest barrier to fully implementing Lesson Study.

2. What do teachers perceive as hindering them from participating in further Lesson Study cycles?

Hypothesis: Time will be the primary factor hindering teachers from participating in further Lesson Study cycles.

Aim 3: Determine whether or not levels of support differ based on Lesson Study modality

1. Did levels of perceived support differ between virtual and in-person modalities of Lesson Study?

Hypothesis: The levels of teacher perceived support will be higher when Lesson Study was implemented in person.

Broader study

Throughout the 2014-17 school years, 405 fifth through ninth grade teachers from nine school divisions across Northern Virginia participated in a grant-funded Lesson Study program. The research program was aimed to have lasting impacts on teacher professional development and curriculum implementation. Participants of this broader study volunteered for the program which may pose a self-selection bias. Teachers were recruited to the study via a flyer sent to district leaders, which was passed on to teachers. This flyer contained a website link, allowing teachers to sign up for the Lesson Study

program if they choose to. Over the three-year period between 2014 and 2017, a total of 90 coaches participated in a one-week Coaching Professional Development Institute (CPDI), 45 school principals participated in a two-day Principals Leadership Professional Development Institute (PLPDI) and 270 teachers participated in an intensive 60-hour Teacher Professional Development Institute (TPDI), with a total of 405 participants.

TPDI is based on a best practices model which has been developed at George Mason University and implemented over the last five years. Over these five years, this model has influenced more than 750 teachers in school districts across the Northern Virginia area. This TPDI involving 60 hours of intense content and curriculum based teaching during the summer required teachers to explore mathematical concepts such as rational numbers and proportional reasoning, and encourages the development of skills in the use of classroom technology. This TPDI was followed by a semester-long Lesson Study cycle in which they planned, taught and observed math lessons as teams of five or six. The teachers and coaches generally self-selected their teams based on proximity and availability.

TPDI is designed to increase teacher instruction of mathematical concepts in relation to Grades 5-9. With the support of coaches, teachers explore and interact with multiple forms of problem solving and cognitively demanding activities and learn about assessments, all while creating a collaborative network across the districts. An emphasis was also placed on the use of technology in the classroom.

The CPDI occurred in the summer leading up to the school year in which the TPDI begins. Each year, 30 coaches worked with the Principal Investigators in order to support

math coaching practices and create a network for math coaches, math specialists and those who provide professional development for math coaches across all nine districts. These coaches learned how to build relationships with mathematics teachers, conduct classroom observations, facilitate math discussions during Lesson Study debriefing meetings, how to work with principals and other administrators, and also to reflect and improve their own coaching practices.

PLPDI is another training feature that builds on a series of workshops for Principals which has been initiated in Virginia over the last two years. Principals play an important role in influencing the school culture, as well as student outcomes. The goal of PLPDI is to encourage Principals to develop skills necessary to enhance school leadership and mathematical instruction. The training involved Principals connecting with the goals of their teachers and coaches, as well as helping them to identify resources within the school that may affect levels of student achievements.

Throughout this semester-long Lesson Study cycle, teachers met in person, but also communicated virtually, via Blackboard collaborate. This virtual platform allowed teachers to exchange documents, organize meetings, and submit reflections in relation to the lesson. Similarly, teachers used Edthena, an online video coaching tool, to analyze classrooms and teacher instruction. Edthena allows teachers to upload videos of themselves in the classroom and have other team members add feedback with timestamped comments.

Due to the nature of the study's funding and the structure of the United States education system, this research project was bound by the time and financial restraints within the city districts. As previously mentioned, traditional Japanese Lesson Study involves two

iterations of the plan-teach-debrief cycles. Current constraints within the US education system are not conducive for this. Therefore, the second plan-teach-debrief cycle was video-based. Once the team debriefed and revised their initial lesson based on teacher observations and student reactions, teachers returned to their individual classrooms to re-teach the improved lesson. This class was recorded and then uploaded to Edthena. Edthena allows teachers and/or coaches to comment on specific points in the video via tags or timestamps on the recording. This process allowed each teacher within the team to watch, reflect, and comment on one another's lessons, and to receive feedback from their team without having to take additional time out of the classroom to meet.

Participants

Within the 2016-2017 cycle of the broader study, 60 educators from this grant funded professional development program within Northern Virginia were asked to participate in the online survey probing teachers' perceptions of supports they received as part of their Lesson Study participation. A total of fifty classroom teachers, ELL teachers, special educators, math coaches and specialists working in grades five to nine responded to the survey. One participant did not complete the second, video-based iteration of Lesson Study and therefore did not respond to questions related to that iteration. Another survey participant did not respond to questions in regards to perceived emotional support during the video iteration.

The majority of the survey participants were female (92%). Eighty-six percent reported to be white, with Black or African American being the next most commonly reported race (4%). Most participants had previously obtained a Master's degree (72%).

Years of experience teaching ranged from less than one year to 31 years, with the mean years of teaching experience being 9.4 years. Most participants ($N=13$) reported teaching grades 6 to 8; ten participants taught Kindergarten to grade 5; five participants taught grades 9 to 12; one participant reported to teach grades 5 and 6; one teacher reported teaching Kindergarten through to grade 6; another participant reported being an individualized math teacher; and finally, one participant reported being a coach of mathematics teachers.

Table 1 Descriptive statistics of study sample

	N
Gender	
Female	46
Male	4
Total	50
Race	
White	43
Black or African American	2
Asian	3
Native Hawaiian or Pacific Islander	1
Other	1
Total	50
Education	
Bachelor's degree	14
Master's degree	36
Total	50
Current position	
Classroom teacher	41
Math specialist/coach	5
Special educator	1
ELL teacher	1
Other	2
Total	50

Role within Lesson Study	
Teacher participant	30
Coach	15
Host teacher	5
Total	50
Lesson Study cycles participated in	
1	24
2	16
3	5
4	5
Total	50

Measure

The 40-question survey (see Appendix for complete survey) was designed to explore teachers’ perspectives of Lesson Study and its influence on the levels of social, emotional, and instructional support that they received during the professional development method. The survey also included questions related to the perceived barriers to participating and implementing Lesson Study.

Ten items measured teachers’ perceptions of social support on an 11-point sliding scale ranging from “Not at all” (0) to “Definitely” (10) (e.g., “Did you feel comfortable asking one or more of your Lesson Study colleagues for advice?” or “Did you communicate with your Lesson Study colleagues outside of required meetings and lessons?”). Of these ten questions, four items asked about the in-person iteration of lesson study, another four questions with parallel wording asked about the video-based iteration to allow for a direct comparison of the experiences. The final two questions were in relation to the participants’ general experience.

These social support-related questions were designed to gauge the level in which teachers interacted with one another within their Lesson Study teams, and outside of these teams. The questions were based on literature by Roeser, Skinner, Beers, and Jennings (2012), in which it was discovered that social interactions play an important role in the teaching profession. As previously mentioned in this thesis, isolation is a significant issue faced by teachers (McLaughlin & Mitra, 2001) and breaking down this isolation is a key goal of Lesson Study. Based on this research, questions such as “Did you converse with teachers more frequently throughout the Lesson Study program than what you would have normally with fellow colleagues?” were included in order to explore whether or not this Lesson Study improved our participants’ perceived levels of social isolation throughout the program. Coburn, Russell, Kaufman, and Stein (2012) attested to this idea.

To explore levels of satisfaction in relation to the Lesson Study teams’ communication, survey participants were asked to respond on a five-point scale. Levels of satisfaction in regards to a team’s communication were recorded on a scale from “Extremely dissatisfied” (0) to “Extremely satisfied” (5). A question relating to whether or not a teacher joined a Lesson Study team with a colleague from their school was also asked in order to create comparison groups.

Due to the teacher burnout and stress literature (e.g., Kelchtermans, 2005; Chang, 2009; Zinsser & Curby, 2014), eight questions in this survey were created in order to gauge teacher’s perceptions of emotional support. Emotional support can be provided to teachers through discussion and engaging with colleagues about classroom issues and

sometimes instruction (Kelly & Antonio, 2016; Zembylas, 2003). Of these eight questions, four items asked specifically about emotional support during the in-person iteration of lesson study. An additional four questions with parallel wording asked about the video-based iteration. Again, this allowed for direct comparison of the modalities.

On an 11-point sliding scale from “Never” (0) to “Always” (10), teachers were asked three questions about how often they felt motivated, received encouraging comments, and used their peers as resources to deal with work-related stress in relation to the Lesson Study cycle. These questions were designed based on research completed by DiPardo and Potter (2003) that explored the emotional resources required by teachers to deal with workplace stress. Two questions were asked about how respondents felt about their teaching on a five-point Likert scale from “Definitely worse” (0) to “Definitely better” (5).

Collaboration on, and discussion of teaching strategies has been found to be beneficial to teachers’ curriculum knowledge classroom instruction (Erickson, Brandes, Mitchell, & Mitchell, 2005; Meyer & Wilkerson, 2011). Therefore, 17 survey items measured instructional support. Sixteen questions on a sliding scale from “Never” (0) to “Always” (10) asked how often teachers received assistance such as advice or suggestions from their Lesson Study colleagues. Eight of these items asked about the in-person iteration of lesson study, and another eight items with parallel wording explored instructional support during the video-based iteration. This allowed for a direct comparison of experiences between the two modalities. An additional question on a five-point scale was framed from “Extremely dissatisfied” (1) to “Extremely satisfied” (5) to

gather how satisfied participants were with the quality of work produced by their colleagues during the whole lesson study cycle.

Based on the Collegial Learning Effectiveness scale (Perry, Lewis, Friedkin, & Baker, 2009), eight questions measured the barriers and administrative support associated with the implementation of Lesson Study. Participants were asked to respond to questions such as “Is the administration at your school supportive of Lesson Study?” and “Do you intend to continue implementing Lesson Study after this program has ended?” Answers to these questions were either “yes” or “no.” Additional questions designed to learn about barriers included, “What hindered your ability to participate in this Lesson Study cycle (if any)?” Within these questions, respondents could select multiple options from a list including cost, technological barriers, time, support from administration, availability of coaches, Lesson Study is bad, and other. An open-ended follow up question was provided to those who selected ‘other’ in order to further understand their response. A similar question was asked in regards to the implementation of Lesson Study in the future.

Prior to any analyses, Cronbach’s alpha was used to measure each particular kind of support (social, emotional, and instructional) to determine the internal consistency of the scales. Social, emotional, and instructional supports were all found to be internally consistent (respectively, $\alpha = .69, .82, .95$).

Chapter Four – Analysis and Results

Aim 1: Understand levels of perceived support in Lesson Study

Overall, how supported do teachers who participate in Lesson Study feel in terms of

social, emotional and instructional support, and do those levels relate to one another?

Ten questions were used to gauge levels of perceived social support. Of these questions, eight were measured on an 11-point scale, one on a two-point scale, and one on a five-point scale. Aggregate responses were created for each scale and type of support. On the 11-point scale from “Not at all” (0) to “Definitely” (10), the mean response for questions such as “Did you feel able to approach your Lesson Study colleagues for assistance with problems in your class?” was 8.33 (*SD* 1.46), suggesting a high level of social support. Levels of satisfaction in regards to social support, via a team’s communication, were recorded on a five point Likert scale from “Extremely dissatisfied” (1) to “Extremely satisfied” (5). This revealed a mean response of 4.62 (*SD* 0.73), between extremely and somewhat satisfied, suggesting most respondents were quite satisfied with their team’s communication. Fifty-eight percent of survey participants reported conversing with colleagues more frequently throughout the Lesson Study program than normal.

Eight items were used to measure emotional support. Six questions were on an 11-point scale, and two were on a five-point scale. On an 11-point sliding scale from “Never” (0) to “Always” (10), teachers were asked how often they felt motivated,

received encouraging comments, and used their peers as resources to deal with work-related stress in relation to the Lesson Study cycle. The mean response was 7.51 (*SD* 2.00), suggesting respondents almost always felt emotionally supported by their Lesson Study colleagues. On a five-point scale of emotional support, respondents reported feeling "slightly better" (4) about their teaching with a mean of 3.93 (*SD* 0.7).

Instructional support was measured using 17 questions. Sixteen questions on an 11-point scale, and one on a five-point scale. Questions asked on a scale from "Never" (0) to "Always" (10), such as "How often did your Lesson Study colleagues give you advice?" revealed a mean response of 6.94 (*SD* 2.22) suggesting most respondents often felt that they received instructional support from their Lesson Study group. Satisfaction levels with the quality of work produced by their Lesson Study team members was measured on a five-point scale. Respondents revealed they were somewhat satisfied with the quality of work produced by their Lesson Study team members, with a mean of 4.6 (*SD* 0.83).

Aggregates for each scale within each type of support were standardized and then averaged when calculating correlations. As presented in Table 2, levels of social, emotional, and instructional supports were all found to be positively correlated with one another. Emotional support and instructional support were strongly positively correlated ($r = .86, p < .05$). Social support and emotional support were found to have a positive correlation ($r = .68, p < .01$), as did social support and instructional support ($r = .59, p < .01$).

Table 2 Correlation analysis of different supports

	Social Support	Emotional Support	Instructional Support
Social Support	1	-	-
Emotional Support	0.68*	1	-
Instructional Support	0.59*	0.86*	1

* $p < .001$, $N = 50$

How do levels of support differ based on whether or not teachers have colleagues from their school within their Lesson Study team?

We explored supports based on whether or not teachers joined a Lesson Study team with a colleague from their own school. Of the 50 participants in this survey, 21 teachers reported to have colleagues from their school within their Lesson Study team. We used standardized variables to create aggregates for each perceived level of support based on whether or not teachers were on a team with a colleague from their own schools. Creating these aggregates from standardized variables, allowed us to combine items from different scales. Based on Levene's test for equality of variances, equal variances were used. The between subjects independent samples t-tests indicated that there was no significant difference ($t(48) = -0.91$, $p = .37$, $d = 0.28$) between levels of perceived social support when teachers had colleagues from their own school in their Lesson Study team ($M = 0.08$, $SD = 0.47$) versus those who did not ($M = -0.06$, $SD = 0.54$). In addition, perceived emotional support was not different ($t(48) = -1.03$, $p = .31$, $d = 0.29$) when teachers had colleagues from their own school in their Lesson Study team ($M = 0.11$, $SD = 0.72$) versus those who did not have colleagues from their own school ($M = -0.08$, $SD = 0.59$). Finally, there was no significant difference ($t(48) = 0.02$, $p = .99$,

$d = 0.01$) between perceived levels of instructional support when a teacher joined a Lesson Study team with a colleague from their own school ($M = -0.02$, $SD = 0.81$), versus those who did not ($M = -0.01$, $SD = 0.68$).

Table 3 Descriptive statistics and t-test of school colleagues within Lesson Study teams

Note. Equal variances assumed

Do you have members in your Lesson Study team from your own school?	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Social Support				-0.91	48	.37
No	29	-0.06	0.54			
Yes	21	0.08	0.47			
Emotional Support				-1.03	48	.31
No	29	-0.08	0.59			
Yes	21	0.11	0.72			
Instructional Support				0.02	48	.99
No	29	-0.01	0.68			
Yes	21	-0.02	0.81			

Aim 2: Understand barriers to implementing Lesson Study

What did teachers perceive to be the barriers (e.g. administrative, technological barriers, time) to them fully implementing Lesson Study?

What do teachers perceive as preventing them from participating in further Lesson Study cycles?

Two chi-square tests of goodness of fit were performed to determine whether barrier to implementing Lesson Study were equally experienced. All chi-square tests were found to be significant. The barriers to implementing this specific Lesson Study program were found to not be equally distributed ($\chi^2 = 64.14$, $p < .0001$). Barriers to

implementing and participating in Lesson Study programs in the future also were not equally distributed ($\chi^2 = 79.14, p < .0001$).

As seen in Table 4, the most frequently cited barrier to hindering teachers' ability to participate in Lesson Study was time ($N = 16$). The willingness of other teachers was the second most cited barrier ($N = 6$). Administration support, and the opinion that Lesson Study is bad, or professional development is bad was selected the least frequently ($N = 0$). In terms of barriers to preventing the implementation of Lesson Study in the future (refer to Table 5), time was selected more frequently than the other choices ($N = 26$). Again, the willingness of other teachers to participate was the second most cited barrier ($N = 19$). A lack of interest in professional development or interest in Lesson Study was selected least frequently ($N = 0$).

Table 4 Barriers to participating in Lesson Study

Barrier	Observed
Time	16
Willingness of other teachers	6
Financial barriers	4
Technological barriers	2
Availability of coaches	1
Other	1
Lesson Study is bad	0
Administration Support	0
Professional development is bad	0

$\chi^2 = 64.14$ with 8 degrees of freedom. $p < 0.0001$ (2-tailed)

Table 5 Barriers preventing future Lesson Study implementation

Barrier	Observed
Time	26
Willingness of other teachers	19
Financial barriers	13
Technological barriers	6
Availability of coaches	5
Administration Support	4
Not interested in PD	1
Not interested in LS	1
Other	0

$\chi^2 = 79.14$ with 8 degrees of freedom. $p < 0.0001$ (2-tailed)

Aim 3: Determine whether or not levels of support differ based on Lesson Study modality

Did levels of perceived support differ between virtual and in-person modalities of Lesson Study?

A paired samples t-test of the identical questions with parallel phrasing was used to compare levels of perceived support during in-person iterations of Lesson Study, and video-based iterations. One respondent was dropped from this analyses because they did not participate in the second, video-based iteration of Lesson Study. An additional participant did not respond to the emotional support questions in regards to the video-based iteration.

As seen in Table 6, a paired-samples t-test indicated that perceived levels of social support during an in-person iteration of Lesson Study ($M = 8.70$, $SD = 1.32$) were significantly higher than the levels of perceived social support during the video-based iteration of Lesson Study ($M = 7.86$, $SD = 2.16$), $t(48) = 3.27$, $p = .00$, $d = 0.47$. A second paired-samples t-test suggested that perceived levels of emotional support during the in-

person iteration of Lesson Study ($M = 8.13$, $SD = 1.66$) were significantly higher than levels of emotional support perceived during the video-based iteration of Lesson Study ($M = 6.97$, $SD = 2.48$), $t(47) = 4.71$, $p = .00$, $d = 0.22$. The final paired-samples t-test also yielded a significant difference, with levels of perceived instructional support in-person ($M = 7.47$, $SD = 1.92$) found to be significantly higher than perceived instructional support on video-based ($M = 6.60$, $SD = 2.64$), $t(48) = 4.06$, $p = .00$, $d = 0.38$.

Table 6 Descriptive statistics and paired samples t-test of Lesson Study modalities

	Paired Differences				
	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Social Support			3.27	48	.00
In Person	8.70	1.32			
Video-based	7.86	2.16			
Emotional Support			4.71	47	.00
In Person	8.13	1.66			
Video-based	6.97	2.48			
Instructional Support			4.06	48	.00
In Person	7.47	1.92			
Video-based	6.60	2.64			

Chapter Five - Discussion

Lesson Study is a model of professional development which is teacher-led and may lead to improved classroom instruction (Lewis et al., 2006). Previous research suggests that teacher quality has an impact on student outcomes (Darling-Hammond, 2000). Therefore, it is pertinent that teachers feel supported while continuing to develop as better instructors. Most of the previous research completed in regards to Lesson Study in the United States has discussed its implementation and the challenges related to the implementation (Chokshi & Fernandez, 2004, 2005; Lewis, 2004; Perry & Lewis, 2009). This calls for more research into the different types and levels of support teachers may experience, and how Lesson Study can be implemented appropriately in order to improve teaching practices and student outcomes.

Teachers with all levels of experience need professional development to improve their instruction and further understand curricula (Suh & Fulginiti, 2012). Previous research has found that Lesson Study implementation is related to improving teacher knowledge and practice (Lewis, 2016), as well as increased student knowledge of mathematics (Lewis & Perry, 2015). This study offers insights into: the supports provided to teachers during a Lesson Study cycle, the potential barriers to its implementation, and the influence of its modality of implementation. The findings of this study are applicable

to teachers, administrators, and education policy makers and offers some support for further implementation of Lesson Study in the United States.

Teacher stress and low job satisfaction are very common contributors to teacher attrition and burnout (Zinsser & Curby, 2014). In order to improve teacher burnout, teachers should be provided with different kinds of supports in relation to their workplace (Weiss, 1999). Results from this research suggest that teachers do perceive some social, emotional, and instructional supports within a Lesson Study team. These results support the idea that teacher collaboration promotes the development of relationships and an exchange of teacher problems and ideas, all of which can assist with managing common workplace emotions, particularly stress (McLaughlin & Mitra, 2001).

Social, emotional, and instructional supports were also found to be highly related to one another. This suggests that Lesson Study effects on teacher perceptions of feeling supported may be generalized across different types of support. This could be because teachers truly are supported in all three aspects, or perhaps that when they are supported in one aspect, they perceive to feel more supported in general. For example, a teacher may experience instructional support by discussing a new scaffolding tool with a colleague, and this may build a social relationship, but also relieve pressure and anxiety about implementing curricula, thus providing social and emotional support, too. This combination of social and emotional support to aid instructional support is somewhat unique to the structure and requirements of Lesson Study. Further research should be completed on the different types of supports teacher may perceive during Lesson Study,

how different components of Lesson Study influence levels of support, and how these supports influence teacher feelings and behaviors.

According to the manner that these supports were defined in this study, teachers who joined a Lesson Study team with a colleague from their own school did not perceive higher levels of social, emotional, or instructional support than those who did not join a team with a colleague. Professional learning communities are an important component of supporting teachers (Chang, 2009; Doig & Groves, 2011); however, in some cases, such as in very small schools, or those that have few resources, it may be difficult to find a group of teachers within the same school to create and join groups. Therefore, these results may be ideal with respect to scaling up the use of Lesson Study, as it suggests teachers from a variety of schools can join Lesson Study teams and perceive similar levels of support. This greatly increases the number of schools that could implement, and teachers who may participate in Lesson Study, potentially including those that are small and/or rural.

This research provided important findings in relation to different modalities in which lesson study could be implemented in the United States. This study found that participants perceived higher levels of social, emotional, and instructional supports during the in-person iteration of lesson study, in comparison to the video-based iteration. Although this research found that teachers can join Lesson Study teams with staff from other schools and experience similar levels of support, this is not as successful when completed virtually compared to in person. Therefore, although small and rural schools

can build and join Lesson Study teams with other schools, geographic location and access may be limiting factors.

I hypothesized that levels of support would be perceived to be different by teachers and coaches during online cycles due to the lack of regular face-to-face interactions and conversation flow. During the video-based iteration of this Lesson Study program, teachers and coaches were not required to be online at the same time, therefore, conversations and feedback were often delayed and/or intermittent. Future research should be conducted in regards to the implementation of Lesson Study in other formats, such as different online platforms with real-time discussions.

This thesis also brings attention to the barriers that may hinder the implementation of teacher professional development. Time has frequently been found to be a barrier to the implementation of teacher professional development (Smith, 2008), and time was selected most frequently by participants as a barrier to Lesson Study implementation within this study. The willingness of other teachers to join a team was the second most frequently selected choice. These findings suggest that resources should be directed toward overcoming these frequently cited barriers. For example, teachers may need to be provided with incentives to participate, as well as educated on the benefits of such programs. School administrators should be aware of the factors which may prevent teachers from being fully invested in Lesson Study, and reframe these barriers to provide incentives to teachers who participate in such programs.

Limitations

There are a few limitations within this study which should be addressed. Firstly, it is important to note that no control group was used within this study to compare Lesson Study to other methods of professional development (or no professional development). It may be useful for future research to include a control group, as well as more than 50 participants. Secondly, teachers, coaches, and specialists volunteered to participate in this study, and therefore, there may be some self-selection bias within the sample. Thirdly, this Lesson Study program was funded, and teachers were provided with Lesson Study resources and guidelines. Similarly, teachers were not required to find or recruit additional coaches, teachers or experts in order to participate in a team.

Additionally, the questions in this survey were in a fixed order which may have led to a sequencing issue. Questions in regards to the in-person iteration of Lesson Study were always asked first and followed up by questions with parallel phrasing about the video-based iteration. This may have had unintended effects on how participants responded to questions at a later point in the survey. Furthermore, the implementation of this Lesson Study program may pose a sequencing issue, as participants experienced an in-person iteration of Lesson Study prior to completing a second video-based iteration. Further research should study alternative orders and/or combinations of modalities, and whether or not this influences levels of support. This study also did not include any fidelity measures to determine key ingredients of Lesson Study that can be separately related to the outcomes. Finally, the classrooms which were studied, and the teachers and coaches who participated in this study were all limited to Math. Therefore, additional

research in other subjects is required to explore the generalizability of the Lesson Study model.

Although this research sought to answer the previously mentioned questions, further research should be completed in regards to Lesson Study. Other types of supports teachers may receive through lesson study, as well as other possible modalities and implementation methods should be explored. Factors that enable and support the implementation of Lesson Study may also be helpful for research and education purposes.

Implications

Teacher professional development, and the broader education system, may benefit from greater exploration of Lesson Study, the supports provided to teachers through the program, and how to overcome the barriers to the implementation Lesson Study. Since this study revealed that teachers in Lesson Study teams perceived social, emotional, and instructional supports, it may suggest that further implementation of this professional development method in schools around the United States is warranted.

Future research should not only consider the different types of supports which could be provided to participants, but also explore the components required to create a successful and supportive Lesson Study team or professional learning community (i.e. individual and team personality combinations, duration and types of teaching/coaching experience). The extent to which teachers perceive feeling supported through Lesson Study may encourage school teachers and administrators to ‘buy in’ to professional development that helps break down the isolation in teachers’ experiences.

An important aspect of professional development in general, but more specifically to Lesson Study, would be to explore the longevity of the supports experienced during the cycle. Research should explore the effects of Lesson Study after two iterations, as seen within this study, and explore comparisons to other program structures which may include one iteration, or multiple cycles. This may be beneficial to gain a greater understanding of the structure and influence of teacher professional development.

As time was disproportionately selected more frequently than any other barrier, this may suggest to school districts and administrators where to re-direct resources to address this issue. For example, because 20 hours is the average length of time required for teachers to implement a Lesson Study cycle (Burroughs & Luebeck, 2010), school districts and administrators may wish to dedicate 20 hours per semester to teacher professional development targeting collaboration and the exchange of lesson ideas. Further analyses should be completed in regards to the financial costs of Lesson Study, and how best to overcome other barriers while still providing participants with a supportive and educational development program. Additional research could also focus on the components that support the implementation of Lesson Study in school districts and education systems.

Lastly, the results of this study suggest that Lesson Study is more successful in providing social, emotional and instructional support to teachers when completed in-person in comparison to video-based. Future research should also be conducted on the influence of, and access to other Lesson Study formats and platforms, such as using other

technological tools, a combination of video-based programs and in-person, or perhaps during a different number of iterations.

Ultimately, this study supports further research and investment into teacher professional development, and the implementation of Lesson Study in the United States. The results of this research may be significant for teachers to consider when attempting to improve their classroom instruction, the teaching profession, and the education system. Education policy makers could also benefit from this research, as these results should be considered when providing resources to school, and mandating teacher qualifications, as well as their required continuing development programs.

Appendix

SURVEY: Lesson Study Support

Thank you for agreeing to take part in this survey about your experience with Lesson Study. The survey should take approximately 5 minutes and is designed to learn more about your Lesson Study experience. Please click "Next" to begin.

Please enter your name:

What is your gender?

- Male (1)
- Female (2)

Choose one or more races that you consider yourself to be:

- White (1)
- Black or African American (2)
- American Indian or Alaska Native (3)
- Asian (4)
- Native Hawaiian or Pacific Islander (5)
- Other (6) _____

What is your current position?

- Classroom teacher (1)
- Math specialist/coach (2)
- Special educator (3)
- ELL teacher (4)
- Other (5)

How many years of experience do you have in this role?

Please select which role you play within this Lesson Study program:

- Teacher participant (1)
- Host teacher (4)
- Coach facilitating Lesson Study (2)

What grade do you teach?

What is the highest level of school you have completed or the highest degree you have received?

- High school graduate (high school diploma or equivalent including GED) (1)
- Some college but no degree (2)
- Associate degree in college (2-year) (3)
- Bachelor's degree in college (4-year) (4)
- Master's degree (5)
- Higher than a Master's degree (6)

How many Lesson Study cycles have you participated in (including this one)?

How many hours (total) did your Lesson Study group spend on:

	1-5 hours (1)	6-10 hours (2)	11-15 hours (3)	16-20 hours (4)	21 + hours (5)
Lesson planning (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lesson teaching/observing (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Lesson debriefing (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Collecting and analyzing student work to prepare for final presentation (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Do you have members in your Lesson Study team from your own school?

- Yes (1)
- No (2)

Answer If Do you have members in your Lesson Study group from your own school?

Yes Is Selected

If yes, how many members from your own school were in your Lesson Study group?

- 1 (1)
- 2 (2)
- 3 (3)
- 4 (4)
- 5 (5)

Answer If Do you have members in your Lesson Study group from your own school?
Yes Is Selected

If yes, how did having a colleague from your school enhance this experience?

Answer If Do you have members in your Lesson Study team from your own school? Yes
Is Selected

Please name other teachers and coaches in your group who contributed to your experience in this course and explain how this peer-exchange helped you grow professionally.

In regards to the first iteration of your Lesson Study cycle (host teacher's lesson and face-to-face) please rate (0 being not at all, 10 being definitely) to what extent:

_____ Did you receive social support from your Lesson Study group? (1)

_____ Did you feel able to approach your Lesson Study colleagues for assistance with problems in your class? (2)

_____ Did you feel comfortable asking one or more of your Lesson Study colleagues for advice? (3)

_____ Did you communicate with your Lesson Study colleagues outside of required meetings and lessons? (4)

In regards to the second iteration of your Lesson Study cycle on Edthena, please rate (0 being not at all, 10 being definitely) to what extent:

_____ Did you receive social support from your Lesson Study group? (1)

_____ Did you feel able to approach your Lesson Study colleagues for assistance with problems in your class? (2)

_____ Did you feel comfortable asking one or more of your Lesson Study colleagues for advice? (3)

_____ Did you communicate with your Lesson Study colleagues outside of required meetings and lessons? (4)

Did you converse with teachers more frequently throughout the Lesson Study program than what you would have normally with fellow colleagues?

- Yes (1)
- No (2)

How satisfied were you with the ability of your team to communicate effectively with each other?

- Extremely satisfied (1)
- Somewhat satisfied (2)
- Neither satisfied nor dissatisfied (3)
- Somewhat dissatisfied (4)
- Extremely dissatisfied (5)

In regards to the first iteration of your Lesson Study cycle (host teacher's lesson and face-to-face) please rate (0 being never, 10 being always) how often you:

- _____ Felt motivated (1)
- _____ Received encouraging comments (2)
- _____ Used your peers as a resource to cope with work-related stress (3)

In regards to the second iteration of your Lesson Study cycle on Edthena, please rate (0 being never, 10 being always) how often you:

- _____ Felt motivated (1)
- _____ Received encouraging comments (2)
- _____ Used your peers as a resource to cope with work-related stress (3)

How did you feel about your teaching after the first in-person iteration of Lesson Study?

- Definitely worse (1)
- Slightly worse (2)
- Neutral (3)
- Slightly better (4)
- Definitely better (5)

Please explain:

How did you feel about your teaching after the second iteration of Lesson Study that you posted on Edthena?

- Definitely worse (1)
- Slightly worse (2)
- Neutral (3)
- Slightly better (4)
- Definitely better (5)

Please explain:

In regards to the first iteration of your Lesson Study cycle (host teacher's lesson and face-to-face), please rate (0 being never, 10 being always) how often your Lesson Study colleagues gave you:

- _____ Advice (1)
- _____ Directives or suggestions (2)
- _____ Constructive comments (3)

In regards to the second iteration of your Lesson Study cycle on Edthena, please rate (0 being never, 10 being always) how often your lesson study colleagues gave you:

- _____ Advice (1)
- _____ Directives or suggestions (2)
- _____ Constructive comments (3)

In regards to the first iteration of your Lesson Study cycle (host teacher's lesson and face-to-face), please rate (0 being not at all, 10 being extremely) the extent to which you feel:

- _____ You increased your curriculum and content knowledge through Lesson Study (1)
- _____ You were better able to meet student needs after Lesson Study (2)
- _____ You were better able to manage your classroom after Lesson Study (3)
- _____ You were better able to meet the expectations of your principal/primary administrator (4)
- _____ You learned new ideas and/or teaching techniques from your Lesson Study colleagues. (5)

Please explain your answers to the question above:

In regards to the second iteration of your Lesson Study cycle on Edthena, please rate (0 being not at all, 10 being extremely) the extent to which you feel:

- _____ You increased your curriculum and content knowledge through Lesson Study (1)
- _____ You were better able to meet student needs after Lesson Study (2)
- _____ You were better able to manage your classroom after Lesson Study (3)
- _____ You were better able to meet the expectations of your principal/primary administrator (4)
- _____ You learned new ideas and/or teaching techniques from your Lesson Study colleagues. (5)

Please explain your answers to the question above:

How satisfied are you with the quality of work produced by other members of your Lesson Study group?

- Extremely satisfied (1)
- Somewhat satisfied (2)
- Neither satisfied nor dissatisfied (3)
- Somewhat dissatisfied (4)
- Extremely dissatisfied (5)

Did your primary administrator join in your professional development group/exercises?

- Yes (1)
- No (2)

Is the administration at your school supportive of Lesson Study?

- Yes (1)
- No (2)

Do you intend to continue implementing Lesson Study after this program has ended?

- Yes (1)
- Maybe (2)
- No (3)

Answer If Is the administration at your school supportive of teacher professional development? Yes Is Selected

In what way is your school administration supportive of Lesson Study? (Check all that apply)

- Providing financial resources (1)
- Professional development in-service days (2)
- Providing substitute teachers (3)
- Hiring coaches (4)
- Providing time for collaboration (7)
- Other (6)

Answer If In what way is your school administration supportive of Lesson Study? Other Is Selected

If other, please explain:

What hindered your ability to participate in this Lesson Study cycle (if any)?

- Cost (1)
- Technological barriers (7)
- Time (2)
- Administration support (3)
- Willingness of other teachers (14)
- Availability of coaches (4)
- Professional development is bad (5)
- Lesson Study is bad (13)
- Nothing (19)
- Other (6)

Answer If What hindered your ability to participate in this Lesson Study cycle (if any)?
Other Is Selected

If other, please explain:

What barriers prevent the further implementation of Lesson Study at your school (if any)? (Check all that apply)

- Financial barriers (1)
- Technological barriers (7)
- Time (2)
- Administration support (3)
- Willingness of other teachers (14)
- Availability of coaches (4)
- Not interested in professional development (5)
- Not interested in Lesson Study (13)
- Nothing (19)
- Other (6)

Answer If What prevents the further implementation of teacher professional development programs at your school? Other Is Selected

If other, please explain:

Thank you for taking the time to complete this survey. If there are any other ways we could support you and your school continue Lesson Study, please let us know in the comment box below.

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Biography

Laura Stokes graduated high school from Roseville College, Sydney, Australia in 2003. She received her Bachelor of Science in Management from Tulane University in 2014. She was employed as a research analyst in New Orleans for one year before attending graduate school at George Mason University in 2015. As a graduate student, Laura participated in Dr. Tim Curby's Development in School Contexts (DISC) lab, and taught multiple undergraduate courses in the Communications department.