Early Childhood Teachers Improving Together: The Impact on Teacher Noticing of Participation in Video-Mediated Professional Learning Communities within a Teacher Preparation Course

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A dissertation

submitted in partial fulfillment of the

requirements for the degree of

Doctor of Philosophy

University of Washington

2019

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Program Authorized to Offer Degree:

Education

University of Washington

Abstract

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As early childhood teachers are increasingly required to enact higher quality teacher-child interactions and pursue higher levels of education, teacher educators need to be able to facilitate effective pedagogies that encourage teachers' learning. Supporting teachers to learn to notice through video analysis has potential to help them more effectively implement interactions as they learn to attend to, analyze, and decide how to respond to the words and actions of children in order to make intentional pedagogical choices. A randomized control experiment was embedded within a mixed methods research design to understand how to effectively implement video-based professional learning communities within an early childhood teacher preservice education course focused on teacher-child interactions. This study aimed to measure the impact on teachers' noticing skills. Pretest and posttest video analysis responses were collected from 55 early childhood teachers who were randomly assigned into intervention or control quarter-long online

course sections. Concurrently, teacher survey data were gathered to understand participant perceptions of the impact on learning and engagement. Video analysis pretest and posttest data were scored using a Teacher Noticing Coding Measure including three components: 'attending,' 'analyzing,' and 'proposing alternative practices.' Scores were analyzed through two-factor split-plot ANOVA and results of survey ratings and open-ended responses were also calculated and coded. Teachers enrolled in the intervention course section received more intensive facilitation of their video-mediated peer groups and demonstrated improvement on all three Teacher Noticing components from pretest to posttest while reporting high levels of satisfaction and impact on learning. Teachers in the control course section did not receive this facilitation and improved only in the first two Teacher Noticing components and declined from pretest to posttest on 'proposing alternative practices' scores, resulting in a statistically significant within-between subjects interaction effect between time and course section. They also reported much lower levels of satisfaction and impact on learning. Findings have implications for several aspects of early childhood teacher preparation, including video-mediated coursework design and facilitation, experimental and mixed methods design, and Teacher Noticing measurement.

Keywords: early childhood teacher education, teacher noticing, video pedagogies, professional learning communities, teacher-child interactions, online teaching and learning

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ACKNOWLEDGEMENTS

I would like to express deep gratitude to my advisor, Dr. Gail Joseph, whose mentorship in innovative and collaborative early childhood teacher education methods has transformed my understanding of how to support both teachers and teacher educators. Her passion, commitment, and vision are contagious. I would also like to express gratitude to my committee members, Dr. Kara Jackson, Dr. Kathleen Artman Meeker, and Dr. Jason Yip for extremely formative feedback and support related to my research methodology, writing, and how I might translate research to support teachers and teacher educators.

My colleagues within the College of Education at the University of Washington have contributed to this research project and my success in countless ways. Thank you to the wonderful team at EarlyEdU within Cultivate Learning for resources, support, and an inspiring shared vision of supporting teacher educators. My own teaching and research have been shaped within the rich collaboration among my colleagues in the Early Childhood and Family Studies, Early Care and Education, and graduate programs, especially Carrie Brennan, Mary Clevenger-Bright, Jodi Newman, Terri Wardrop, Lynn Dietrich, Miriam Hirschstein, Colleen Dillon, and Kathleen Kuhl. Researching the facilitation of professional learning communities has been much richer while simultaneously being a part of one with several of these colleagues in which challenge and support are so authentic and meaningful. I would like to extend a special thank you to Dara Welch who efficiently and enthusiastically supported this research; Dawn Williams, who co-taught several courses with me and showed me that the very best way to teach is in deep partnership; Weijia Wang and Rilee Krause who expertly supported my teaching; and Soliel Boyd, Carrie Brennan, and Mary Clevenger-Bright, who inspirationally led the way and showed me how to finish this dissertation strong.

I am grateful for every student I have had the honor of teaching, from children and families in Head Start preschool and Seattle Public Schools kindergarten to current and future teachers in my courses at the University of Washington; I continue to learn so much from each of you!

My journey toward this degree began in California through the encouragement and support of Dr. Doug McConnell, Dr. David Scott, and Dr. Desiree Segura-April. I will forever be grateful for early leadership and teaching opportunities you offered during my master's degree. You saw potential in me that I did not yet see in myself and reminded me that training educators could be how I "act justly…love mercy…walk humbly…" in this world.

I owe much gratitude to my family and friends, including Nara Conner and Jerry and Carole Packard. My parents, David and Ruth Packard and my brother, Michael Packard believed I could do anything I set out to do and have supported me every step of the way and without their support I would not have been able to complete this project. Finally, the deepest gratitude to my husband, Ewerton Scaboro da Silva, who enthusiastically joined me while I was on this journey and offered more strength, encouragement, "syncs," and home cooked meals than I ever imagined possible. This is for us and our future together.

This research used statistical consulting resources provided by the Consulting Program of the Departments of Biostatistics and Statistics, University of Washington.

DEDICATION

To my wonderful parents, David and Ruth Packard: teachers who inspired me to teach.

Chapter 1. INTRODUCTION

> *Maria, a second-year preschool teacher, sinks into the seat of her car after a day of teaching and rests her head on the headrest, staring straight ahead through the window. She thinks back to the especially busy day of coordinating with two different co-teachers while teaching 18 four- and five-year-old children and wonders what she could have done differently to feel more successful. In her Early Childhood Education teacher training courses, she is learning about "serve-and-return" interactions, responding to and building upon children's words and actions to support their development. She is also learning to extend those interactions with multiple back-and-forth exchanges to even further support learning in developmental domains such as social-emotional, language, logic and reasoning, and disciplinary domains such as literacy, math, science, engineering, and technology. She knows that today the children likely offered hundreds of "serves". But in the complexity of the busy classroom, how is she supposed to be able to notice them? And how does she decide which ones to "return" and how to most effectively do so "in the moment"?*

Early childhood teachers experience the complex reality of teaching within the "blooming, buzzing confusion of sensory data" (B. Sherin & Star, 2011, p. 69) that exists in early childhood classrooms. Given this complexity, an especially important part of building teaching expertise is developing professional vision and learning to notice: to pay attention to, interpret, and decide how to respond to the words and actions of children in order to make intentional pedagogical choices that support children's development (Goodwin, 1994; Hamre, Downer, Jamil, & Pianta, 2012; van Es & Sherin, 2002). The aim of this study is to contribute to an understanding of how teacher educators may best support early childhood teachers to develop this skill.

1.1 Background and Problem Statement

With a large amount of recent research in early childhood development, early childhood teachers' roles are increasingly viewed as having a significant impact on young children's development. Alongside this research in child development has emerged research in evidence-

based early childhood teaching practices that result in positive child outcomes, especially the "serve and return" interactions that are so important (National Scientific Council on the Developing Child, 2004). New insights about equitable practice also illuminate methods of fighting against deficit perspectives that have limited the perception of the learning and development capabilities of children and call for teachers to be better prepared to serve all children across ethnicity, race, class, gender, and other identities (McDonald, Kazemi, & Kavanagh, 2013). As a result current reform movements call for early childhood teachers to adopt new methods of teaching and meet new professional standards and requirements (National Association for the Education of Young Children, 2015).

One example is the increasing use of the Classroom Assessment Scoring System (CLASS) as an observational instrument for determining classroom quality in terms of teacher-child interactions, aligned with research that teachers' enactment of high quality interactions results in higher child outcomes (Hamre & Pianta, 2007). It is rooted in the reality that "serve and return" individualized interactions within the context of responsive adult-child relationships are the primary mechanism for children's development (National Scientific Council on the Developing Child, 2004).

In order to adequately prepare teachers to meet these new requirements, professional development for early childhood teachers has come under intense scrutiny in recent years, with increased accountability regarding teaching practices and their impact on child outcomes (Institute of Medicine & National Research Council, 2015). Preparation programs for early childhood educators are currently fragmented in terms of alignment, content, requirements, and effectiveness (Bowman, Donovan, & Burns, 2000; Whitebook, Gomby, Bellm, Sakai, & Kipnis, 2009). Despite increasing numbers of children attending early learning settings and increasing

awareness of the importance and positive impact of high quality experiences on children in the early years, the field still "struggles to identify evidence-based teacher learning approaches and to align preparation and ongoing professional development" (Institute of Medicine & National Research Council, 2015, p. 365). Teachers' practice has a direct impact on children's learning and development during time spent in early learning settings (Hamre & Pianta, 2007). However, many teachers in the workforce are not adequately prepared to enact high quality effective practices (Maxwell et al., 2009; Phillips, Gormley, & Lowenstein, 2009; Bogard, Traylor, & Takanishi, 2008; Early et al., 2006), especially those called for in current educational reform movements.

The education and professional development of early childhood teachers is costly for institutions of higher education, districts, states implementing quality rating and improvement systems, and teachers themselves pursuing higher education degrees (Miles, Odden, Fermanich, & Archibald, 2004; Tout et al., 2010). With limited resources in this era of increased accountability, it is important to ensure that both small and large decisions about methods of teacher preparation are coordinated and grounded in research demonstrating that they are most likely to increase teacher effectiveness and ultimately have positive impacts on children's learning and development (Hamre, Downer, Jamil, & Pianta, 2012; Sheridan, Edwards, Marvin, & Knoche, 2009).

1.2 Purpose of Present Study

This study's design is grounded in an integrated framework of teacher learning trajectories over time as comprised of gaining knowledge, honing noticing skills, planning, practicing, enacting teaching skills in authentic classroom settings, reflecting, and identifying ongoing goals for improvement all within a situated theory of learning (Hamre et al., 2012). This

study attends to the complex and integrated nature of teacher learning, while focusing closely on one skill, learning to notice, through a particular pedagogical method, a video-mediated professional learning community within teacher preparation coursework. However, teacher knowledge, skills, and beliefs are all inextricably integrated with noticing abilities and this study acknowledges that reality and the challenges that arise particularly for training early childhood teachers.

The purpose of this study is to better understand how to effectively implement video-based learning activities within early childhood preservice education courses and to measure their impact on teachers' noticing skills when embedded within explicitly facilitated teacher professional learning communities. Therefore, this study is built upon concepts from three intersecting bodies of teacher learning research: teacher noticing, video-embedded pedagogies, and teacher professional learning communities. This study also attends to the reality that preparation of teachers of children aged birth to five-years-old and elementary and secondary teachers have historically developed along different pathways, with different bodies of literature, resulting in a lack of alignment and coordination across the birth to twelve-grade education continuum.

1.3 Significance of Present Study

This study's findings are intended to contribute to the field in several ways. With the increasingly wide use of video-based pedagogies to support teacher learning, it is important for teacher educators to better understand how to structure and facilitate effective and productive video-embedded learning opportunities for diverse groups of students. Which elements result in improved teacher practice? How might teacher educators most effectively facilitate them? Existing research offers important foundational insights into teacher knowledge, teacher

noticing, using video, and teacher communities of practice that contribute to the design and implementation of teacher preparation (Kang & van Es, 2018). However, evidence to support very specific components such as how to create and facilitate video-based communities of practice, design tasks for them, and evaluate learning within the context of early childhood preservice education is missing. This gap in the literature will be addressed in this study.

This study also addresses the need for effective methods that remove barriers to higher education access for all early childhood teachers. Flexible options are needed for students who are balancing multiple responsibilities such as caring for family and working. Online, video-based pedagogies are a promising method for increasing access while also ensuring effective teacher learning, but research is specifically needed to determine effectiveness.

This study is intended to serve several audiences. First, early childhood teacher educators and higher education administrators will benefit from knowledge about how to intentionally integrate video-embedded communities of practice in specific courses and across coursework throughout a program to support teacher noticing. They will also learn a method of assessing teacher noticing along a continuum of growth. Because this study takes place in an online course, it will especially be of interest to those training teachers in fully online or hybrid modalities. Additionally, policy makers and funding agencies will be interested in the evidence for supporting this pedagogical teacher education method. Finally, researchers will be interested in the way this study builds upon and integrates prior research on teacher noticing, professional learning communities, and video-based pedagogies and calls for further research in this important line of research.

Children, families, schools, and communities benefit greatly from teachers who are so well prepared and supported along their various learning trajectories that they not only stay in the

field of early childhood education for years, but continue to improve the efficacy of their practice and evolve professionally. No matter when along their professional trajectories they enter a formal teacher preparation program, it is essential that when they do, we structure and facilitate their membership in powerful video-mediated communities of practice, hopefully inspiring them to continue a trajectory of participation in ongoing communities of practice as well.

1.4 Overview

In order to address the problem and need for research described here, this study begins with a literature review of teacher noticing, video-embedded pedagogies, and teacher professional learning communities in Chapter 2. Next, grounded in concepts from these three bodies of research, Chapter 3 describes the present study, including the research questions and methodology. The effect of a facilitated video-based professional learning community pedagogical model was studied through an embedded mixed methods research design, with random assignment of teachers to two course sections in order to determine if intervention group teachers displayed more growth in measures of teacher noticing than did comparison group teachers. Chapter 4 presents the results and Chapter 5 discusses the conclusions, implications for early childhood teacher preparation, and limitations of the study.

Chapter 2. LITERATURE

2.1 Teacher Learning

Because of the interconnected and developmental nature of teacher learning, it is important to situate any examination of teacher practice in larger integrated frameworks of teacher learning trajectories. A theory of teacher learning must be fully developed and serve to ground the many decisions teacher educators make (Kang & van Es, 2018). Preparation and ongoing professional development for teachers of infants through high school students is increasingly shifting to focus more centrally on scaffolded practice. Teachers not only need to learn about practices, but they actually need repeated opportunities to enact components of those practices with facilitated reflection opportunities to demonstrate improvement: "practice makes practice" (Britzman, 1991; McDonald et al., 2014). This leads to a call for reform in teacher education, moving beyond a primary focus on teacher knowledge acquisition to an explicit focus on putting that knowledge into practice, helping teachers not only learn the components of the practice of teaching but also how and when to enact them in authentic, complex settings to promote children's learning (Sheridan et al., 2009).

Central to this shift is an increasing awareness of the transformative power of education when deficit perspectives about students, families, schools, communities, and teachers are actively counteracted. Across the birth to high school range and in various types of settings, equitable education and care includes many components, including collaborating and building reciprocal relationships with families and communities, culturally and linguistically responsive practice, anti-bias education, trauma-informed practice, and "ambitious teaching practice," which is defined as:

> "A practice that attends to the learning of all students- across ethnic, racial, class, and gender categories- and that aims to deepen students' understanding of ideas as well as their engagement in the solving of complex problems, rather than the more common place emphasis on activities and procedural talk" (McDonald et al., 2013, p. 385).

Additionally, holistic teaching practice attends to students' development in intersecting domains. When teachers are supported to learn through 'doing' and reflecting in authentic settings, they are better prepared to "improve the learning opportunities available to students of color, low-income students, and English language learners…to address the persistent inequities that overwhelmingly limit those students' opportunities to learn" (McDonald et al., 2013, p. 378).

Two recent models of teacher learning draw upon some similar underlying theories and respond to these calls for reform in teacher education: the Intentional Teaching Framework, designed for teacher educators to support early childhood teachers, and the Learning Cycle, designed for teacher educators to use in training elementary and secondary teachers.

2.2 The Intentional Teaching Framework: Supporting Early Childhood Teacher Learning

Models of professional development for early childhood teachers and corresponding research comprise a growing body of literature. With recent reform efforts to professionalize existing early childhood teachers, as well as improve the effectiveness of professional development opportunities, research efforts have been largely devoted to models such as coaching for practicing teachers. One early childhood teacher development model that addresses the call for focus on practice-based approaches, the intentional teaching framework (Figure 2.1), is informed by several scholarly frameworks, including co-construction of knowledge, experiential learning, and models from teacher education that help teachers to connect theory to

practice and build skills (EarlyEdU Alliance, 2016; Hamre, Downer, et al., 2012). The framework consists of four components necessary when preservice, novice, or experienced teachers are learning skills: knowing, seeing, doing, and reflecting in order to improve. Knowing refers to gaining knowledge of child development and quality practices that contribute to positive outcomes for children. Seeing refers to the ability to identify those quality practices when enacted by self and others, such as in exemplar videos. Doing refers to setting goals, planning, and implementing high quality practices, including modifying as needed to support the individual developmental needs of children. Finally, reflecting and improving refer to the ability to observe and examine one's own practice and engage in critical analysis in order to improve. It may also include observation and analysis of peers' practice in order to provide feedback with the goal of supporting peers to improve (Hamre, Downer, et al., 2012; Joseph & Brennan, 2013). According to this framework, effective reflection fully integrates analysis of practice with planning for improvement; reflection, learning to see, and gaining knowledge must always serve as a catalyst for improvement of practice.

Figure 2.1. Intentional Teaching Framework.

2.3 The Learning Cycle: Supporting Elementary and Secondary Teacher Learning

The learning cycle (Figure 2.2) was designed along with a set of instructional activities as a framework for teacher educators to support elementary and secondary teacher learning (McDonald et al., 2013). Similarly to the intentional teaching framework, it was designed to apply research showing that teachers learn best through actively engaging in teaching practices and that creating a common framework and language supports teacher learning across a teacher preparation program, during in-service continued learning, and learning together with groups of other teachers (Ball & Forzani, 2011; Grossman et al., 2009; Lampert et al., 2013; McDonald et al., 2013). The learning cycle consists of four intersecting components. The first component, introduce, aligns with the 'know' component of the intentional teaching framework, in which teacher educators share some portion of teaching practice for teachers to learn. The learning cycle goes beyond the intentional teaching framework to include specific methods that teacher educators might use, for example, modeling, showing a video representation of the teaching practice, and guiding teachers through activities that help them learn. The second component is to guide teachers to prepare to enact the learned teaching practice with students; the third component is enacting the practice with children. The learning cycle divides these two aspects of what the intentional teaching framework calls 'doing'. Finally, after enacting, teachers analyze their enactment of the practice, not only individually, but also together with other teachers around the shared goal of understanding how their teaching practice supported and could better support student learning.

It is interesting to note that the 'seeing' component of the intentional teaching framework is woven throughout the learning cycle: teachers observe and analyze examples during

'introduce', observe themselves and each other during rehearsals as they 'prepare' and 'enact', and thoroughly 'analyze' through close observation. Learning to see, or notice, is essential in both frameworks.

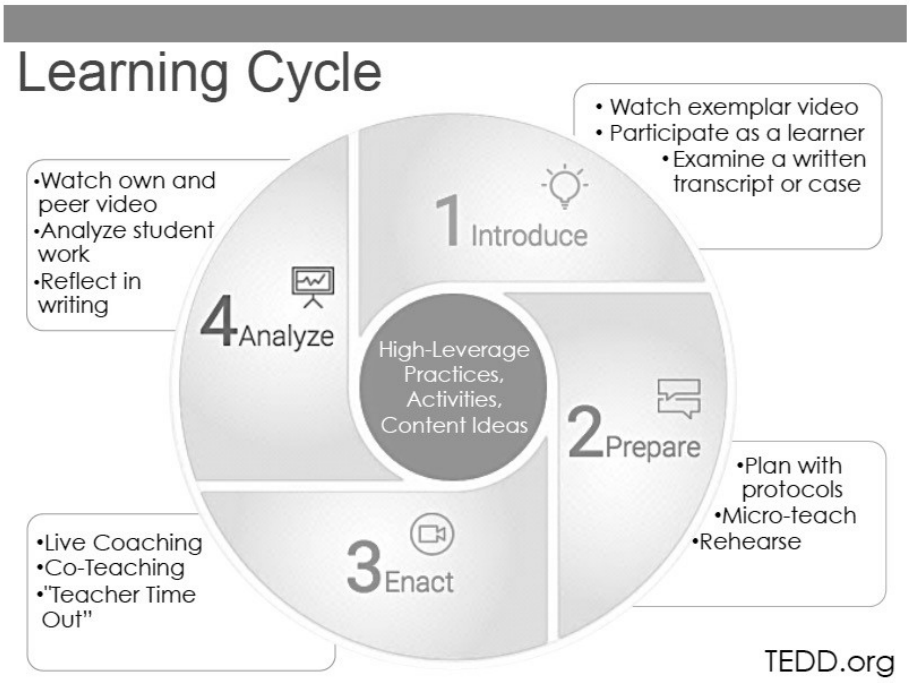


Figure 2.2. The Learning Cycle

2.4 Teacher Noticing as a Component of Teacher Learning

Although they use different terminology and definitions and emphasize components differently, elementary, secondary, and early childhood teacher preparation models include noticing skills as a component of learning to teach. Applied linguist Charles Goodwin (1994) first described this general concept with the term 'professional vision' which he defined as "socially organized ways of seeing and understanding events that are answerable to the distinctive interests of a particular social group" (pg. 606). He asserts that members of a profession learn to enact three practices comprising professional vision through engaging in the

discourse of that profession. The first practice, *coding*, is the transformation of what is observed within a professional setting into 'objects of knowledge', central to a profession's discourse, the second practice, *highlighting*, is the process of noticing the important phenomena in a setting and the third practice is creating and using *material representations* (Goodwin, 1994). Goodwin's (1994) notion of coding and highlighting is similar to the process used by scientists and researchers in many disciplines, coding data using a particular coding scheme as a process of classification in order to organize and understand the world, as well as make connections across different collections of observations. The items that are coded are thus units of analysis to be used by a professional such as a teacher in the complex act of teaching. Authors in education have built on this concept with other terms such as 'disciplined perception' of practice (Stevens & Hall, 1998), 'teacher noticing' (Mason, 2002), and 'learning to notice' (van Es & Sherin, 2002).

2.4.1 *Cognitive theoretical framework grounding for Teaching Noticing*

A body of literature within education draws upon cognitive theory to describe the phenomenon of noticing in the mind of a teacher (Hamre, Downer, et al., 2012; Moreno & Valdez, 2007; Pianta et al., 2014; Pianta, Mashburn, Downer, Hamre, & Justice, 2008; Santagata, Zannoni, & Stigler, 2007). Cognitive models of learning describe the processing of information as happening similarly to the way a computer gathers, stores, and retrieves information to make decisions, much occurring outside of consciousness (Mayer, 2014). One cognitive model of learning is dynamic memory theory (Schank, 1982). According to this theory, people develop schemas and scripts based on experiences and then draw upon those to decide how to behave in any new moment. Over time, multiple experiences lead to growing memory networks of stored knowledge, and according to this theory, abstracted rules. When new information is acquired, it

is filtered through these rules and stored accordingly to guide future behavior. The abstract rules are similar to Goodwin's (1994) concept of codes, used by professionals to understand and categorize phenomena in a professional setting. Nigel Bell and Bronwen Cowie (2001) analyzed the way teachers draw upon these cognitive processes to identify student learning and non-learning within classroom interactions as a type of formative assessment. Judith L. Fraivillig, Lauren A. Murphy, and Karen C. Fuson (1999) propose that teachers employ this ability by eliciting multiple student ideas, waiting and listening, and identifying the most relevant, in light of learning goals, to highlight and build upon.

Roxana Moreno and Alfred Valdez (2007) describe one application to teacher learning, as a teacher draws upon these cognitive processes when viewing a teaching video case. While closely observing the case, a teacher draws upon prior knowledge to decide which information is important to notice and extract from the case, matches and classifies that information with similar cases stored in memory, and ultimately draws upon this growing network of similar information to solve new problems, whether in future cases or in classroom teaching practice (Schank, 1997). Research on expertise has demonstrated that experts in a particular domain are able to move through this process quickly and efficiently when solving new problems (Kolodner, 1993; Ross, 1987).

A related theory, cognitive flexibility theory, builds upon constructivist models of learning to address the transfer of knowledge and skills beyond the setting in which they were initially learned (Spiro & Jehng, 1990). It suggests that complex situations, such as teaching, have "radically changing situational demands," requiring spur-of-the-moment restructuring of one's knowledge in order to adapt (Spiro & Jehng, 1990, p. 165). In order to support learning, information supporting principles should be presented from different perspectives through

diverse case examples. From this diverse set of examples, learners then develop their own schemas, which can then be used flexibly and dynamically (Moreno & Valdez, 2007; Spiro & Jehng, 1990). Therefore, teacher professional development should offer teachers different examples of new skills and opportunities for teachers to analyze and create meaning, in order to transfer the knowledge into the complex classroom context.

2.4.2 *Sociocultural theoretical frameworks: Supporting teachers to gain noticing skills*

While these cognitive theories describe what occurs within a teacher's mind in terms of the development and use of noticing, they do not fully explain the kinds of experiences and interactions teachers need in the context of professional development to develop effective noticing skills. Sociocultural theories of learning, the perspective that learning is situated in culture and constructed socially, emerged out of a need to explain aspects of learning not included in cognitive learning theories (Cole, 2005; Vygotsky, 1978, 1981). Cognitive theories, such as information processing theory that analyze the individual as the unit of analysis within a view of knowledge solely as symbols being manipulated inside of an individual mind, fail to take into account crucial processes of learning, as systems of activity, in which individuals are both influenced by and influence their physical and social contexts, other individuals, and shared tools (Greeno, Collins, & Resnick, 1996; Gutierrez & Rogoff, 2003; Lave & Wenger, 1991; Mayer, 2014). These offer a basis for teacher development literature to describe and demonstrating effective processes for explicitly supporting teachers to gain noticing skills (Moreno & Valdez, 2007; Santagata, Zannoni, & Stigler, 2007).

First, a sociocultural perspective highlights the fact that teacher noticing is always situated in historical and contemporary contexts. The codes that are named and privileged by a profession have developed over time and are passed down in various ways, while they continue

to evolve (Goodwin, 1994). In the teaching profession, this includes formally, through higher education and professional development opportunities, curriculum and assessments tools, and informally, through interactions with colleagues and administrators at particular sites. Assessment and evaluative measures mandated by state, district, or school sites and designed to evaluate students or teachers, may have particular impact on the codes teachers learn to notice and act upon. In elementary and secondary education, an example is district testing of all children at certain grade levels and in early childhood, an example is the increasing use of the Classroom Assessment Scoring System (CLASS) as an observational instrument for determining classroom quality in terms of teacher-child interactions, as explained in chapter 1 (Hamre & Pianta, 2007). In both instances, policy decisions have likely shaped the vision of teachers in classrooms affected by these measures.

2.5 VIDEO-EMBEDDED PEDAGOGIES TO SUPPORT TEACHER LEARNING

Video is a particularly valuable tool to facilitate teacher noticing. A growing research literature demonstrates effective outcomes of a variety of video-based pedagogies within teacher professional development (Jacobs, Lamb, & Philipp, 2010; Pianta et al., 2014; Putnam & Borko, 2000; van Es & Sherin, 2002). Video is a tool that carries great potential for mediating teacher learning, including the implementation of instructional practices, self-analysis, and observation of children's learning. From the time video became widely available to the public, it has been used to model exemplar teaching practice, representing professionals enacting practices that novice teachers watch and analyze, including microteaching and distinct interactions, or entire lessons (Sherin, 2004). For example, teachers watch video of experts and accompanying commentary by the expert, allowing them a "window" into their thought process or extended video-based cases, used to analyze teaching practice in context (Masats & Dooly, 2011). For

both novice and experienced teachers, analyzing video of other teachers in action as a component of professional development has been linked to a variety of improvements in teaching practices by participants (Borko, Jacobs, Eiteljorg, & Pittman, 2008; Moreno & Valdez, 2007; Santagata et al., 2007; Sherin, Russ, Sherin, & Colestock, 2008).

Another increasing application of the use of video has emerged with the technological advancement of video capture and editing software: teachers capturing themselves on video enacting practices, reflecting, sharing with a community of practice, and getting feedback (Bayat, 2010; Sherin, 2004). Miriam Sherin and Elizabeth van Es have written extensively about their model of video clubs, which are facilitated groups of teachers "who meet on a regular basis to view and discuss video segments from their classrooms," analyzing the videos in light of shared learning goals, especially related to student learning and discourse (van Es, 2014, p. 55). This process allows teachers a powerful opportunity to analyze their own practice as they can view the video multiple times, looking for multiple measures of quality, as well as share the video and gain valuable outside perspectives, from peers, coaches, and teacher educators. Rich class interactions and contexts can be captured on video for later close inspection and analysis, helping teachers to increase their ability to notice what is important (Jordan & Henderson, 1995; Sherin, 2004; van Es, 2012). Research demonstrates the effectiveness of teachers engaging in reflection about their teaching on video, including such positive outcomes as increasing the quality of reflection, understanding of content knowledge and increased ability to link theory and practice (Bayat, 2010).

2.6 PROFESSIONAL LEARNING COMMUNITIES: SUPPORTING TEACHERS' TRAJECTORIES OF PARTICIPATION IN THE EDUCATION COMMUNITY OF PRACTICE

In the field of education the term professional learning community (PLC) and related terms have been used with increasing popularity in reference to a wide variety of groups comprised of professionals involved in education; as a result, the term lacks a clearly shared meaning (DuFour, 2004). The use of terminology such as teacher communities, learning communities, professional learning communities and communities of practice are often used to mean a variety of groupings. In order to determine the specific mechanisms within PLCs that are effective, it is important to define and differentiate a PLC from other groups of teachers gathering in community.

Jean Lave and Etienne Wenger (1991) were the first to coin the term "communities of practice," offering an anthropological description and analysis of current professional communities such as midwives and butchers, as well as the manner that meanings, beliefs, and understandings are discussed, constructed and replicated in shared practices (Lave, 1988; Wenger, 1999; Wenger, McDermott, & Snyder, 2002; Lave, 1991). Over time, Wenger and his colleagues have taken this observed phenomena of existing communities of practice and developed ways to more intentionally foster communities for the purpose of increasing professional learning and improving practice (Buysse et al., 2003; Palincsar, Magnusson, Marano, Ford, & Brown, 1998; Wenger et al., 2002). Etienne Wenger, Richard McDermott, and William M. Snyder define communities of practice as "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (2002, p. 4). Leaders in education have built upon this

work to apply the model for educational professionals, including teachers. These professional learning communities, emerging first within elementary and secondary schools and districts and more recently within early childhood education, are defined by one author as a community "with the capacity to promote and sustain the learning of all professionals in the school community with the collective purpose of enhancing student learning" (Bolam, McMahon, Stoll, Thomas, & Wallace, 2005, p. 145). The vast majority of research and descriptions of models of teacher professional learning communities have been within elementary and secondary schools. Many focus on math instruction and are designed for practicing teachers as a form of professional development instead of for novice teachers in teacher preparation programs (Buysse, Sparkman, & Wesley, 2003). However, a growing number of PLCs are being implemented in early education and intervention (Wesley & Buysse, 2006).

2.7 PROFESSIONAL LEARNING COMMUNITIES GROUNDED IN SITUATED LEARNING THEORY

Professional learning communities are grounded in a theory of learning as situated (Lave & Wenger, 1991; Wenger, 1999; Wenger et al., 2002). From a situated learning perspective, the nature of learning and knowing are inherently contextualized, social, and distributed among people and tools (Greeno, 1997; Greeno et al., 1996; Putnam & Borko, 2000). Knowledge is not generated in isolation nor out of contexts; likewise, learning is not a decontextualized acquisition of a body of knowledge by an individual in isolation, but rather both are sociocultural phenomena (Putnam & Borko, 2000). Sociocultural theories of learning, the perspective that learning is situated in culture and constructed socially, emerged out of a need to explain aspects of learning not included in behaviorist and cognitive learning theories (Cole, 2005; Vygotsky, 1978, 1981). Cognitive theories such as information processing theory that analyze the individual

as the unit of analysis within a view of knowledge solely as symbols being manipulated inside of an individual mind (Greeno et al., 1996; Mayer, 2014) fail to take into account crucial processes of learning, as systems of activity, in which individuals are both influenced by and influence their physical and social contexts, other individuals, and shared tools (Gutierrez & Rogoff, 2003; Lave & Wenger, 1991). Instead of knowledge residing in any one individual's cognition, distributed cognition asserts that knowledge is distributed among individuals and tools (Cole & Engeström, 1993; Lave, 1988). A situated perspective asserts that it is the activity among individuals, tools, and contexts that leads to conceptualization of knowledge (Buysse et al., 2003; Carr, Jonassen, Marra, & Litzinger, 1998; Resnick, 1991). Hutchins (1990, 1991) describes the manner in which the knowledge for navigating a large ship is distributed among people and tools, allowing the group of individuals to perform greater cognitive tasks than any of them could on their own.

Sociocultural frameworks of learning are especially suited to describing how and in what situation learning occurs, through human social interactions and mediated by artifacts, or tools. These tools refer to symbols such as language, forms of technology, and, in the context of teacher learning, they include curriculum and lists of 'best practices' formulated by experts to serve as guides for classroom practice (Wertsch, 1988). Contexts for teacher learning include classrooms, schools and centers, children's homes, and community. However, cultural historical activity theory elaborates on the complex system of people, artifacts, and organizational elements in which knowledge and its meaning is situated. It asserts that learning and change develop through contextualized action among individuals and tools, grounded not just in local and current contexts, but also in historical and cultural actions (Cole, 1998). According to Putnam and Borko, "how a person learns a particular set of knowledge and skills, and the situation in which a

person learns, become a fundamental part of what is learned" (2000, p. 4). The field of early childhood education itself has history and shared culture, as do centers, communities, and those professionals serving within them.

Situated learning theory is grounded in the reality that all knowledge emerges out of everyday situations (Putnam & Borko, 2000). Because those situations exist in particular contexts, that knowledge is limited in its transfer to situations that are similar (Stein, 1998). In addition, learning cannot be separated from the environment in which knowledge needs to be applied (Buysse et al., 2003). Learning happens within daily activities, not in isolation from them. Because classrooms and schools are complex environments with diverse groups of children, families, and colleagues, teachers must be able to engage in learning experiences that facilitate their implementation of and reflection about those practices within their daily contexts with children and families. Knowledge itself is always generated in social and cultural contexts and is subsequently shared and applied in social and cultural contexts, often different from each other (Buysse et al., 2003, p. 266). To deny the situated nature of knowledge generation, learning, and application is to deny a fundamental aspect of the nature of knowledge. If teachers simply implement recommended practices, such as a set of recommended behaviors, in the context of their classroom without a critical analysis of and reflection on the appropriateness in the context of working with individual children, families, a community, and a district, school and/or center, the recommended behaviors may not have the intended impact. Collaborating with others in that or similar contexts ensures an intentional and responsive approach to implementing recommended practices.

Professional learning communities foster a situated development of teacher professional identity, knowledge, and practice. It is explicitly through participation in the community that the

development of the self and practice occurs (Barab & Duffy, 2012; Lave & Wenger, 1991). According to David Stein, learning occurs during negotiation and problem solving within social interactions (1998). Teacher PLCs facilitate this by offering regular opportunities for a teacher to engage in reflection and dialogue about teaching experiences with people who have different levels of experience, making learning a function of membership in the community of learners (Barab & Duffy, 2012; Buysse et al., 2003). Pam Grossman, Peter Smagorinsky, and Sheila Valencia (1999) argue that a sociocultural and situated approach helps answer an important question related to teacher learning: "Under what circumstances do particular kinds of changes take place?" (p. 4). Therefore, a situated learning approach helps to inform the design elements of teacher professional learning communities and analyze each element in light of its impact on teacher learning as a result of participation in a community, informing a method for understanding the circumstances in which teacher PLCs lead to teacher learning and improved practice.

This is also a process through which intentional opportunities for teachers to develop noticing skills may be designed. It is within communities of practice that meanings, beliefs, and understandings are discussed, constructed and replicated in shared practices among members of a profession, both experienced and novice (Lave, 1988; Wenger, 1999; Wenger, McDermott, & Snyder, 2002; Lave, 1991). Charles Goodwin (1994) draws upon sociocultural theory to assert that professionals gain professional vision through engaging in the discursive practices of the profession, learning the codes, how to highlight them in complex environments, and finally, how to generate and use representations as tools of the profession. A sociocultural perspective highlights the important role of settings, peers, and instructors and facilitators of professional

development in teacher learning. Teachers learn these codes, or decompositions of practice, through engaging in the discourse of the profession with others in the field.

2.8 Design characteristics of teacher professional learning communities

General consensus exists within the literature about essential design elements of effective teacher PLCs and the methods and reasons for and evidence of their effectiveness as mechanisms for supporting teacher learning, grounded in theory and research (Barab & Duffy, 2012; Bolam et al., 2005; Newmann & et al., 1996; Vescio, Ross, & Adams, 2008). Drawing upon this body of literature, this section will explore the following six essential characteristics of effective PLCs (Table 2.1): 1) diverse and inclusive membership; 2) shared goals, values, and norms; 3) focus on student learning; 4) facilitated reflective dialogue; 5) collaboration; and 6) demonstration of improvement. While it is necessary here to analyze each characteristic in isolation, the very core of the community of practice model, including the nature of learning as situated, asserts that these characteristics work in interaction with each other and not in isolation (Louis & Kruse, 1995).

Table 2.1. Professional Learning Community Design Characteristics

PLC Design Characteristics
Diverse and Inclusive Membership
Shared Goals, Values, and Norms
Focus on Student Learning
Facilitated Reflective Dialogue
Collaboration
Demonstration of Improvement

2.8.1 *Diverse and Inclusive Membership*

The nature of membership within professional learning communities impacts the learning of its teacher members. Teachers bring different types of knowledge, including specialized knowledge of students and personal experiences and backgrounds, such as cultural and linguistic knowledge (Shulman, 1987). This type of diversity has the potential to support the challenging of assumptions in favor of adopting a critical and transformative approach to teaching, such as countering deficit perspectives about children's capabilities for learning.

Additionally, including professionals at multiple levels of expertise when possible is one method of establishing effective professional learning communities (Pugach, 1999). Intentionally designing PLCs with a diverse group of participants aligns with the bi-directional nature of teacher learning from a situative perspective and is one of the functions of the communities of practice model discussed by Lave and Wenger, as a method for teaching new members of the profession how to be full professionals (1991). According to their model, novice professionals "enter a community at the periphery and over time move closer to full, legitimate participation as they gain knowledge and learn the community's customs and rituals and adopt a view of themselves as members of the community" (Buysse et al., 2003, pp. 265–266). Through discourse in the community, novice teachers learn the discourse of the profession and by enacting practices and discussing with the community, novice teachers learn how to enact the practices of the community (Cobb, 1994). The impact does not only occur from more experienced to less experienced teachers. The experiences, new ideas, and thinking of all members of the community, both novice and those with expertise, impact each other and the broader community in a bi-directional manner (Pugach, 1999). According to Barab and Duffy,

one essential process of a PLC within a school is to continuously regenerate, welcoming all new members as retiring members leave over years (Barab & Duffy, 2012).

A potential danger of including members with diverse levels of experience in PLC discourse is that experienced professionals may reinforce the status quo within early childhood education, thus hindering the strong call for reform within the field (Sykes & Bird, 1992). Instead of a pure "apprenticeship" model, both novice and experienced teachers need to learn new ways of teaching together. The reinforcing traditional culture of the early childhood field broadly, as well as within individual districts and sites, often enculturates new members while resisting change (Fleer, 2003; Sarason, 1990). This culture includes concepts about children, families, and communities, the role of the teacher, the nature of early childhood, teaching practices and environments, and ways of thinking about learning. In an article applying Lave and Wenger's community of practice model to the early childhood education field, Marilyn Fleer offers the long-held phrase, stated as a belief by many professionals in the field, that "children learn through play" as an example of a potentially problematic concept without the use of a critical lens (Fleer, 2003; Lave & Wenger, 1991). She offers several considerations and questions including the manner in which this concept is rooted in a particular euro-normative culture and the need to define 'play' and 'learning' as well as the role of the teacher to ensure children's learning (Fleer, 2003).

Within an intentionally designed PLC, maintaining the status quo is not inevitable, however. The community can actually serve as a powerful catalyst for supporting teacher learning, especially the "risk taking and struggle entailed in transforming practice" (McLaughlin & Talbert, 1993, p. 15). Fleer asserts that the field can "move beyond social reproduction to communities of practice that reflect everyone's practices" (2003, p. 77). One method is by

ensuring that membership is inclusive of participants with different roles, backgrounds, and specialties, as appropriate for the goals of a particular PLC. When PLCs exist at a school or center, Bolam and his colleagues (2005) describe the need for inclusive membership of PLCs, especially when considering school or center-wide goals and broad impact. Especially in the field of early childhood education, including all professionals serving children (e.g. teachers, assistant teachers, special education teachers, and specialists providing mental health, speech, occupational, and physical therapies) may increase impact. Alternatively, communities containing only teachers working with similarly aged children may be effective given very specific goals around teacher practices. In their research, McLaughlin and Talbert (2001) identified several secondary departmental teacher learning communities that were effective, given a purpose of increasing the quality of specific teacher practices related to that department. Ultimately, making meaning from the day to day experiences of teachers is facilitated when a community itself reflects the environment in which teachers are implementing practices (Buysse et al., 2003).

According to the theory of distributed cognition, community members can incorporate and build on the expertise of each other as well as shared tools, resulting in new insights, new ways of teaching, and new learning. The group can accomplish more together than they are able to individually if they are willing to engage in critical and reflective analysis of their own and others' teaching.

2.8.2 *Shared Goals, Values, and Norms*

According to the literature, another characteristic of effective teacher PLCs is having shared goals, values, and norms (Andrews & Lewis, 2004). In the early phase of the PLC, Jane Bumpers Huffman and Kristine Kiefer Hipp (2003) found it took time to establish norms,

grounded in the experiences and values of each member, before moving on to focus on specific practices and student learning. Effective PLCs facilitate teacher improvement, which is only possible when teacher participants feel safe to engage in the process of inquiry, to take risks and experiment with new knowledge, and transform practice (McLaughlin & Talbert, 1993). Norms must ensure every participant feels supported to reflect on strengths and areas for improvement and to give and receive honest feedback through the group's commitment to enact behaviors of mutual trust and respect (Bolam et al., 2005).

In addition to shared norms, effective PLCs have common goals and values. The broader community of early childhood education practice, with its shared culture and history, has shared meanings and goals, within which any individual PLC is situated (Barab & Duffy, 2012). Fred Newmann offers examples such as "views about children and children's ability to learn, school priorities for the use of time and space, and the proper roles of parents, teachers and administrators" (1996, p. 181). However, any given PLC may meet regularly for very particular goals. Shared values shape the purpose, goals, and focus of the community. Ultimately, the shared purpose of effective PLCs is student learning, another essential characteristic of all successful PLCs.

2.8.3 *Focus on Student Learning*

Teacher professional learning communities must go beyond diverse and inclusive membership and the development of shared goals, values, and norms, to sustain a primary focus on student learning (Hord, 2004; Newmann & et al., 1996). In a review of the literature on the impact of professional learning communities on teaching practice and student learning, Vicki Vescio, Dorene Ross and Alyson Adams, found that the one common feature of PLCs with demonstrated increased student achievement was "a persistent focus on student learning and

achievement by the teachers in the learning communities" (2008, p. 87). All specific and targeted purposes must support this overarching goal. DuFour (2004) contends that the mission of teachers in PLCs is not to make sure children are taught, but rather to make sure they learn.

Early childhood teacher preparation has historically focused more often on isolated knowledge, beliefs, and awareness-building, instead of guiding teachers to learn to enact specific teaching behaviors, skills, and practices that have been shown to promote positive child outcomes, as well as support teachers to make in-the-moment teaching decisions (Pianta et al., 2014; Sherin et al., 2008). Research demonstrates that teachers' enactment of high quality instructional interactions results in higher child outcomes, leading to an increased focus on teacher-child interactions in early childhood teacher professional development (Pianta et al., 2008). However, a focus on teachers' development of practices, even if those have previously been linked to positive child outcomes in research, without an equal focus on teachers' ability to observe and analyze children's words and actions to ensure learning, may not result in the same positive child outcomes as demonstrated in the original research findings. Teachers' focus must remain on children's learning and development, as the effectiveness of interactions are constantly evaluated and adjusted as needed. Within a situated learning perspective, a PLC's inquiry focused on student learning must always be centered in "issues, dilemmas, and ambiguity that emerge from actual situations in authentic practice settings" instead of being solely content-driven (Buysse et al., 2003, p. 267).

Beyond a broad focus on student learning and development, effective PLCs share a specific focus on a type of student learning they want to foster, such as a developmental domain or a content area and corresponding specific aspect of teacher knowledge such as those outlined by Shulman (1987): content, general pedagogical, pedagogical content, of learners and of

educational contexts and purposes. A focus may be present from the beginning of the PLC or emerge out of the needs of the members. In a review of the literature exploring communities of practice seeking to integrate educational research and practice Virginia Buysse, Karen Sparkman, and Patricia Wesley (2003), identified three effective PLCs, each with a specific goal related to student learning (e.g. science, early literacy, and enhancing field-based experiences of student teachers). Studies conducted by Supovitz (2002) and Supovitz and Christman (2003) of multiple PLCs across two school sites found that significant gains in student learning occurred only in PLCs that engaged in "structured, sustained, and supported instructional discussions and that investigated the relationships between instructional practices and student work," but they did not find gains in PLCs that did not engage in these highly focused discussions (p. 5). The results of studies of PLCs across contexts consistently confirm that a primary focus on student learning is essential for effectiveness.

2.8.4 *Facilitated Reflective Dialogue*

Teachers learn how to improve their ability to foster children's learning and development through reflective dialogue, another characteristic of effective PLCs. A robust literature exists to support the importance of reflection on teacher learning (Marcos & Tillema, 2006) with the roots of reflective practice in teaching tracing back to the work of John Dewey (1933). Theorists, researchers, and teachers have not come to agreement on a definition or application of reflection; however, broad consensus exists that it is important and includes some essential components: it is an ongoing process, or cyclical in nature; it involves active and critical examination of practice, especially one's own practice, compared to intentions and philosophical approaches; and its goal is always improvement and/or increasing knowledge (Hamre et al., 2012; Hatton & Smith, 1995; Kottkamp, 1990). Professional learning communities are uniquely positioned to

facilitate the kind of reflective dialogue and inquiry described in this body of literature and indeed, Buysse argues that reflection "about the intersection of professional knowledge and experience is one of the cornerstones of the community of practice approach" (2003, p. 267).

In their overview of designing professional development interventions for early childhood teachers, Bridget Hamre, Jason Downer, Faiza Jamil, and Robert Pianta (2012) draw upon literature of teacher reflection to identify four components: observation, assessment, analysis, and planning for change. Given the busy nature of teaching, PLCs offer a unique potential for guiding teachers through each of these components in a cyclical manner through regular and repeated meetings, by offering intentional time and prompts ensuring that observation, assessment, analysis, and planning for change happen. Beyond the structural support it provides, the process of individual members' sharing their practice, self-analysis, and peer feedback with each other, results in deeper joint understanding, constructed from diverse perspectives (Rogers, 1997). In their survey of early childhood professional development, Susan Sheridan, Carolyn Edwards, Christine Marvin, and Lisa Knoche (2009) state that many PLCs use protocols to guide sessions and David Kennedy (2004) asserts that an expert facilitator is required for guiding the group in discourse, learning, and staying on task, although further research is needed to determine the efficacy of various methods of protocols and facilitation.

In addition to facilitation of teachers' reflection of technical skills and competencies in particular settings, PLCs may support several other types of reflection. Hatton and Smith (1995) describe the analysis of one's professional role and identity as well as using community dialogue to solve problems that arise within professional settings. The process of teachers learning together as they closely examine their practice and student learning through student work and observations is related to teacher action research (Sheridan et al., 2009). Honest and critical

reflection is one method for ensuring that PLCs are not merely engaging in social reproduction of the status quo, but are instead engaging in improvement and reform (Fleer, 2003).

2.8.5 *Collaboration*

Ultimately, an essential characteristic of effective PLCs is that they intentionally focus on collaboration (Vescio et al., 2008). The learning of each individual member is supported through the collective learning of the group over time (Bolam et al., 2005). PLCs draw upon the situated perspective of learning as occurring in relational contexts among those with similar concerns to counteract the manner in which teaching has historically been an individual endeavor, with the responsibility for the improvement of teachers being held in near isolation (Barab & Duffy, 2012; Buysse et al., 2003). Participation in a PLC transforms the individual responsibility into a collective responsibility for the learning of teachers and the learning of students (Bolam et al., 2005). Collaborating contributes to deprivatization of practice, making teaching public through networks and partnerships, and shifting the manner in which teachers do the work of teaching (Newmann & et al., 1996).

The collaborative nature of PLCs is one common characteristic of PLCs that several research studies found to contribute to changes in teaching culture at schools (Vescio et al., 2008). They cite a study conducted by Karen Seashore Louis and Helen Marks (1998) that found both collaborative activity and 'deprivatization of practice' as key facets of effective PLCs. In an extensive review of literature, including data from nearly 400 schools ranging from preschool to high school, Bolam (2005) identifies a strong pattern in PLCs' positive impact on both teaching practice and increased learning culture and morale when the group adopts a systemic approach to improvement within a school or center. As previously noted, PLCs exist in larger interdependent contexts, of their own and other schools and districts, as well as larger communities of teachers

specializing in various ages and curricular areas, thus collaboration may be extended not only to the members of a particular PLC, but the broader community of practice as well.

2.8.6 *Demonstration of Improvement*

The final characteristic of an effective PLC is that they are able to demonstrate improvement. This aligns with the mandate that professional development for early childhood teachers be evidence-based and grounded in theory about its mechanisms of effectiveness, not only to ensure current teachers experience effective professional development, but also to ensure that ongoing research continues to inform the improvement of development opportunities (Hamre et al., 2012; Institute of Medicine & National Research Council, 2015; Sheridan et al., 2009; Mcdonald et al., 2013). The goal of a PLC is not to simply exist; they are intended to be a vehicle for observable improvement, ultimately of student learning by improving teacher practice and, as applicable, school-wide practice (Bolam et al., 2005; Vescio et al., 2008). According to Lave and Wenger (1991), the ultimate benchmark for assessing if a community of practice is effective is the degree to which its members are able to successfully apply new knowledge, not simply retain it.

A slowly growing body of research has demonstrated measurable improvement of teacher practice or student learning as a direct result of teacher participation in a PLC (Sheridan et al., 2009). According to a literature review conducted by Vescio et al. (2008), very few studies have been designed to demonstrate positive teacher practice or child outcomes, with eleven studies meeting their definition of a PLC and demonstrating positive outcomes. Further research is needed to determine the precise mechanisms of PLCs that contribute to these outcomes and for individual communities to follow evidence-based practices (Sheridan et al., 2009). However,

demonstrating improvement needs to occur at the level of each community as well, with members setting shared goals and demonstrating improvement to each other.

2.9 Video-mediated professional learning communities: Supporting teachers to improve

The use of video and corresponding analysis protocols as tools within PLCs has immense potential to facilitate teacher learning in terms of aspects of each of the essential PLC mechanisms of change discussed in this study. Video-based pedagogy can support teacher learning within several of these design characteristics of professional learning communities. First, co-viewing and analysis of videos of practice together can support bi-directional and shared learning among members with diverse teaching expertise (Pugach, 1999). Through engaging in dialogue and analysis of either exemplar or peer videos, novice teachers can gain the knowledge and practices of the field, while more experienced teachers refine practice (Cobb, 1994; Lave & Wenger, 1991). In addition to professional knowledge, each member of a diverse PLC views videos of practice through a unique set of lenses including cultural and linguistic knowledge, knowledge of the communities and families served, and personal experiences and identities, thus contributing to a richer analysis and discourse.

Members' discourse analyzing video must include risk-taking, respectful disagreements, confusion and questioning, not just affirmation and agreement, in order for meaningful and transformative teacher learning to take place (Bolam et al., 2005). This is especially true when members share videos of their own practice, an incredibly vulnerable type of sharing. In order for them to feel safe, both sharing their own videos of practice and offering honest personal reflection and balanced feedback to other members, very clear norms are essential. Participants must feel safe to take risks, experiment with new knowledge by enacting it in their classrooms,

capture video of that practice, and share clips that include both strengths and areas for improvement, engaging in the process of inquiry (McLaughlin & Talbert, 1993). Offering both positive and constructive feedback to each other must be normalized within a set of behaviors of mutual trust and respect (Bolam et al., 2005).

When videos of practice are coupled with a specific focus on an aspect of student learning alongside corresponding teaching practice to foster that learning, both novice and experienced teachers have the potential for learning new ways of teaching together. This is a proven characteristic of effective PLCs (Hord, 2004; Newmann & et al., 1996). This may be fostered first by the group learning some specific aspect of teacher knowledge such as those outlined by Shulman (1987): content, general pedagogical, pedagogical content, of learners and of educational contexts and purposes, and then engaging in highly focused discussions about applications in their own classrooms. The shared analysis of video clips supports PLCs to maintain their shared goals and values related to student learning, when coupled with specific guidelines for the observation and analysis of the clips. After a community has developed clearly shared goals, analysis of video rather than verbal discussion alone, can help the group maintain focus (Kang & van Es, 2018; van Es & Sherin, 2002). Video of interactions between teachers and children is particularly powerful in facilitating an analysis both of teaching practice and a close observation of the children (Hamre et al., 2012; Pianta et al., 2008). Video allows for the group to support each other in close observations of children: what are children saying and doing that offers insight into their learning? What might you do in response to those child observations? Video allows for teachers to practice this type of close observation away from the busy and noisy classroom, while still observing an interaction that occurred in an authentic context (Buysse et al., 2003).

Reflective dialogue around video analysis within a PLC is particularly powerful. Video clips can be repeatedly viewed, both individually and together in order to engage in various aspects of reflection: observation, assessment, analysis, and planning for change (Hamre et al., 2012). The intentional teaching framework is an approach to teacher learning that is informed by several scholarly frameworks, including co-construction of knowledge, experiential learning, and models from teacher education that help teachers to connect theory to practice and build skills (Hamre et al., 2012). The framework consists of four components necessary when teachers are learning skills: knowing, seeing, doing, and reflecting in order to improve. Knowing refers to gaining knowledge of child development and quality practices that contribute to positive outcomes for children. Seeing refers to the ability to identify those quality practices when enacted by self and others, such as in exemplar videos. Doing refers to setting goals, planning, and implementing high quality practices, including modifying as needed to support the individual developmental needs of children. Finally, reflecting and improving refer to the ability to observe and examine one's own practice and engage in critical analysis in order to improve. It may also include observation and analysis of peers' practice in order to provide feedback with the goal of supporting peers to improve (Hamre et al., 2012; Joseph & Brennan, 2013). According to this framework, effective reflection fully integrates analysis of practice with planning for improvement; reflection must always serve as a catalyst for improvement and video may be used as a tool to facilitate many aspects of the intentional teaching framework, including reliably seeing practices, reflecting on one's enactment (or 'doing') of learned practices, highlighting areas of needed knowledge, and demonstrating quantifiable improvement over time. Gail Joseph and Carrie Brennan (2013) applied this model with early childhood pre-service teachers in a higher education course, identifying unique affordances as well as challenges of

working with this population. Each of these video-based pedagogies facilitates cyclical shared reflection intersecting knowledge and experience (Buysse et al., 2003).

Finally, video can be used to make teaching public, collaborating in making teacher learning the responsibility of the larger group instead of the sole responsibility of individual teachers. In addition, practices captured on video, alongside student observation and assessment data, are able to demonstrate student improvement over time. Teacher videos of practice from the beginning of the PLC can be compared to videos of practice at the end, to demonstrate that teacher involvement in the PLC resulted in positive student learning and teacher practice.

2.10 CHALLENGES IN IMPLEMENTING VIDEO-EMBEDDED PROFESSIONAL LEARNING COMMUNITIES

Challenges exist in implementing effective characteristics of PLCs, including through the use of video-based pedagogies. First, barriers exist in terms of the logistics of setting up PLCs. With limited resources, it may be hard for current teachers to get regular, paid time released from classrooms to attend PLCs, whether the PLC is originated by teachers themselves, a school, a district, or as a part of a higher education course. Resources may also be limited to acquire needed technology for video-based PLCs, including videos cameras with high quality microphones to capture audio in noisy classrooms, and laptops or tablets with editing software to upload, edit, view, and share videos, as well as provide access to technology support for teachers. Scheduling and facilitating PLC meetings regularly may also be challenging in terms of coordinating teachers' work schedules and geographic locations.

When members of a PLC are asked to capture and share video of themselves, challenges occur in terms of using the technology, including the positioning of the camera in a classroom to capture the important action, audio of that action, and address any possible impact the presence

of the camera has on those in the room (Sherin et al., 2008). Joseph and Brennan (2013) contend that teachers must be adequately trained on the use of technology and given adequate opportunity to learn how to use it before being asked to engage in the process of sharing and analyzing videos of practice.

In addition to logistics, members of the PLCs encounter personal challenges. Sharing videos of personal practice, or even verbally discussing one's practice, is vulnerable and teachers may feel hesitant to be honest, to ask questions, to share areas for needed improvement. Teachers may also feel hesitant to offer honest and constructive feedback to other members of the group, but instead offer cursory or only positive feedback. Especially novice teachers need explicit guidance on how to analyze one's own practice and how to give quality feedback to peers (Bayat, 2010; Borko et al., 2008). A safe and nurturing environment is needed so that participants are willing to take personal and professional risks in sharing both successful videos of their practice as well as those that depict areas for growth.

Another challenge PLCs face is maintaining consistent focus on student learning and the specific teaching practice they have chosen as a focus. Conversations can easily get off topic, making the time together unproductive. It may be challenging to strike the right balanced agenda, with enough structure and enough flexibility referred to by Putnam and Borko as "the agenda-setting dilemma" (2000, p. 9). Protocols and facilitation are important to guide the group to maintain focus.

2.11 Noticing across early childhood, elementary, and secondary teacher learning models

A body of literature reflects the research about and models of professional development designed to promote elementary and secondary teachers' learning to notice while a smaller body

of literature has recently begun to explore aspects of early childhood teachers' noticing skills. While these bodies of literature emerged out of similar previous literature and share some common themes, they differ in several aspects regarding the type of professional development they suggest as effective in promoting teachers' noticing as well as the types of phenomena of interest they emphasize.

The literature across elementary and secondary noticing and early childhood noticing agree that the process of obtaining teacher noticing is an important part of the process of teacher learning in professional development, drawing on many of the same theoretical frameworks and previous research. The definition of teacher noticing used in this study includes three components: 1) notice what is significant; 2) interpret the event; and 3) use the interpretation to inform pedagogical decisions (van Es & Sherin, 2002). In this description, the goal is not only that teachers would be able to identify what is important, but also that they would be able to interpret classroom interactions and act on them to promote student learning.

2.11.1 *Supporting Elementary and Secondary Teachers to Learn to Notice*

The majority of research and models of practice related to teacher noticing have emerged within K-12 teacher professional development, with many of those specifically focused on supporting math and science teachers. However, the roots of these ideas emerged as early as 1904, when describing aspects of learning through experience to connect theory and practice, John Dewey (1904/1965) wrote about the importance of teachers' recognizing what to focus on and how to analyze it within teachers' professional practice.

Literature on expertise has demonstrated the ways in which experts know where to focus attention and are able to remember what they saw accurately (Berliner, 1994). According to Michelene Chi (2006), expert chess players are able to recall more details from a chessboard than

novice chess players, and expert teachers are able to recall more details of a classroom than novice teachers. The researchers found that beginning teachers were more apt to notice general interactions, whereas seasoned teachers were more likely to distinguish substantive interactions (Berliner, 1994). In teacher education, novice teachers do not automatically know what they should pay attention to within ongoing activity in a classroom or in interactions between teachers and students and will need guidance. With current reform movements in both early childhood and K-12 teaching, however, even veteran teachers need to learn to attend to new aspects in classroom interactions than they had previously and benefit from guidance in doing so (Sherin & van Es, 2008).

Through a qualitative analysis of the ways novice professionals learn to be professionals within several fields, Pam Grossman, Crista Compton, Danielle Igra, Matthew Ronfeldt, Emily Shahan, and Peter Williamson (2009) identified several important aspects of professional preparation, including representations of practice which are examples, helping novices to develop understanding through various ways of seeing. Examples include not only direct observations of practice, but also examples on video, written cases, and artifacts such as lessons, student work, and assessments. Representations of practice exist on a spectrum of authenticity, with the most authentic capturing the true complexity of the practice in context, such as a live observation in an actual classrooms and the least authentic capturing less complexity, such as a text or oral description of a practice as a representation. Examples of moderate levels of authenticity include modeled teaching (e.g. when a teacher educator models a strategy for novice teachers, teaching them as if they were children) or viewing examples of classroom teaching on a video (Grossman et al., 2009). Judith Warren Little (2003) asserts that various types of representations of practice offer affordances and limitations in terms of what teachers are able to

see and learn from them. While her work focuses on the ways teachers themselves create and share representations of their own practice to other teachers in professional learning communities, her work also applies to the representations of practice that teacher educators create or select, and share with novice teachers (Grossman et al., 2009; Little, 2003). For example, when watching a video of a teacher and student interacting, certain aspects of practice are highlighted very well such as the observable behaviors of the teacher and student. However, other aspects of practice are nearly or completely hidden, such as the teacher's prior planning process, goals, background knowledge of students, 'in-the-moment' decision-making processes, and the school context. Grossman and her colleagues (2009) assert that it is important for teacher educators to consider these limitations and make intentional choices of the use of representations of practice. For example, adding accompanying material to this video such as a reflection by the teacher or other background information could help illuminate additional aspects of practice.

An important strategy in helping teachers develop teaching noticing skills is through the decomposition of practice, or the "naming of parts" (Grossman et al., 2009, p. 2068). Complex practice must be broken into integral parts with teachers learning these parts before integrating them. Examples of decompositions of practice in education include specific teacher-child interactions or components of the physical environment that are intended to promote various aspects of children's development. As teachers learn the names and details of decompositions of practice, they become "codes" through which those teachers can analyze their own and others' practice and they develop what Goodwin (1994) termed, professional vision.

Elizabeth van Es and Miriam Sherin (2002) have applied the concept of professional vision to their work supporting math and science teachers to "learn to notice." They define teacher noticing as "the ability to notice and interpret significant interactions in a classroom"

(Sherin & van Es, 2008, p. 28). In their work on the importance of teachers 'learning to notice', they build upon the notion that professional vision is something that naturally develops in professionals over time as they gain expertise (Berliner, 1994). Instead, they argue that teacher professional development should include it as an explicit skill for novice teachers to develop and given the current climate of reform, they contend that even experienced teachers who have developed teaching noticing skills, need to refine that vision, learning to notice and react to new things within their professional settings (Sherin & van Es, 2008).

Not only should teachers be able to observe teacher practices, but they should also be able to observe children closely to inform interactions, individualize instruction, and ensure learning occurs (Sherin & van Es, 2008). Elizabeth van Es (2014) contends that noticing and reasoning about student thinking is a key component of teaching expertise. Teachers should learn to listen closely to what students say and watch what they do in order to make teaching decisions.

2.11.2 *Models of supporting elementary and secondary teachers' learning to notice*

Several researchers have evaluated models of professional development designed to support K-12 teachers to increase some aspect of their teaching noticing skills, with the hypothesis that this results in increased teacher practice and improved student learning (Hatch & Grossman, 2009; Koran, Snow, & McDonald, 1971; Moreno & Valdez, 2007; Santagata et al., 2007; van Es & Sherin, 2002). Teachers' ability to notice and apply what is important in the context of case-based learning is one such line of research. During the late 60s, a movement focused on microteaching, the break-down of teaching into a set of discrete skills, emerged within education certification programs in the United States (Allen, 1966). In this approach, students were asked to watch videos depicting these discrete skills, enact them on video to share

for feedback from an instructor. A study conducted by Mary Lou Koran and her colleagues (Koran et al., 1971) found that an intervention group of preservice teachers who received either video or text modeling of a discrete teaching skill related to asking questions showed more growth in implementing the questioning skill with students than a control group who received no modeling.

More recent researchers have built on and refined this work. Roxana Moreno and Alfred Valdez (2007) found that preservice teachers enrolled in an educational psychology course who were guided to watch a video case, depicting application of course content in a classroom, had higher retention of the knowledge and were better able to transfer that knowledge in the analysis of a novel case, than preservice teachers who either read a narrative case or were not exposed to any case. However, four weeks later, while retention was still greater for the intervention group, no treatment effects were found on their transfer. The authors assert that observing video-based cases increases knowledge, but has limitations on its own in promoting long term transfer. With a much larger sample (n=140), Rossella Santagata, Claudia Zannoni, and James Stigler (2007) demonstrated that pre-service math teachers who were guided to analyze several videos using a framework comprised of 1) goals and parts of the lesson, 2) student learning, and 3) teaching alternatives, demonstrated improved ability to analyze instruction as measured by five criteria (elaboration, mathematics content, student learning, critical approach, and alternative strategies) on a post-course analysis of an instructional video.

Miriam Sherin and Elizabeth van Es (2002) designed and researched the effectiveness of several models of professional development designed to help teachers 'learn to notice' what is important in classroom interactions. First, they evaluated a program for novice teachers enrolled in a higher education program seeking secondary math or science certification, randomly

assigning six of them to an intervention consisting of several sessions using video-analysis software, with six in the control. Novices in the intervention were guided to analyze a teaching video example, and a video of their own practice in terms of three aspects of classroom interactions: student thinking, teacher's roles, and discourse. By analyzing pre- and post-analysis of videos, they found that the intervention were able to make greater gains in including more analysis and evaluation, rather than mere description, in narrative reflections on videos of practice.

Thomas Hatch and Pam Grossman (2009) offer a description of one model designed to support a developmental trajectory of novice teachers gaining teaching noticing over time. They build on previous writing about the affordances and limitations of representations of practice (Grossman et al., 2009; Little, 2003), arguing that only showing exemplar videos of expert teachers obscures much of the complexity of teaching. Their desire to "make teaching accessible for analysis while still capturing its complexity" led to the development of a digital exhibition of teachers at various levels of expertise enacting similar practice (Hatch & Grossman, 2009, p. 73). Additionally, they provided a variety of corresponding records of practice such as curricula, student work, and other assessment and teaching tools, all of which are discussed and analyzed within the context of teacher education methods courses (Lampert & Ball, 1998). This ensures that novice teachers not only see teaching models of experts, but also "near peers", allowing them a vision of their own next developmental level as a professional.

Another line of research explores the effectiveness of asking teachers to share videos of their own practice, both for self- and peer-analysis (Borko et al., 2008; Sherin & van Es, 2008). The goal of this approach is to help teachers' develop teacher noticing, hypothesized to increase teacher effectiveness in the classroom. Miriam Sherin and her colleagues have developed an

approach called video clubs, “a group of teachers who meet on a regular basis to view and discuss video segments from their classrooms” (Sherin & van Es, 2008, pg). In one study of mathematic teachers, however, Sherin and van Es (2008) found that teachers who participated in a year-long video club demonstrated increased teacher noticing, as exhibited not only in interview data but also through direct observation of teacher’s instructional practice in their classroom. In comparing pre- and post- video of teachers’ classroom math teaching, researchers found an increase in the frequency of teachers’ noticing student mathematical thinking and teachers’ reasoning verbally about student mathematical thinking during instruction. This is an especially promising example of a rare research study demonstrating impact of an intervention related to teacher noticing on classroom practice.

Hilda Borko, Jennifer Jacobs, Eric Eiteljorg, and Mary Ellen Pittman (2008) designed a professional development program for middle school algebra teachers from different schools in which they gathered regularly, following a Problem-Solving Cycle of first meeting to learn and plan a pedagogical component of math instruction, implementing it on film in their own classroom, meeting again to share, analyze, and discuss clips from their videos in light of the teacher’s role, and meeting one more time to analyze and discuss those same clips in light of student thinking. Through comparing teachers’ discussions in a cycle of three meetings at the beginning of year to their discussions at the end of that year, the authors found the discussions to be more productive, as measured by the quality and content (Borko et al., 2008).

Therefore, in this body of literature, broad consensus exists that teachers need to be able to know what to focus on in the classroom and why it is important, in terms of their own instructional practice, their interactions with children, and what children say and do.

2.12 Supporting Early Childhood Teachers to learn to Notice

Although the term 'teacher noticing' has not often been used in early childhood research as an overarching construct, its components exist within several different threads of literature and practice. First, a focus on child observation exists, closely aligned with child assessment to determine children's development along developmental pathways in multiple domains (Meisels & Atkins-Burnett, 2000; National Research Council, 2008). One specific example of a structured child observation protocol is Functional Behavior Assessment, a component of positive behavior support (Blair, Umbreit, & Bos, 1999). It is designed to support teachers and other adults' understanding of the purpose of a child's specific challenging behavior. Very close observation of the child's behavior, as well as what occurs before and after, is central to being able to create and implement a successful intervention that will not only promote positive behavior but also support the child's social-emotional learning.

Moving beyond a focus on child observation, Robert Pianta and his colleagues have focused on the importance of teachers learning to observe teaching practice, both their own and others, in order to better be able to enact effect teaching practices. In several research articles, they have used the intentional teaching framework to research the impact of early childhood professional development interventions on teachers' practice, specifically focusing on teacher-child interactions that have been linked to positive child outcomes (Hamre & Pianta, 2007). In their work, they define observation skills as

> "teachers' capacity to correctly and accurately identify specific features of teacher-child interactions from video, using a specific framework. Observation skills can be acquired by repeated practice and feedback watching examples and assessed through actual observation and matching of responses to standards" (Pianta et al., 2014, p. 145).

The authors note that teacher perception in the classroom likely includes senses other than just sight- including hearing and feeling, although terms related to visual perception are most often used (Hamre et al., 2012).

A result of the increased focus on serve and return interactions between adults and children and the subsequent widespread call for teachers to enact the types of interactions mandated in the CLASS described in Chapter 1, the focus of early childhood teacher learning research has increasingly shifted to helping teachers enact those types of interactions. The methods for helping teachers to do so includes learning to reliably observe teachers' enactment of those interactions.

Using a web-mediated professional development coaching system called MyTeachingPartner (MTP), Robert Pianta, Andrew Mashburn, Jason Downer, Bridget Hamre, and Laura Justice (2008) studied the effect of its use with teachers in a state-funded pre-k program. The MTP uses the Classroom Assessment Scoring System (CLASS) as a standardized framework to support teachers to improve interactions through repeated observations and feedback. In this study, teachers who received access to web-based teaching resources including exemplar videos of practice aligned with each interaction dimension of the CLASS and corresponding teaching materials alongside a year of coaching in which they filmed themselves enacting the interactions and received feedback from the coach increased their CLASS scores in a final observation of their teaching practice more than did the control group who simply had access to the exemplar videos of practice and corresponding teaching materials. The authors conclude that facilitation of analysis of teachers' personal videos of practice is an effective component of professional development, leading to improved teacher practice (Pianta et al., 2008).

In a study built upon these findings, Bridget Hamre and her colleagues (Hamre, Pianta, et al., 2012) designed and studied the impact of early childhood teachers' participation in a 14-week course on effective teacher-child interactions that used CLASS as a basis for the content. It guided teachers to learn about the kinds of instructional, organization, and emotionally supportive interactions that promote children's language and literacy development, as well as domains of language and literacy development. In addition, it focused on building teachers' observational skills through analysis of videos in order to reliably detect effective teacher-child interactions. Finally, it guided teachers to capture video, enacting learned interactions from the course in their own classroom, and to share that video along with a self-analysis with the instructor and peers. Of 440 participants in this study, half were assigned to this course and the other half experienced none of the course content. Participants were measured on their beliefs regarding and knowledge of children's language and literacy development and teacher-child interactions as well as their ability to detect effective interactions in videos depicting a teacher and children in a classroom. The observational measure used was the Video Assessment of Interactions and Learning (VAIL) in which teachers watch two videos (2-3 minutes each) and identify up to five strategies the teacher in the video is using. The narrative responses are coded for accuracy (according to the CLASS) and breadth (the number of indicators for a dimension). The authors offer this example: "for the CLASS Instructional Learning Formats dimension, there are four indicators: effective facilitation, variety of modalities, student interest, and clarity of learning objectives" (Hamre, Pianta, et al., 2012, p. 103). The more of these indicators a narrative response includes, the higher the score regarding breadth. Finally, teachers submitted four 30-minute videos of themselves teaching and these were CLASS coded. Teachers who participated in the course intervention scored higher on belief and knowledge measures as well

as in their ability to identify multiple aspects of effective instruction on video, as measured by the VAIL. The authors found that teachers' skill in describing a broad range of effective interactions on video examples partially mediated the association between treatment assignment and observed Instructional Support interactions, as measured by CLASS (Hamre, Pianta, et al., 2012). This finding is a very important contribution to the literature, as the authors assert that it is possible that the aspects of the course that guided teachers in video analysis may have been one of the most important in terms of mediating improved practice, although further study is needed. Finally, in a follow-up study with the same participants from the previous study, Robert Pianta and his colleagues (2014) explored the effects after the immediate impacts of the course, two years later. They found that VAIL identification skills were not a statistically significant mediation of the course effects on observed behavior, as measured by the CLASS, after two years. This finding may indicate that additional components of noticing, beyond simple observation of skills are needed to impact teachers' behavior with children in the classroom context.

2.13 Differences in approaches to teacher noticing in elementary and secondary versus early childhood education: Highlighting different "Attending" and "Analysis" codes

Because of the distinctly different histories, policy and professional cultural contexts of elementary and secondary education and early childhood education, several different categories of 'codes' have been more or less highlighted within the discourse of teacher noticing of these two groups of professionals. Although some categories of codes certainly overlap, several distinct differences exist and these two bodies of literature bring them into different levels of focus.

2.13.1 *Student Thinking: Words and Actions*

Attending to the words and actions of students within the classroom is one perspective that figures prominently in elementary and secondary teacher education literature but not as prominently in recent early childhood literature. In research studies with elementary and secondary teachers, their analysis of practice, often captured on video, is coded for the degree to which they noticed "students' thinking" (Borko et al., 2008), "students' thinking and understanding of specific concepts and ideas" (Santagata et al., 2007), "student thinking" and "student engagement" (Sherin et al., 2008), "student thinking" (van Es & Sherin, 2002), and the student as an "actor" and "math thinking" of students (van Es & Sherin, 2008). In each of the aforementioned research articles, a major goal of the intervention was to increase the frequency and depth of teachers' noticing and interpretation of students' thinking and actions for the purpose of gaining a deeper understanding of student knowledge and ability. Authors cite reform movement in elementary and secondary education, calling for increased attunement and responsiveness to students in-the-moment in order to encourage student learning (Santagata et al., 2007; van Es & Sherin, 2008).

In contrast, the focus of recent professional development models and their corresponding measures of teacher noticing for early childhood teachers includes a very small focus on student thinking and behavior. The VAIL, a measure used to assess early childhood teachers' observation skills, takes into account teachers' accuracy and breadth of identification of CLASS interactions, which includes a secondary focus on how children respond to teacher's actions, but not an explicit focus on isolating student words and behaviors to analyze in order to better understand their thinking, sense-making, and developmental needs in order to customize instruction (Hamre, Pianta, et al., 2012; Pianta et al., 2014).

2.13.2 *Teacher's Roles and Actions*

A second category of codes describes a close analysis of the roles and pedagogical choices made by teachers during practice. In recent elementary and secondary teaching literature, this is tightly joined with an analysis of the purpose behind teachers' actions, justifying them in terms of the ways in which they do or do not promote student learning. In elementary and secondary teaching studies, teacher analysis of practice, often of videos of practice, was coded for the degree to which teachers noticed "teachers' analysis of the content presented in lessons" (Santagata et al., 2007), "teacher moves'" and "teacher strategies" (Sherin et al., 2008), "teacher's thinking" and "pedagogy" (Borko et al., 2008), "teacher's roles" (van Es & Sherin, 2002), and teacher as "actor" and "pedagogy" (van Es & Sherin, 2008).

Noticing teacher's actions and roles is highlighted in the early childhood literature, but from a more descriptive behavioral standpoint, with less emphasis on including analysis of practice, a comment about the purpose behind choices that teachers' made. The emphasis is more on the degree to which the teacher was or was not exhibiting the correct behaviors and how the children responded and the degree to which it was an effective enactment of a previously defined teacher behavior (Hamre, Pianta, et al., 2012; Pianta et al., 2014).

2.13.3 *Discourse and Interactions*

A final category of codes highlights the discourse or interactions between students and teachers. This is somewhat emphasized in the elementary and secondary literature, especially in terms of fostering domain-specific discourse, such as to promote mathematical reasoning, including among groups of students, in whole class settings, or between teachers and students. In some of the elementary and secondary studies reviewed in this chapter, teacher analysis of practice, often of videos of practice, was coded for the degree to which teachers noticed 'cause-

effect relationships between teacher actions and student learning' (Santagata et al., 2007), 'discourse' and 'engagement' (Sherin et al., 2008), and 'discourse' (van Es & Sherin, 2002).

In the early childhood literature, this category of code is featured prominently, as the interaction framework of CLASS, rooted in the focus on serve and return adult-child interactions, is used to guide each of the interventions discussed in this paper.

2.14 Gaps in Literature supporting early childhood teachers learning to notice

Several gaps exist in the literature on supporting teacher noticing. First, the vast majority of this research has been conducted with elementary and secondary teachers, specifically many teaching math and science in middle or high school. Further research is needed to understand the design and impact of interventions designed to improve teachers' noticing in other disciplines and supporting various developmental domains, including teachers of children in early education and elementary settings.

The recent research that has been conducted with early childhood teachers has focused almost entirely on teachers' implementation of the CLASS with a narrow focus on observational skills for the purpose of accurately learning to enact effective teacher-child interactions as defined in the CLASS. This has resulted in more of a focus on noticing teacher's roles and actions and interactions with children, without an equal focus on children's words and actions. Additionally, this has resulted in more of a focus on evaluating the practice of early childhood teachers and making child observations without a further focus on interpreting those words and actions to gain a deeper understanding of children's thinking and developmental needs.

However, for teachers' actions and words to be able to consistently result in positive child learning outcomes for all children, teacher education must move far beyond simply training

teachers to reliably enact a set of teaching practices. Although particular teaching practices may have previously been linked through research to causing positive child outcomes on average, effective teachers must constantly evaluate the effectiveness of those teaching practices with children in their own classroom. As a result, teachers' evaluation of their own practice must be grounded deeply in their interpretation of children's actions and words and their interpretation of the impact of their teaching practice. According to van Es and Sherin (2002) often

> [teacher education programs] focus on helping teachers learn to act, often providing them with instruction concerning new pedagogical techniques… [but] they do not necessarily ensure that teachers will learn to interpret classroom interactions in ways that allow for flexibility in their approach to teaching (p. 572).

Thus, an effective method of supporting teacher noticing is to first guide teachers to focus attention on individual children's words and actions, then develop the analytic skills necessary in order to interpret children's learning. Only then must teachers move to evaluate their own actions, in light of how effective they supported children's learning, and propose alternative pedagogical ideas. Ultimately, expert teachers learn to do this "in the moment" in order to engage in responsive and adaptive teaching.

Supporting early childhood teachers to not only focus on their own practice and their interactions, but to focus equally on how to interpret children's words and actions would support them to better know how to effectively enact serve-and-return, high-quality, extended interactions. In a busy complex classroom, they would be better prepared to notice: to pay attention to and interpret "serves" and make decisions about which ones to "return" and how to do so most effectively.

Given the need to support early childhood teachers to notice, research is needed to determine the effectiveness of specific design features of professional development models, measuring to what extent they positively impact teachers' noticing skills and to what extent teachers' noticing skills mediate their improvement of teaching skills and positively impact children's learning. In their article, Hosun Kang and Elizabeth van Es call for research to determine effective methods for the productive use of video within teacher preparation programs, in order to support student teachers' noticing and teaching skills (2018). Design features include facilitating discussion and self-analysis and the use of protocols using videos of practice. The professional learning community model seems especially promising as a focus of research, given the possibility of building upon the specific characteristics outlined in prior research. Finally, conducting research in which student teachers are randomly assigned into control and intervention groups in order to test the efficacy of an intervention is particularly challenging within the structures and limitations of teacher preparation higher education programs, yet this strong research design is needed to inform the practices of those very teacher preparation programs.

2.15 Overview of the Current Study

Grounded in the literature review, the present study is a response to these gaps in the research. In order to examine whether teachers who participated in a video-mediated Facilitated Professional Learning Community (F-PLC) course section displayed positive changes in their ability to notice teacher-child interactions in classroom contexts and propose alternative teaching moves to support those children's learning compared to a video-mediated Un-facilitated Student Learning Groups (UF-SLG) course section, a between groups, independent measures randomized control study was conducted within a concurrent, embedded mixed method design. Teachers

were randomly assigned into control (UF-SLG) and intervention (F-PLC) course sections. Teachers were also asked to rate their own and their peers' levels of participation and their satisfaction levels related to the amount they felt they learned and efficacy of the instructional method. The study aimed to answer the following research questions.

1. Does participation in the Facilitated PLC course section result in teachers' increased ability to attend to what is significant in teacher-child interactions than teachers who did not participate in in it?
2. Does participation in the Facilitated PLC course section result in teachers' increased analytic ability when observing teacher-child interactions than teachers who did not participate in in it?
3. Does participation in the Facilitated PLC course section result in teachers' increased ability to propose alternative practices when observing teacher-child interactions than teachers who did not participate in in it?
4. What is the impact of membership in a course section (F-PLC or UF-SLG) on teachers' perceptions of its effectiveness on their own learning and on their own and peers' levels of participation?

Chapter 3. METHODOLOGY

The study design used to explore the research questions will be explained in detail. First, the participants will be introduced, followed by the setting. Next, the research procedures will be described in detail, with special attention given to the course and the intervention section. Finally, the measure and data analysis will be explored.

3.1 PARTICIPANTS

The participants were 55 students enrolled in and earning college credit for successful completion of this course. 98% of the participants were located geographically around the United States in states such as California, Idaho, Oregon, New York, and Nevada with 2% located in other countries. Approximately 66% of them were located in Washington State, with most of those students in or near the greater Seattle area. The students represented various levels of teaching experience as well as varied educational levels in relation to early childhood education, from no previous related education to having a Child Development Associate Credential (CDA) or an associate of arts degree in early childhood education with additional professional development. Preservice and novice teachers comprised almost half of the participants, with 16% of the students having had no previous teaching experience and 25% of the students having had one to two years of teaching experience. 39% of the students had three to five years of teaching experiences and 20% had ten or more years. A required component of the course was that students spent at least three to five hours weekly in an early learning classroom implementing teaching skills from the course, although many students met this requirement through their current job. During the course, 47% were serving as either a lead or assistant teacher in an early

learning classroom or family childcare, teaching children from infancy through pre-kindergarten. 9% of the students were serving as an administrator, director, or family support coordinator and 44% were volunteering in an early childhood classroom at least once weekly.

3.2 SETTING

The study was conducted in two sections of an undergraduate course, Engaging Interactions and Environments, within a fully online Early Care and Education Bachelor of Arts completion degree program in the College of Education at the University of Washington. In this study, a 'course section' is defined as a teaching unit lasting for one quarter and led by two instructors in a co-teaching model. The researcher served as the co-instructor for both course sections, with all grading and feedback randomly dividing equally between both instructors who coordinated closely to achieve reliability on grading assignments using shared rubrics and offering student feedback. The enrolled students remain for the entire quarter and are evaluated formally through a variety of assignments, receiving an official grade at the end of the course. All students pursuing this degree were required to take this course in the second quarter of their first year in the program and all were concurrently enrolled in another course about how to understand and read research in the early childhood field. The goals and learning objectives of this course as well as the research design were informed by its placement in this larger teacher preparation program, attending to the importance of supporting teachers' long-term learning trajectories over time. This course was one of the very first practice-based teaching methods courses that students took in this program, as well as the first time they were asked to enact and capture on video their new teaching skills in order to analyze. Subsequent courses in the program

build on student learning in this course to continue to support them to refine noticing skills as integrated with all other knowledge, skills, and beliefs.

The course was conducted fully online using the Canvas learning management system and Coaching Companion, a web-based platform for sharing videos, analyzing and giving feedback to peers. Parental consent was obtained from all families of children in teachers' classrooms who appear on their teaching videos that were submitted to the course sections in this study.

3.3 Site and Participation Selection

Selecting this site and these participants offers several affordances. These teachers represent a wide range of teaching experiences with many serving as current lead or assistant teachers. This diversity of experience level reflects the reality of current groups of early childhood teachers learning together in the field, supporting generalizability to other similarly diverse groups of teachers. This is grounded in a situated view of teacher learning from novice to expert as occurring within interactions and collaborations with those of differing expertise, thus viewing this diversity as strength. Additionally, these participants are a part of increasing numbers of early childhood teachers enrolling in bachelor degree programs, offering important insights to effective methods of supporting their learning. Finally, the fully online delivery of this course, with student teachers engaging in online discourse with each other and offering feedback in online text offers a unique affordance to study this accessible method of teacher preparation education.

3.4 Research Design

An independent measures randomized control experiment was conducted within a concurrent, embedded mixed method design to investigate the research questions. In addition to exploring if teachers' participation in the intervention F-PLC course section had a positive impact on their ability to observe, analyze and enact effective instructional interactions (research questions 1, 2, and 3), this study also sought to explore the teachers' perceptions about the effectiveness of their participation, including their own and peers' levels of engagement. Therefore two types of data were gathered concurrently, a pretest and posttest to determine the change in Teacher Noticing and a survey, including both ratings and open-ended responses. The survey was embedded within the theoretically-grounded primary experimental design, an appropriate method when seeking to explore participants' reactions to the experiment (Creswell & Clark, 2010).

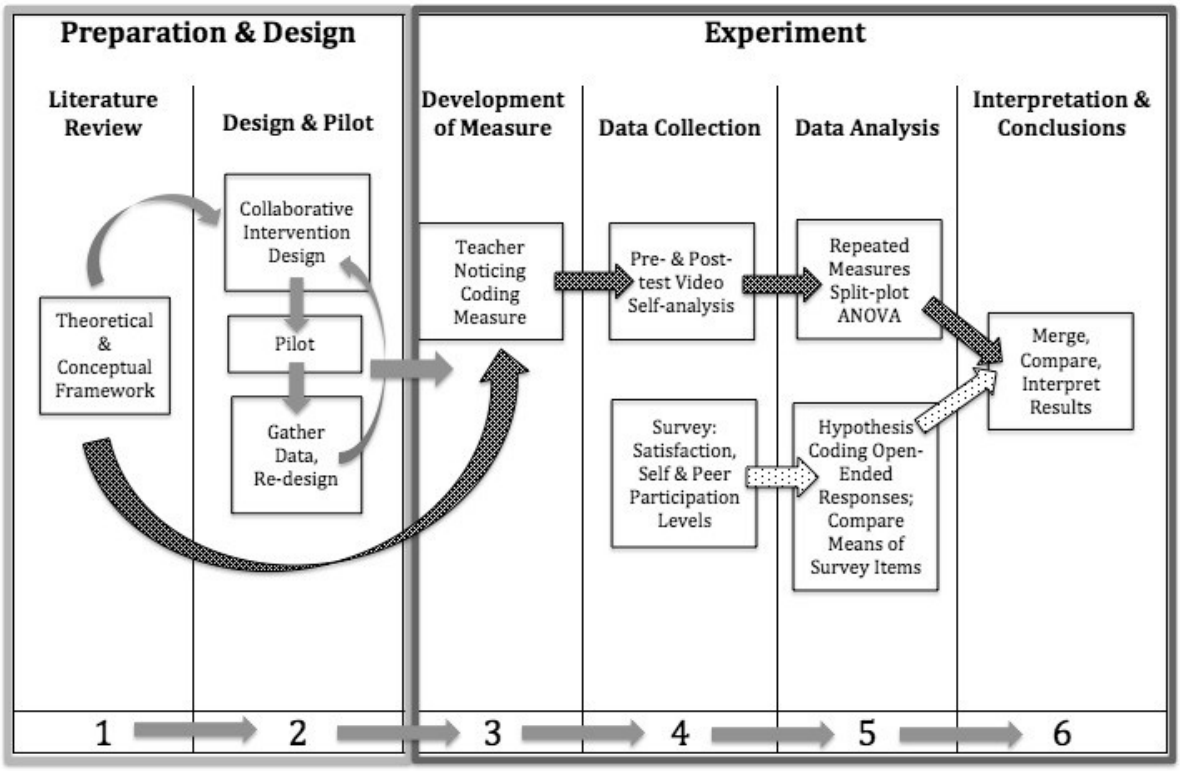
This is an important contribution to the literature, as a gap exists concerning the design mechanisms through which professional learning community development models effect change in teachers.

3.5 Research Process

The first stage of this study included an extensive literature review and the design of the intervention facilitated professional learning community course section based on that literature review. The second stage was a pilot study. The pilot study enabled the refinement of the "Enacting and Reflecting on Practice: Video and Reflection Guide" and the Peer Feedback Guides for both course sections as well as the methods for asking students to rate participation and satisfaction. The third stage of the study consisted of the experimental design and

simultaneous collection of several types of data during the academic quarter of winter 2017, in which students were enrolled in both sections. The fourth stage was data analysis.

Table 3.2. Research Process: Concurrent, Embedded Mixed Methods Design



Prior to the start of the quarter, during the previous quarter, student teachers followed a prompt to capture their own teaching practice on video and type a written reflection. These written reflections were gathered and served as a pretest measure of teachers' noticing skills. Students who enrolled in the course were randomly assigned into two course sections: 1) Facilitated PLCs Course Section and 2) Traditional Student Groups Course Section. At the end of the course, all students were asked to capture video of their teaching practice and follow the same prompt to type a written reflection, serving as a posttest of teachers' noticing skills. Additionally, students were asked to rate their own participation, the participation of members of their learning group or professional learning community, and their own satisfaction.

Initially, 71 students enrolled in the two sections and seven students withdrew from the course during the quarter, resulting in 64 students completing the course, with 30 students in the un-facilitated student learning groups section (control) and 34 students in the facilitated professional learning community course section (treatment). Eight of those students either did not complete the pretest or the posttest, so they were removed from the dataset, resulting in 23 students in the control and 33 students in the intervention.

3.6 Course Sections: Engaging Interactions and Environments

The course content of both sections is aligned with research findings that teachers' enactment of high quality interactions results in higher child outcomes (Hamre & Pianta, 2007) and was initially developed by the EarlyEdU Alliance, a higher education collaboration with state and federal agencies and institutions of higher education to support early childhood teachers to have access to high quality teaching degrees (2016). The following information describes the course content and the difference between the control and intervention course sections.

Table 3.3. Control and Intervention Course Section Details

	Control Course Section: Un-facilitated Student Groups	**Intervention Course Section: Facilitated Professional Learning Communities**
Course Content & Learning Objectives: Interactions	**Same**: Both reviewed the same readings, videos, websites, and other resources.	
Intentional Teaching Framework	**Same**: Both were introduced to the general framework, with an emphasis on the ultimate goal of improvement in teaching practice	
Video-based Pedagogies	**Same**: Both shared four videos of their own practice with their group of peers during the course	
Support Teacher Noticing	**Same**: Both intended to support teacher noticing	
Professional Learning Community Pedagogy		
Diverse/ Inclusive Membership	Random Assignment	Mixed Expertise
Shared Goals, Norms, Values	No facilitated discussion or information given	Information and facilitated discussion
Focus on Children's Learning and Development	**Same**: Both included a focus on supporting children's learning through high quality teaching practice.	
Facilitated Reflective Dialogue	No guidance, examples, or rubric; pass/fail grading	Guidance, examples, detailed rubric
Collaboration	No guidance about helping peers improve	Guidance and detailed rubric for helping peers improve
Demonstration of Improvement	Focus is on self-improvement	Focus on both self and peer improvement

3.6.1 *Same components in both course sections*

Both sections of the course design included the following elements.

1. Course Learning Objectives: Instructional Interactions

Clearly articulated learning objectives are an essential component of coursework, and an essential component of the productive use of video to support student teachers' learning, according to Kang and van Es's framework for "Productive Use of Video in Preservice Education" (2018). The following course learning objectives and aligned course content were grounded in the research that teachers' enactment of high quality instructional interactions results

in higher child outcomes (Hamre & Pianta, 2007) as explained in more detail in prior chapters. These interactions served as a shared framework of practice including types of interactions and pedagogical "moves" as decompositions of practice. The overall course learning objectives were a) identify, describe, and apply instructionally supportive interactions and explain how they support children's growth and skill development; b) analyze instructional support interactions in videos of your own and other teachers' early childhood classrooms; c) enact and exhibit effective instructional support interactions within your service learning setting; and d) examine your practice to identify strengths and specific ideas for improvement.

2. Grounded in the Intentional Teaching Framework

The course was designed to align with the components of the intentional teaching framework as described in detail in chapter 2: knowing, seeing, doing, and reflecting, all in order to improve. First, student teachers gained knowledge about the importance of interactions, specific types of interactions, and pedagogical moves to enact those interactions with young children to support learning. Decompositions of practice that are named and well defined support teachers in learning. Second, they were shown video examples of teachers enacting the interactions as representations of practice. Weekly quizzes served to offer student teachers a formative assessment on their knowledge and ability to see the interactions in videos of practice. Third, students were asked to regularly enact these instructional interactions with children in their classrooms, capture them on video, and reflect on those videos of practice. Finally, students were also guided to identify specific areas of improvement for themselves throughout the quarter, as the intentional teaching framework guides all learning to be specifically tied to continued improvement.

3. Incorporated Video-based pedagogies

To ensure that the use of video was productive in this course, special attention was given to how and by whom clips were chosen, how video tasks were designed for students, and which tools were used to facilitate video-based assignments, all aligned with the course learning objectives and prior research, important components of the productive use of video (Kang & van Es, 2018). Video was used for several purposes in the course. First, the instructor/ researcher selected particular clips to show as examples of course content and for students to analyze in knowledge checks. Second, students were given a video task four times throughout the quarter: to capture video of themselves enacting learned instructional interaction practice, edit, share what they feel is their best clip and reflect on it using a guided prompt, with an overarching goal of demonstrating improvement over the entire course. A variety of supports were given to students in filming themselves, as student teachers often encounter significant challenges with the use of video. Support included tutorials in using video and editing equipment, guidance in how to capture video in busy classrooms, and support in the vulnerable act of sharing personal videos of practice with peers. All students in both sections received instructor feedback on their videos and on their analysis of those videos throughout the course.

4. Supporting Teachers' Learning to Notice

As articulated in the course learning objectives and grounded in the literature review, one goal of this course was to support all student teachers' learning to notice, referred to as "seeing" and "reflecting" in the intentional teaching framework. The Enacting and Reflecting on Practice: Video and Reflection Guide is a tool that guided the process of observing and analyzing students' videos of practice (see Appendix A).

3.6.2 *Different components in both course sections*

The two course sections were different in terms of the way students were guided to interact with their peers around videos of practice. While students in the control course section were placed in un-facilitated traditional student learning groups, student interactions in the intervention course section were facilitated within professional learning communities.

This research study sought to examine the impact of implementing a facilitated PLC pedagogical model within this course as compared to a traditional learning groups pedagogical model, leaving all other course components the same across the two course sections (see Table 3.2). According to the productive use of video framework, this aspect of facilitating conversation around videos is an important component of course design (Kang & van Es, 2018).

1. Diverse and Inclusive Membership

Student teachers in both course sections were placed into small groups of 4-6 peers. Student teachers in the un-facilitated student learning groups section were placed randomly, while those in the facilitated PLC section were grouped heterogeneously according to teaching experience level, drawing upon a situated learning perspective in which teachers with different levels of expertise learn through interactions with each other about practice in authentic environments. However, because the participants in this study represented a wide range of experience levels, the randomly assigned control un-facilitated student learning groups were nearly equally as diverse in terms of membership as the facilitated PLC groups. Therefore, the results of this study could not be attributed to the levels of diversity of experience in these groupings. Further studies should be designed carefully to study the effects, if any, of grouping on teacher learning.

2. Shared Goals, Norms, Values

At the beginning of the course, students enrolled in the facilitated PLC course section received information about the benefits of membership in a PLC and were guided to get to know each other and develop group norms and commitments and shared goals. The un-facilitated student learning groups section were simply guided to introduce themselves to each other and share a teaching memory with their group. An overall goal of personally improving instructional interactions in practice was clearly communicated with both groups.

3. Focus on Children's Learning and Development

Both course sections included a focus on supporting children's learning through high quality teaching practices such as extending conversation, scaffolding, and questioning.

4. Facilitated Reflective Dialogue

In addition to information about the importance of reflecting, active and critical examination of practice, together in a PLC, student teachers in the F-PLC section were guided through a reflective protocol and corresponding rubric every two weeks during the course. Each time, instructors offered feedback to members about their participation in the group and offered tips for improvement as well as any needed support to ensure the continued focus of the PLC discourse on the topic and not wandering off topic. This structural and repeated cycle was designed to scaffold student teachers improved quality of reflection in the PLC over time.

5. Collaboration and Demonstration of Improvement

Participants in the F-PLC course section received information about the positive impact of collaboration, adopting a shared responsibility for improvement of each member of the group-helping peers improve. Although both sections of the course were grounded in the intentional teaching framework, which emphasizes improvement, the participants in the F-PLC section were

taught how and held accountable for giving peers constructive feedback in order to promote their improvement, while the UF-SLG section were not (see Appendix B for the Un-Facilitated Student Learning Groups course section Peer Feedback Guide). The F-PLC student teachers used the Facilitated Professional Learning Community course section Peer Feedback Guide (see Appendix C) to receive and offer coach-quality feedback on the quality of the interactions in their PLC members' videos of practice, especially emphasizing the analysis and detailed feedback on specific instructional interactions of PLC members' videos. Student teachers received feedback from instructors on the quality of their feedback to peers, according to a detailed rubric.

3.7 Data Collection Methods

Data collection began at the end of the prior quarter when all students were asked to write a reflection of a video of their teaching practice following the same Enacting and Reflecting on Practice: Video and Reflection Guide (Appendix A). At the end of the course, all student teachers enrolled in both course sections were asked to write a reflection on another video of their practice using the same prompt. Additionally, participants were asked to complete a survey at the end of the course about their perceptions about their own learning process and to rate the level of participation of their peers and themselves in their student learning groups or professional learning community and their satisfaction. The written reflections and surveys were submitted by students on two online websites: the Canvas learning management system and the Coaching Companion and were collected by the instructor/ researcher and co-instructor.

3.8 Data Analysis Methods

Student pretest and posttest written analysis of videos of practice were analyzed in order to answer research questions 1, 2, and 3. The Teacher Noticing coding measure was developed from a set of codes originally developed by Elizabeth van Es (2011) in order to analyze this data and also built upon a "learning to notice" framework she created with Miriam Sherin (2002) (see Appendix D). This measure is designed to evaluate individuals' growth over time in their ability to notice when observing teacher-child interactions, as defined in chapter 1.

Students' written video analysis from both course sections were combined, including pre-course video analysis text and post-course video analysis text and a total of 112 written analysis were blind coded. They were coded by the researcher and a graduate student who was trained on the coding measure. Differences between the two coders were discussed and resolved in order to come to a shared consensus, with inter-rater reliability calculated as greater than 85%. After the essays were coded, they were then placed in one of the levels, as defined in Appendix D.

The resulting data were subjected to a repeated measure split-plot analysis of variance (ANOVA) with treatment condition (course section) as the between-subject factor and immediate and delayed video analysis (including both detection of instructional interactions and analysis of children's learning and teacher behavior) scores as the within-subject factor.

Finally, averages of student ratings of their own participation level, their peers' levels of participation, and their overall satisfaction in participating in this method of learning were calculated and compared across control and intervention to observe any patterns. Open-ended responses were coded according to the components of the Intentional Teaching Framework: knowing, seeing, doing, and reflecting, further illuminating and explaining the quantitative ANOVA results.

Chapter 4. RESULTS

4.1 Overview

In the following chapter, detailed results will be presented for each research question. First, descriptive statistics for the Facilitated PLC course section and comparison groups on pretest and posttest scores for all outcome measures are presented in Table 4.4 below. Next, the comparison results of analysis between the two course sections in terms of attending, analyzing, and proposing alternative practices are reported. In order to answer the first three research questions, SPSS was used to analyze data with a two-factor split-plot ANOVA, examining the impact of participation in course section on teacher noticing. The final research question was answered through an examination of a survey gathered at the end of the course from all students enrolled in both sections. Results of ratings and one open-ended response were analyzed, comparing the findings of the control and intervention course sections. Finally, a summary is presented at the end of the chapter.

4.2 Tests of Hypotheses for Research Questions 1, 2, and 3

4.2.1 *Descriptive Statistics*

The results of pretest and posttest for student teachers in the experimental and control groups are presented as scores in Table 4.4. Each score of the three components, attending, analyzing, and proposing alternative practices, resulted in a 1-4 rating as described in the Teacher Noticing Measure (see Appendix D) with 4 being the maximum number of points a student teacher could earn for each of the three components.

Table 4.4. Descriptive data for each of the teacher noticing scores of students in the treatment and control groups

Group	Test	Criteria	Mean	Standard Deviation	N
Control	Pretest	Attend	1.70	0.76	23
		Analyze	1.22	0.42	
		Propose Alternative Practices	2.57	0.95	
	Posttest	Attend	2.22	0.74	
		Analyze	1.65	0.57	
		Propose Alternative Practices	2.26	0.92	
Treatment	Pretest	Attend	1.34	0.48	32
		Analyze	1.03	0.18	
		Propose Alternative Practices	2.06	0.76	
	Posttest	Attend	2.00	0.92	
		Analyze	1.75	0.51	
		Propose Alternative Practices	2.59	0.98	
Total	Pretest	Attend	1.49	0.63	55
		Analyze	1.11	0.31	
		Propose Alternative Practices	2.27	0.87	
	Posttest	Attend	2.09	0.84	
		Analyze	1.71	0.53	
		Propose Alternative Practices	2.45	0.96	

4.2.2 *Description of Statistical Analysis*

To answer research questions 1, 2, and 3, the data were subjected to a two-factor split-plot (one fixed within-subjects factor and one fixed between-subjects factor) mixed model

ANOVA, conducted in order to test course section, time, and their interaction on each of three components of teacher noticing: Attending, Analyzing, and Proposing Alternative Practices. The within-subjects factor was time, with two measurements (pretest and posttest) and the between-subjects factor was the treatment condition, course section membership with two groups (control and intervention). The following null hypotheses were tested: (1) the mean scores of Attending, Analyzing, and Proposing Alternative Practices were equal between pretest and posttest; and (2) the mean scores of Attending, Analyzing, and Proposing Alternative Practices for each course section were equal.

On all three measures, posttest Teacher Noticing scores demonstrate improvement over pretest Teacher Noticing scores for teachers enrolled in the Facilitated PLC course section. Teachers enrolled in the Un-facilitated Student Group course section also demonstrate improvement in pretest Teacher Noticing scores for all measures except Proposing Alternative Practices, which actually decline from pretest to posttest.

4.2.3 *Research Question 1: Does participation in the Facilitated PLC course section result in teachers' increased ability to attend to what is significant in teacher-child interactions than teachers who did not participate in in it?*

Hypothesis 1: Student teachers who participate in the F-PLC course will demonstrate more of an increase in their ability to attend to what is significant from pretest to posttest scores than teachers who do not participate in it.

A two-factor split-plot ANOVA was used to analyze the difference. All assumptions for the split-plot ANOVA were evaluated and met including sphericity, homogeneity of variance, normality, and independence. Alpha was set at .05.

The ANOVA revealed a statistically significant within-subjects main effect for time (F_{time} =15.108, df =1,54, p =.000) (pretest, M = 1.530, SE =.084; posttest, M = 2.094, SE = .115). It also revealed a nonstatistically significant within-between subjects interaction effect between time and course section ($F_{time\ x\ course\ section}$=.084, df =1,54, p=.772) (See Table 4.5 for means and standard errors for the interactions.) . Finally, there was a statistically significant between-subjects main effect for course section ($F_{course\ section}$ =4.303, df = 1,54 , p=.043) (Control course section, M =1.957 , SE=.107; Intervention course section, M =1.667, SE = .090). Effect sizes were quite large for the significant effects *(partial* $\eta^2_{course\ section}$ = .074, power = .829; *partial* η^2_{time} = *.219*, power = .999) with very strong power. However, the power was very low for the non-significant effect (*partial* $\eta^2_{time\ x\ course\ section}$ = .002, power = .075).

Table 4.5. Split-Plot Analysis of Variance on Attending Scores

Effect	**Mean Square**	**df**	**F**	**Sig.**
Intercept	355.849	1	672.359	< .001
Course Section	2.277	1	4.303	.043
Error	.529	54		

Between-Subject Effects on Attending

Effect	**Mean Square**	**df**	**F**	**Sig.**
Time	8.620	1	15.108	< .001
Time*Course Section	.048	1	.084	.772
Error (Time)	.571	54		

Within-Subject Effects on Attending

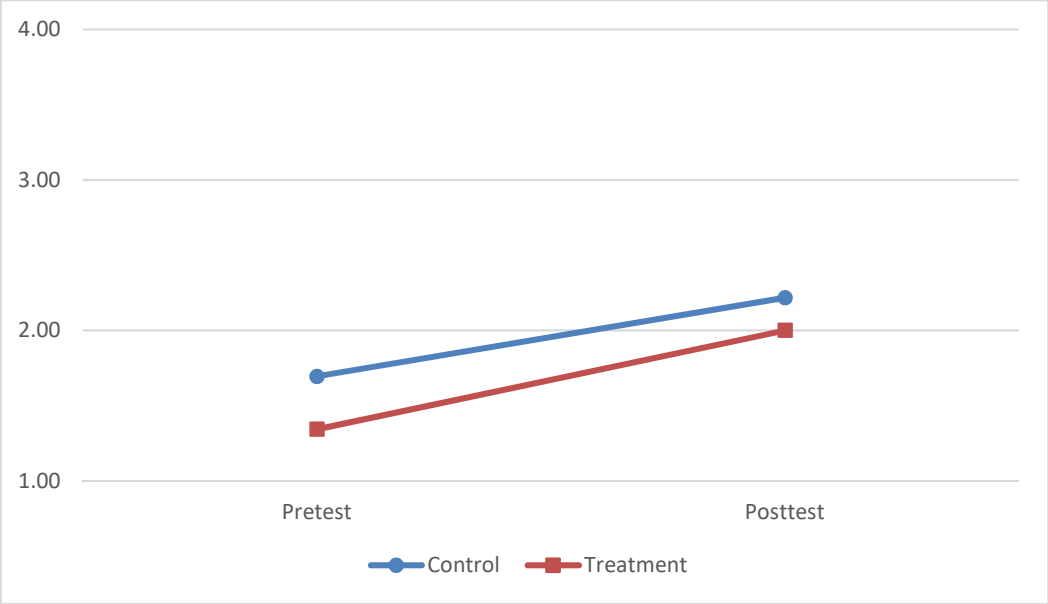


Figure 4.1. Line graph presenting the growth trends for the Attending scores for the treatment and control groups from Pretest to Posttest.

4.2.4 *Research Question 2: Does participation in the Facilitated PLC course section result in teachers' increased analytic ability when observing teacher-child interactions than teachers who did not participate in it?*

Hypothesis 2: Student teachers who participate in the F-PLC course will demonstrate more of an increase in their analytic ability from pretest to posttest scores than teachers who do not participate in it.

A two-factor split-plot ANOVA was used to analyze the difference. All assumptions for the split-plot ANOVA were evaluated and met including sphericity, homogeneity of variance, normality, and independence. Alpha was set at .05.

The ANOVA revealed a statistically significant within-subjects main effect for time (F_{time} = 42.663, df = 1, 53, p = .000) (pretest, M = 1.124, SE =.041; posttest, M = 1.701, SE = .073). It also revealed a nonstatistically significant within-between subjects interaction effect between time and course section ($F_{time \times course\ section}$ = 2.585, df = 1,53, p=.114) (see Table 4.6 for means

and standard errors for the interactions). Finally, there was a nonstatistically significant between-subjects main effect for course section ($F_{course\ section}$ = .306, df = 1,53, p= .582) (Control course section, M =1.435 , SE=.061 ; Intervention course section, M =1.391 , SE = .052). The effect size was quite large for the one significant effect *(partial* η^2_{time} =.446, power =1.000) with very strong power and moderate effect size and power for one non-significant effect (*partial* $\eta^2_{time\ x\ course\ section}$ =.047, power =.693). However, effect size and power were very low for the remaining non-significant effect (*partial* $\eta^2_{course\ section}$ =.006, power = .116).

Table 4.6. Split-Plot Analysis of Variance on Analyzing Scores

Effect	**Mean Square**	**df**	**F**	**Sig.**
Intercept	213.652	1	1252.784	< .001
Course Section	.052	1	.306	.582
Error	.171	53		

Between-Subject Effects on Analyzing

Effect	**Mean Square**	**df**	**F**	**Sig.**
Time	8.903	1	42.663	< .001
Time*Course Section	.540	1	2.585	.114
Error (Time)	.209	53		

Within-Subject Effects on Analyzing

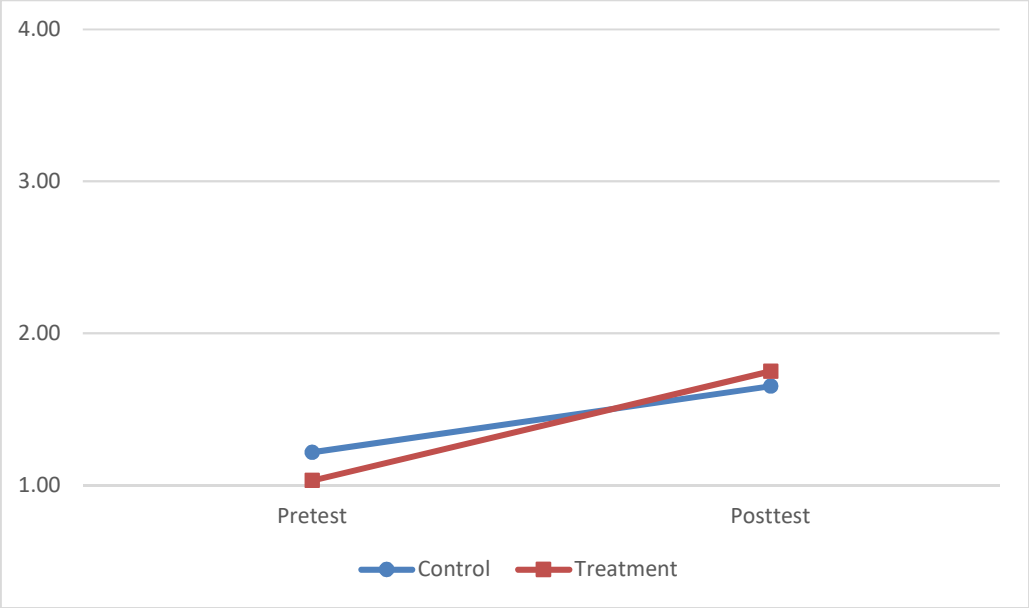


Figure 4.2. Line graph presenting the growth trends for the Analytic ability scores for the treatment and control groups from Pretest to Posttest.

4.2.5 *Research Question 3: Does participation in the Facilitated PLC course section result in teachers' increased ability to propose alternative practices when observing teacher-child interactions than teachers who did not participate in in it?*

Hypothesis 3: Student teachers who participate in the F-PLC course will demonstrate more of an increase in their ability to propose alternative practices from pretest to posttest scores than teachers who do not participate in it.

A two-factor split-plot ANOVA was used to analyze the difference. All assumptions for the split-plot ANOVA were evaluated and met including sphericity, homogeneity of variance, normality, and independence. Alpha was set at .05.

The ANOVA revealed a nonstatistically significant within-subjects main effect for time (F_{time} = .501, df =1,53, p =.482) (pretest, M = 2.314, SE = .115; posttest, M = 2.427, SE = .130). Of particular note, is that it also revealed a statistically significant within-between subjects interaction effect between time and course section ($F_{time\ x\ course\ section}$= 6.799, df =1,53, p=.012) (see Table 4.7 for means and standard errors for the interactions). Finally, there was a

nonstatistically significant between-subjects main effect for course section ($F_{\text{course section}}$ =.208, df = 1,53, p=.650) (Control course section, M =2.413 , SE=.142 ; Intervention course section, M =2.328, SE =.121). The effect size was quite large for the one significant effect (*partial* $\eta^2_{\text{time x course section}}$ =.114, power =.972) with very strong power However, effect size and power were very low for the remaining non-significant effects (*partial* $\eta^2_{\text{course section}}$ =.004, power = .096; *partial* η^2_{time} =.009, power =.177).

Table 4.7. Split-Plot Analysis of Variance on Proposing Alternative Practices Scores

Effect	**Mean Square**	**df**	**F**	**Sig.**
Intercept	601.611	1	647.267	< .001
Course Section	.193	1	.208	.650
Error	.929	53		

Between-Subject Effects on Proposing Alternative Practices

Effect	**Mean Square**	**df**	**F**	**Sig.**
Time	.344	1	.501	.482
Time*Course Section	4.672	1	6.799	.012
Error (Time)	.687	53		

Within-Subject Effects on Proposing Alternative Practices

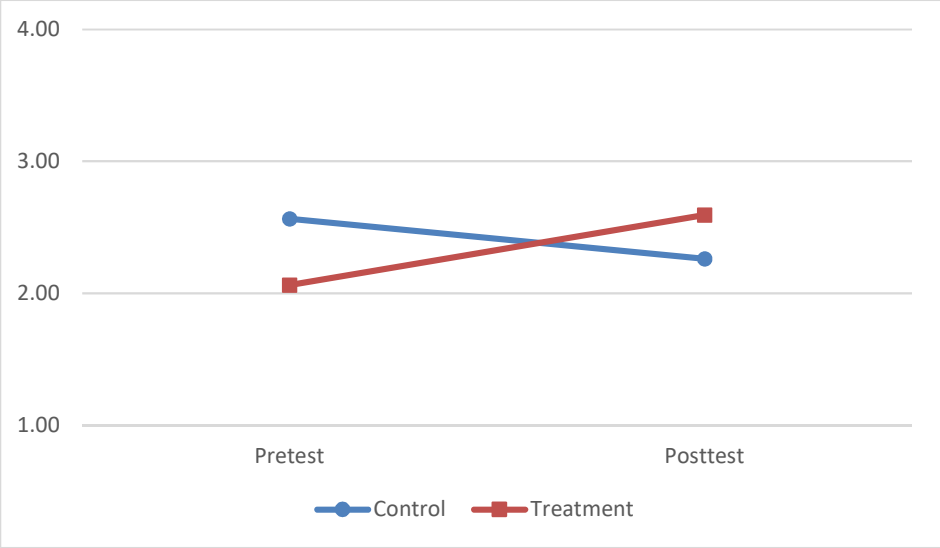


Figure 4.3. Line graph presenting the growth trends for the Proposing Alternative Practices scores for the treatment and control groups from Pretest to Posttest.

4.3 Tests of Hypothesis for Research Question 4

4.3.1 *Research Question 4: What is the impact of membership in a course section (F-PLC or UF-SLG) on student teachers' perceptions of its effectiveness on their own learning and on their own and peers' levels of participation?*

Hypothesis 4: It would be expected that students enrolled in the intervention (F-PLC) course section would rate the impact of the course on their learning and their levels of participation higher than the ratings of students enrolled in the control (UF-SLG) course section.

At the conclusion of the course, students in both course sections were asked to reflect upon their participation in the course in several aspects through a survey. The following portion of this chapter describes students' ratings of their own and peers' levels of participation, their perception of the impact of four aspects of the course on their learning and themes emerging from their descriptions of the specific impact of analyzing peer videos to offer feedback on their own learning. Results will be explored and responses from teachers in the control and intervention course sections will be compared.

4.3.2 *Student Teachers' Participation Ratings: Self and Peers*

At the conclusion of the course, students were asked to rate their own level of participation and that of each of the peers in either their student group (UF-SLG) or professional learning group (F-PLC) on a scale of 1-4. They responded to the following prompt:

> Please offer a rating of the extent to which each member of your group participated and contributed to your group, including yourself. Your feedback is anonymous and will not be shared with other students. Follow the prompts below to type in the name of each member of your group, including yourself, and select a corresponding rating:

4- Very High Quality Participation (always timely, offered thorough peer feedback, communicated if late);

3 - Good Participation (usually timely, offered good peer feedback, sometimes communicated if late);

2 - Low Participation (often late, missing or offered low quality peer feedback, rarely or never communicated of late);

1 - Never participated

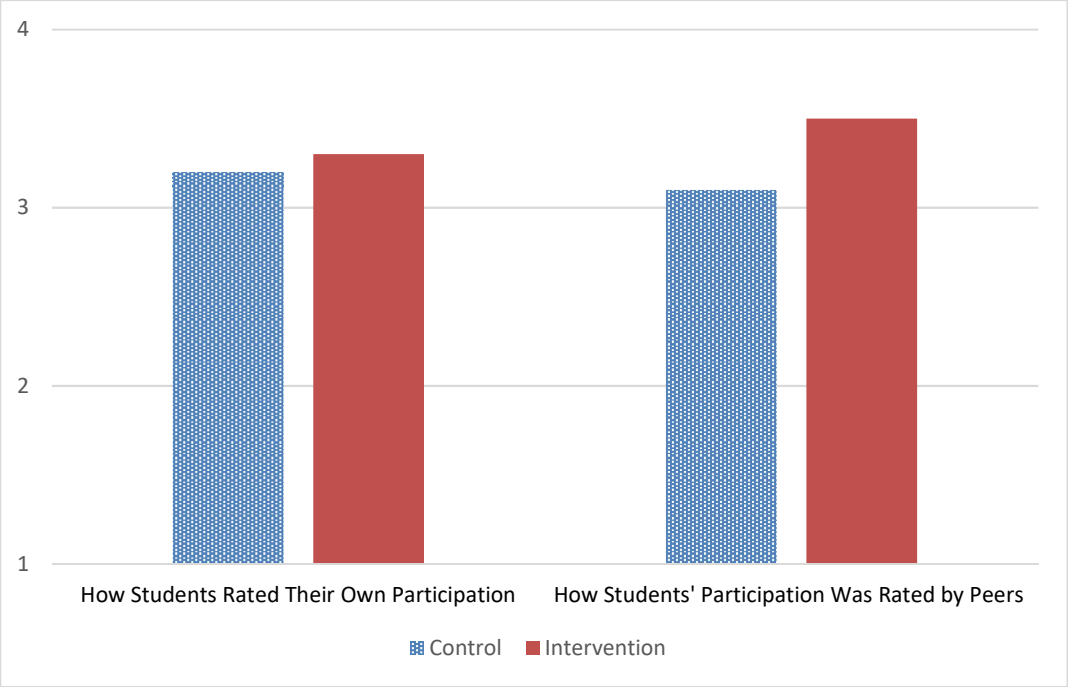


Figure 4.4. Student teachers' ratings of selves and peers on levels of participation

Students in the intervention rated their own level of participation (3.3) as slightly higher than did students in the control (3.2). Students in the intervention also rated their peers' levels of participation (3.5) as higher than students in the control rated their peers' levels of participation (3.1). It is interesting to note that in the control course section, students rated themselves slightly higher than peers rated them, while in the intervention students rated their peers' participation higher than their own. Students enrolled in the intervention course section were reported as

having higher levels of participation by themselves and peers, a potential positive impact of the facilitated PLC pedagogical teacher education approach.

4.3.3 *Student Teachers' Perceptions of the Impact on Their Learning*

At the conclusion of the course, students were asked to rate various components of the course in terms of impact on learning. They followed this prompt:

> Rate the extent to which each of the following components of this course supported you to learn and improve: A) Applying the knowledge you gained from course material with children and capturing it on video; B) Analyzing your own video and writing a self-reflection; C) Analyzing peer videos and writing peer feedback; D) Receiving feedback from peers.

6 = Strongly supported your learning
5 = Supported your learning
4 = Somewhat supported your learning
3 = Somewhat did not support your learning
2 = Did not support your learning
1 = Strongly did not support your learning

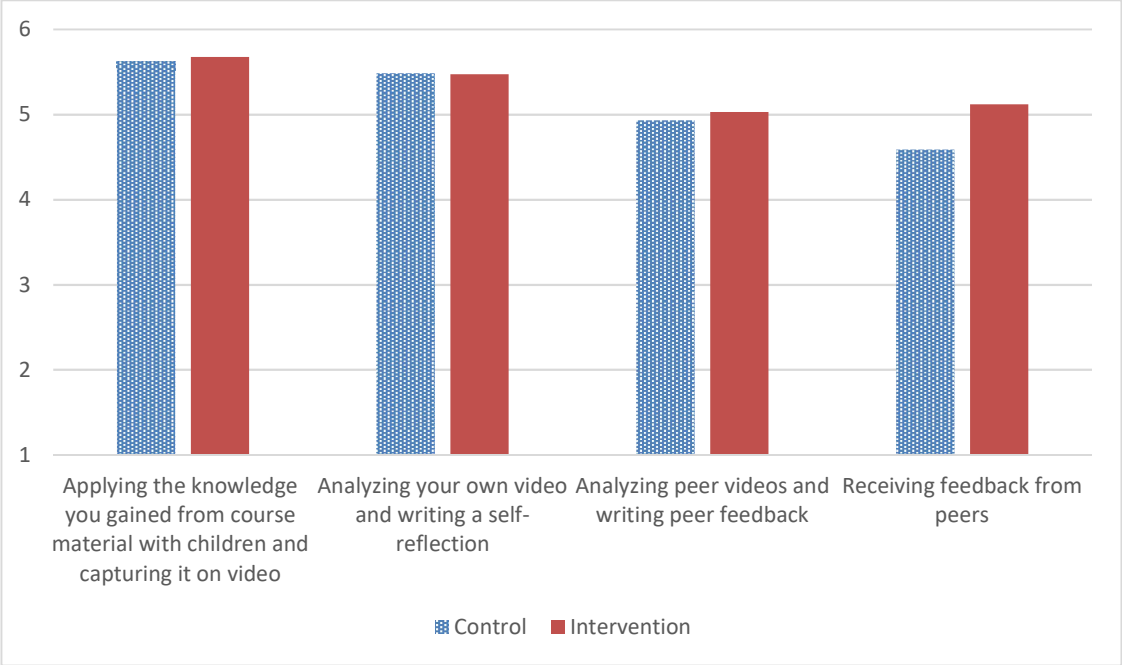


Figure 4.5. Student teachers' ratings of impact on learning

Students in both control and intervention course sections similarly rated the impact of several aspects of the video-sharing approach on their learning: applying knowledge from the course to enact practices and capture on video; analyzing that video, and analyzing peers' videos of practice to write feedback. This includes aspects that were the same across both courses (applying course knowledge to capture on video and reflect upon it). It also demonstrates that all students across both courses found the process of analyzing peer videos and writing feedback to be equally beneficial. The difference is observed in the degree to which students found receiving peer feedback to be supportive of their learning, with students in the facilitated PLC intervention course section rating this higher than the control un-facilitated student group section.

4.3.4 *Student Teachers' Descriptions of the Impact of Analyzing Peer Videos on Their Learning*

In order to understand more about student teachers' perceptions of how giving and receiving peer feedback supported their learning, they were also asked to specifically reflect on the impact of analyzing their peers' videos on their own learning. They typed a response to the open-ended question, "How, if at all, did analyzing your peers' videos and writing feedback to them help your own learning?" The responses ranged in length from one to three sentences and were submitted electronically as a part of a survey within the Canvas learning management system at the conclusion of the course. Coding categories were drawn from the Intentional Teaching Framework (Hamre, Downer, et al., 2012): know, see, reflect, and do, as defined in the literature review of this study and aligned with the key components of video-mediated teacher learning in the context of professional learning communities. Student responses were coded and frequency of codes were tallied (Table 4.8) and analyzed according to control and intervention course sections for comparison.

Table 4.8. Student impact of peer video analysis on learning

Themes from students' open-ended responses to the prompt: "How, if at all, did analyzing your peers' videos and writing feedback to them help your own learning?"		Number of Occurrences in Control Reflections UF-SLG (N=23)	Number of Occurrences in Intervention Reflections F-PLC (N=32)
SEE/REFLECT: Improved Noticing Skills	Helped analyze videos of self more effectively	4% (1)	28% (9)
	Helped analyze and write peer feedback more effectively	13% (3)	13% (4)
KNOW: Improved Knowledge of Teaching Practices	Writing constructive feedback to peers improved knowledge of practices	17% (4)	41% (13)
	Observing peers' implementation of teaching practices improved knowledge of practices	30% (7)	19% (6)
DO: Improved Planning and Enacting Teaching Practices	Receiving constructive feedback from peers helped improve practice	0% (0)	19% (6)
	Receiving positive or general feedback from peers helped improve practice	26% (6)	0% (0)
	Comparing peers' practice to self helped improve practice	17% (4)	9% (3)
	Peer videos gave teaching practice ideas to implement	57% (13)	31% (10)
Did Not Improve Learning		30% (7)	12% (4)

4.3.4.1 See and Reflect: Improved Teacher Noticing Skills

Across the two course sections, several students described ways in which the process of analyzing peers' videos actually supported their skill in analyzing other videos of practice, whether of their own or other peer videos. Only one student (4%) in the control course section described how the analysis of peer video supported the analysis of their own video, while 28% of students in the intervention course section explicitly described this impact. Many of them made the connection between the role of offering constructive feedback to peers and their ability to identify specific differences in their own practice. This helps to illuminate the finding that students in the intervention course section improved from pretest to posttest in the measure of "proposing alternative practices" when analyzing their own video of practice, while students enrolled in the control course section decreased from pretest to posttest.

These two sources of data analysis confirm that students who received scaffolding to provide objective, specific, and constructive "coach-quality" feedback to peers not only transferred that skill to analysis of their own practice but many of them identified the impact explicitly upon reflection. One student enrolled in the intervention course section described it as being "helpful to practice analyzing someone else's work because it helped me put that critical lens on, which in turn made it easier to apply that same critical lens to my own practice." Another student stated, "It made me realize that I needed to apply some of the feedback I was offering into my own videos. I would have a few "aha" moments, where after commenting, I would think, 'Well, perhaps I need to re-watch my videos again and...apply this information to the next video."

Another theme that emerged within the category of teachers' increased noticing was the way they felt that analyzing peers' videos and writing feedback helped them to further develop

their attending, analytic, and proposing alternative practices in order to craft peer feedback. Students in the F-PLC intervention group were generally specific in terms of aspects of this skill that improved, such as "being objective and writing observations similar to what I would be doing in [the observation-based assessment Teaching Strategies] GOLD", giving "feedback that is specific and constructive much like what we learned about providing feedback to children," and "practicing my coaching skills." One student asserted an impact on "think[ing] critically about areas in early childhood and another student realized that they were learning to "really observe based on the interaction strategy and not my subjective point of view." Three students (13%) enrolled in the control course section also made comments that fit within this theme, with two of them being general comments about the "opportunity to work on communication skills" and "a different opportunity which was trying to provide feedback in a clear, useful, yet respectful way." Just one student in the control course section mentioned anything explicitly related to constructive feedback, when they stated, "It also helped me to learn how to put into words constructive comments for my cohort."

4.3.4.2 Know: Improved Knowledge of Teaching Practices

Many students described another theme, the ways in which watching and writing feedback about peers' videos of practice supported them to improve their understanding of the teaching practices taught within the course, effective teacher-child interactions. Students across the two course sections reflected upon the role of observing peers' implementation of teaching practices as contributing to their own improved knowledge of those practices at somewhat similar rates (control- 30%, intervention- 20%) with the nature of these comments being similar. Students referred to watching peer videos as offering helpful examples of the teaching practices in "different school settings, group sizes, and relationships" and as "adding another dimension,

more depth, to my understanding of the material." Another student stated that it caused them to "stop and think about what the other members and their kids did, and how that related to the course materials. It's easy to understand the concept when the instructor says, 'When a child does _____, they are working on _____.' It's very different in a real life scenario and I have to construct the meaning myself." These student perceptions confirm the nature of learning as situated and support the idea that a resulting effective pedagogy is observing a variety of peer teaching videos, independent of the quality of the peer discussion and analysis of those videos.

However, a large number of students in the intervention (41%), went beyond statements about viewing peers' videos to claim that writing peer feedback to peers based on their viewing of the videos supported their knowledge development of the teaching practices, while only 17% of students in the control course section made this claim. As one student claimed, "I had to be more aware of what high quality instructional interactions look like so I can provide the best feedback possible." Another student stated that "offering them feedback forced me to find ways of offering constructive feedback which made me think more deeply about the strategies themselves." Finally another student "got the opportunity to test whether or not I could watch an instructional interaction and name the strategies that were being used." Many of the comments by students in the intervention course section specifically mentioned the impact of giving constructive or specific feedback, not simply positive or general feedback.

4.3.4.3 DO: Improved Planning and Enacting Teaching Practices

In a similar manner as students described the impact on their knowledge about practices, across both course sections students identified several ways that their ability to move beyond simply knowing about teaching practices, in order to plan for and enact them was supported through viewing and writing feedback on peer video. Students in both course sections described

the value of being able to compare peers' practice to their own practice in order to improve their ability to enact those practices better (control-17%, intervention- 9%), and the value of observing peer videos in order to get new ideas for how to better implement the practices (control- 57%, intervention- 31%). One student summarized this: "I think that being able to watch how someone else takes the same knowledge that I have learned and executes the skills in a different way is very helpful. It gave me different perspectives and ideas for my intentional interactions." Another student articulated the value of observing near peers: "This was one of my favorite parts of the class because I could reflect on what I would have done (better or worse) from the standpoint of someone who is standing in a very similar place to where I am standing in terms of this journey of becoming a better teacher." It is valuable for students to not only view exemplar videos of practice, but to examine a variety of videos of their peers.

The manner in which students talked about the impact of receiving peer feedback, however, was very different between the two course sections. 26% of the students in the control course section stated that they received positive or general feedback from peers that helped them improve; none of them mentioned receiving constructive feedback from peers. In contrast, nearly 20% of students in the intervention mentioned that receiving constructive feedback from their peers helped them to improve their enactment of practices; none of them simply mentioned general or positive feedback. For example, a student from the control course section stated, "It helped me because it gave me a "outside" person's opinion. I may have overlooked some things and having peer feedback told me the things that I didn't see. It was like someone proof reading your essay and helping you correct and make it better." In contrast, students from the control course section offered reflections such as, "The video assignments helped me a lot! I appreciate the feedback of teachers and peers!" and "I loved hearing positive feedback from [peers]." It is

noteworthy that this group of students in the facilitated PLCs were able to feel comfortable and supported enough to give and receive constructive and balanced feedback that many appreciated and found valuable, while no one in the intervention mentioned feeling uncomfortable or unwilling to give or receive constructive feedback. Although this may be challenging for student teachers, these findings support the idea that it is possible to scaffold successfully within teacher education courses.

4.3.4.4 Not Supportive of Learning

While students enrolled in the intervention did not mention any challenges with giving constructive feedback, several students in the control reflected upon this. One of them wrote: “As far as writing feedback, I found I mostly wanted to find something good about the interaction and share that rather then criticize anything. So, I'm not sure how honest any of the feedback was...it probably tended to be a little generic.” Another student described that writing the peer feedback “was hard because I was worried I might hurt their feelings. I tried to focus on what they commented on themselves and then stick to positive comments.” Overall, 30% of them mentioned an aspect of analyzing peer video that they felt did not support their learning. Within the students enrolled in the intervention, 12% stated something that did not support their learning, including one related to personal hardships during the quarter and another: “I have to say this part I did not find much value in because I did not really take advantage of it to its full capacity.” Two students in the control section and two students in the intervention section stated that the entire practice of giving and receiving peer feedback was not at all beneficial to their learning. Following up with those students would be valuable in terms of better understanding what barriers existed in this pedagogical model and what they feel would better support their learning. A mid-course survey, asking students for open-ended responses describing what is

supporting their learning and what would better support their learning, related to the video-mediated group discussions would provide the opportunity for a teacher educator to quickly identify teachers or groups who are struggling during the course and provide additional support and scaffolding.

4.4 SUMMARY

This chapter described the results of the analysis of data in order to explore the study research questions and hypotheses. Data analysis included split-plot mixed ANOVAs to determine the effect of the intervention on each of three aspects of teacher noticing: attending, analyzing, and proposing alternative practices. Finally, students' open-ended reflections on the impact of the video-embedded peer sharing pedagogy were coded and these qualitative themes were explored in light of the quantitative results.

Chapter 5. DISCUSSION

This chapter will summarize and discuss the major findings of this study's research questions in light of the literature review in chapter two, offering implications for the field. Finally, limitations will be discussed as well as future research directions.

The purpose of this study was to better understand how to effectively implement video-based learning activities within early childhood preservice education courses and to measure their impact on teachers' noticing skills when embedded within explicitly facilitated teacher professional learning communities. It addresses a need in early childhood teacher preparation for evidence-based methods that are grounded in an integrated theory of how teachers learn. The study design was an embedded mixed method design, centering around a randomized controlled experiment within a teacher preparation higher education course, using a guided video-embedded community of practice pedagogical model, aligned with the intentional teaching framework of teacher learning (Hamre, Downer, et al., 2012). Specifically of interest was the way teachers developed noticing skills, building on and extending research about the importance of this in supporting teacher learning (van Es & Sherin, 2002). This aim was addressed through four research questions related to the impact of the intervention on three aspects of noticing skills (attending, analyzing, and proposing alternative practices) as well as student teachers' perceptions about the effectiveness of their participation in the course.

5.1 Main Findings

5.1.1 *Research Question **1**: Does participation in the Facilitated PLC course section result in teachers' increased ability to attend to what is significant in teacher-child interactions than teachers who did not participate in in it?*

The results from the split-plot ANOVA showed that all students enrolled in both the control and intervention course sections improved in their ability to attend to significant aspects within their videos of practice. Students moved from observing children as entire groups to more frequently honing in on individual children's words and actions and they moved from focusing on children's behavior or their own feelings about seeing themselves on video to more frequently focusing on children's learning and the impact of their teaching practices on children's learning as connected to the teacher-child interactions highlighted in the course content. Students enrolled in the intervention course did not make significantly more gains than students in the control course section on this measure, indicating that participating in the facilitated PLC did not account for the gains. They might be attributed to students gaining more knowledge about the teaching practices, watching exemplar videos, enacting the practices, reviewing and reflecting on their enactment through watching their videos, or simply repeatedly watching peers' videos of practice independent of a structured discussion.

5.1.2 *Research Question 2: Does participation in the Facilitated PLC course section result in teachers' increased analytic ability when observing teacher-child interactions than teachers who did not participate in in it?*

The results from the split-plot ANOVA on analytic ability demonstrated very similar gains in scores as those for research question 1, attending, across both control and intervention course sections, with the intervention gaining a little more than the control, although not a

statistically significant difference. Therefore, these gains may be mostly attributed to the same course components as listed above and not attributable to membership in the intervention PLC. This growth represents students' movement from only making descriptive or evaluative comments to interpreting observations related to the impact of the teacher-child interaction on children's learning. It is noteworthy that pretest and posttest analytic scores were lower than both attending and proposing alternative practices scores, demonstrating that this skill is especially important for teacher educators to support in novice teacher development.

5.1.3 *Research Question 3: Does participation in the Facilitated PLC course section result in teachers' increased ability to propose alternative practices when observing teacher-child interactions than teachers who did not participate in it?*

Not only did students in the intervention course section make significantly more gains in their ability to propose alternative practices, the students in the control course section actually decreased in their levels of this measure from pretest to posttest. Given the statistically significant finding, participation in the facilitated PLC contributed to student gains. Growth in this area was demonstrated when students increasing the frequency of specific and concrete ideas for different actions they could have taken in the teacher-child interaction that would have better supported a child's learning. As students improve in this skill, not only are the alternative teaching practices specific and concrete, but they are increasingly supported by evidence from their observations (what they attended to) and their interpretations of those observations (analyzing). Students in the intervention were supported to repeatedly give coach-quality feedback, including both strengths and areas for improvement while students in the control were not supported in this way. After practicing this skill all quarter with peers, students in the intervention applied that skill in the posttest. Students enrolled in the control section, however,

did not practice this skill during the quarter, perhaps developing a habit of not proposing alternative practice ideas to their peers that caused them to offer less alternative ideas for themselves in the posttest than they did in the pretest. These findings offer compelling evidence for teacher educators to take the time to facilitate and scaffold peer interactions around shared videos of practice.

Overall, although gains were made nearly across the board on attending, analyzing, and proposing alternative practices, the mean posttest scores on each of these three components of teacher noticing remained under 3, on the 1-4 scale of the Teacher Noticing measure. It is important to interpret data in context, especially when evaluating a course within a teacher preparation program that is designed to support an overarching teacher learning trajectory. This course occurred in the second quarter of the program, after students had only taken coursework in child development, introduction to the field and being a resilient educator. This course offered the first introduction to teaching practices and the use of video as a tool for analysis. The intent of the program would be that students would continue to take practice-based courses throughout the entire program that would build upon this skills, including continuing to improve in attending, analyzing, and proposing alternative practices skills.

5.1.4 *Research Question 4: What is the impact of membership in a course section (F-PLC or UF-SLG) on student teachers' perceptions of its effectiveness on their own learning and on their own and peers' levels of participation?*

Several interesting themes emerged from students' reflections about the course that illuminate the statistical analysis for research questions 1-3. Nearly one third of students enrolled in the intervention stated that analyzing peers' videos, especially looking for specific ideas to help them improve, helped them to better analyze their own videos in order to find ideas to

improve while only one student (4%) from the control course section stated that this was the case. Indeed, the quantitative analysis of proposing alternative practices confirms that students' perceptions were accurate. Across different measures, students in the intervention were generally more satisfied with the peer interaction component, felt that it supported their learning more, and felt that they and their peers were more engaged than students in the control course section. It is important that students not only experience increased learning, but that they recognize when they are learning, what caused it, and how they can continue to engage in those methods to continue learning.

5.2 Limitations

The findings of this study offer important insight about how teacher education might better support teacher noticing, especially given the use of a control group in an experimental design. This methodology protects against the argument that growth may be due to the maturation of participants, for example, that they might have improved in their teacher noticing skills as a result of their experience and improvement in teaching skills and not as a result of participation in a PLC. The control allows for more robust conclusions about the cause of improvements in scores. Alongside these strengths, however, there are several limitations that must be considered alongside an interpretation of those results, including threats to both internal and external validity.

First, the selection of participants from within one early childhood teacher preparation program may cause an interaction of selection and treatment. Selecting subjects who chose to apply and were accepted into this undergraduate program may restrict the generalizability of results to populations that share these factors (Kirk, 2013). Additionally, subjects who were initially participants in the study were dropped due to incomplete data. However, participants do

represent diversity in terms of several other categories, including ages, geographic location, and other demographic features. Random assignment of subjects to intervention and control helped to distribute any sources of variation over the entire experiment, instead of it effecting just treatment level. The split-plot ANOVA used with the resulting sample size is robust against the impact of these dropped cases. Further, it helped to make sure that the error effects were statistically independent (Shadish, Cook, & Campbell, 2002).

Second, the characteristics of the setting as a fully online course within a bachelor completion program at a large university may also restrict generalizability of results to settings that share these factors. For example, these results may not generalize to traditional face-to-face courses or those in other degree programs or at other types of institutions of higher education.

A third limitation was in the use of a measurement that was grounded in prior research and theory, but was not subjected to a complete validity and reliability process. The result of this limitation related to instrument validity, the use of a dependent variable that may have low reliability, is that it may inflate the estimate of error variance "and result in not rejecting a false null hypothesis" (Kirk, 2013).

Finally, researcher bias may have impacted the study results because the researcher also served as a co-instructor for both course sections. Subject-predisposition effects or cooperative-subject effects may have caused the subjects to analyze videos, engage with peers, and rate and reflect on the experience at the end of the course in ways that were perceived to be desirable by the co-instructors (Kirk, 2013). The teaching method of dividing all teaching responsibilities including grading and giving feedback equally between two co-instructors, one of whom was not a researcher in this study helped to mitigate this limitation to some degree.

5.3 Practical Implications for Early Childhood Teacher Preparation

Teacher educators will be able to apply implications from this study into work teaching student teachers through practice-based approaches. Certainly it confirms that the use of video as a tool for reflection on practice is an important pedagogy teacher educators should employ, aligned with other studies that demonstrate this. Additionally, grouping students together with the goal of their learning together is valuable and is also aligned with prior research. However, one unique and important takeaway from this study for teacher educators is that asking students to engage in discussion about shared videos of practice with each other without intentionally scaffolding that discussion and holding students accountable for the quality of that discussion may have the unintended consequence of actually reinforcing less desired teacher noticing skills. If students repeatedly practice discussions with peers that are general, disconnected to the teaching practice of focus, and mostly offer positive feedback to peers, they will develop habits, not only of engaging with peers in this manner but also when reflecting on their own practice. Student teachers need to be explicitly taught the importance of and methods for engaging in productive conversations with peers, including offering coach-quality feedback.

Additionally, teacher educators can use this as a model of a practice-based course grounded in an integrated theoretical approach of how teachers learn and grow, the intentional teaching framework. The “knowledge” about teacher-child interactions is supported and reinforced through students “doing”, enacting in classrooms with children, “seeing” examples, and “reflecting”, or analyzing teaching practice, all supporting improvement over time. Of particular note, is the manner in which “seeing”, or teacher noticing, is called out explicitly in the intentional teaching framework as an important skill that aligns with and reinforces other teaching skills. Teacher educators might use the current study to ask themselves how they are

supporting "seeing" skills as they are defined as teacher noticing in this study: attending, analyzing, and proposing alternative practices.

This study also demonstrates that asking student teachers to not only observe exemplar videos provided by teacher educators, but to also review videos of their own and peers' practice with scaffolding is beneficial, even for student teachers early in a teacher preparation program. This addresses a call for further research into the most effective way to use video productively throughout the trajectory of a teacher preparation program, due to the need for a "coordination of the multiple components of a video-embedded activity system and its' consequences- whether and to what extent the video-mediated interactions increase preservice teachers participation in ways that are valued in the community" (Kang & van Es, 2018, p. 3). This study offers one example of how to guide students with the video analysis guide and peer feedback guide. It also offers a way to assess teacher Noticing skills within the Teacher Noticing Measure.

5.4 Future Research

This study supports several areas of further research. First, the study demonstrates one method for conducting randomized controlled studies within early childhood teacher preparation higher education coursework through the use of two course sections offered concurrently in a fully online course. It is important for future studies to employ similar methods to continue to be able to make robust causal inferences. Another opportunity for further research is related to the Teacher Noticing Measure, moving it through the process of determining reliability and validity.

Other aspects of the video-mediated pedagogy can be examined, including the use of different discussion and feedback protocols, evaluating the use of video itself as a teaching method through a controlled experiment, and evaluating the impact not only on noticing skills, but also on knowledge development and practice. Specifically, a very important next step for

research is to measure the impact of this teaching method on child outcomes as a result of the teachers' participation in the video-based peer sharing pedagogical model.

Finally, further research can explore how this might apply to early childhood professional development serving in-service teacher outside of institutions of higher education as well as applying lessons learned into models of K-12 preservice programs.

5.5 Conclusion

Video-mediated early childhood teacher professional learning communities within teacher preparation programs offer unique affordances in facilitating teachers' noticing skills as they situate learning in authentic contexts and professional discourse. Although some challenges exist when implementing video-mediated PLCs, this research study contributed to the field of early childhood teacher preparation research by demonstrating that teachers who participated in this model were better able to propose specific effective teaching practices to peers and themselves and on average, felt more satisfied with their learning and their peers' participation and contribution to their learning than teachers who did not experience this pedagogical approach. The intent of this research is to inspire teacher educators to re-envision their role as video-mediated coaches, and to shed light upon the complex process of organizing course learning environments and facilitating student teachers' learning together within it, in order to intentionally improve practice.

APPENDICES

Appendix A. Enacting and Reflecting on Practice: Video and Reflection Guide

1. Plan

Early Learning Outcomes Supported: _____

- Choose one or more child outcome(s) you plan to promote (e.g. from the *Head Start Early Learning Outcomes Framework, Birth-Five* or your state's Early Learning Guidelines or a TSG-Teaching Strategies Gold Objective).

Teaching Moves/ Instructional Interaction Focus: _____

- Plan specifically how you will enact the interaction in order to promote the child outcomes you identified. See the "do" row of the rubric below for guidance as well as the corresponding lesson materials.

Filming Details: _____

- Plan for filming
    - Choose a date and time to film in your service-learning setting.
    - Remember to plan extra time for the unexpected! Discuss the timing with those appropriate at your site, whether an administrator, lead teacher, or other co-workers.
    - Draw upon the program video tutorials in planning for filming.

2. Enact & Film

- Enact your plan and ideally let your video begin and end at least ten minutes before and ten minutes after the interaction you are filming so that you can select the best portion from the final footage.
- Make sure the settings on your camera are correct and set to capture low-resolution video and high quality audio.
- Remember to make sure your video is quality by ensuring it's *Stable and Steady*, the *Light is Right*, it's *Loud and Clear*, and you and the children are *Framed and Ready*.

3. Select & Edit Your Best Clip

- Identify a video clip you feel highlights your best enactment of the interaction for this assignment, based on your established goals. Please note that you should not edit multiple clips together, but choose one continuous clip to share. Feel free to share both exemplary moments and missed opportunities, showing opportunities for continued improvement.
- Use the video tutorials and your chosen video editing software to export, edit your video down, compress if the file size is very large, and upload to Coaching Companion.

4. Analyze Your Video

- View the recording as soon as possible so that your memory is fresh and you can readily recall the interaction. Be sure to set aside sufficient time to analyze the video.
- Watch your video clip 3 times. After each viewing, follow these prompts when observing and interpreting to take notes, in light of each of the three purposes listed below.

Definition of "Observe": What do you notice as significant and important? Use specific and objective observations.

Definition of "Interpret": Using specific evidence from the video, including time stamps, connect to broader principles of teaching and learning, child development, including the type of interaction(s) for this assignment. In your reasoning, use your specific knowledge of the classroom context, child development and learning, and the children.

1) First Viewing of Video: Focus on what children are ready to learn, learning, thinking (through observation/interpretation of words and behavior)

2) Second Viewing of Video: Focus on your role and the approach you took to promote children's learning (through observation/interpretation of your words and behaviors)

3) Third Viewing of Video: Focus on *Interactions/discourse between you and child(ren) (through observation/ interpretation of the quantity and quality of the "back and forth" exchanges between you and children)*

5. Write a Reflection

- **Draw upon your notes from the three viewings to write a reflection.** Submit it in the comment section along with your video on Coaching Companion, to share with your group and instructors (see rubric below for guidance).

A high quality comment will include:

a. **Setting the Stage/ Planning:** What interaction strategy and aspect of children's learning were you focused on in this clip and what was the child developmental outcome(s)? Be specific about why you chose to focus on this strategy for your clip. Please briefly describe how you had planned to implement the strategy in your setting. Be specific about the development of your plan to accomplish this goal.
b. **Objective & Specific Observation:** A brief statement of what you observe and your impression while viewing the video clip three times, in terms of the children (*what children are ready to learn, are learning and thinking)*, you (*your role and the approach you took to promote children's learning)*, and your interactions with them (*quantity and quality of the "back and forth" exchanges between you and children)*. Be specific in describing exactly how you enacted this interaction strategy. How do you observe the children responding to you? Be specific.
c. **Reflection/ Analysis/ Self-Assessment:** Include a judgment of how well you implemented the interaction strategy. Are there any specific factors that you think influenced the interaction? Was a particular part hardest for you? What else could you have done in this moment or in other moments during your day?
d. **Plan for Improvement:** What could you do next time to implement this strategy (or a related strategy) in a more intentional/ effective way? Please note, that even very high quality interactions have room for improvement, especially in the context of engaging in interactions throughout the many hours of a day with many different children.

Grading Rubric

	Accomplished	Emerging	Developing
DO: Enact the Interaction Strategy	**[ratings included here for the specific type of interaction of focus for each assignment]**		
Video Quality	You and the child(ren) can be heard and seen clearly throughout at least 90% of the video; meets length requirement.	You and the child(ren) can be heard and/or seen clearly throughout approximately 70-90% of the video; length is up to one minute longer or shorter than the required length.	Video is barely audible/ visible throughout at least half of the video, making it impossible to hear and/or see you and the child(ren); length is more than one minute longer or shorter than required length.
REFLECTIVE COMMENT: Setting the Stage	You describe how you had planned to implement a strategy in your setting, demonstrating thoughtfulness and intentionality. You name the specific interaction strategy you were focused on in this clip and why you chose to focus on it. You name the specific aspect(s) of children's learning you were focused on, including specific child developmental outcome(s), quoted from early learning guidelines.	You describe how you had planned to implement a strategy in your setting, demonstrating some thoughtfulness and intentionality. You name either the specific interaction strategy or the aspect of children's learning you were focused on. You may describe children's learning in broad terms, but do not quote an early learning guideline.	Your description of how you planned to implement a strategy in your setting lacks depth and offers little details, not demonstrating thoughtfulness or intentionality. You do not include a focus on children's learning.
REFLECTIVE COMMENT: Objective, Specific Observations & Self Analysis	Your reflection demonstrates insight and is well reasoned with specific, objective examples of children's learning, what you have enacted on the video and how this is an example of the instructional interaction. Your reflection uses objective, specific observations of children's words and behaviors to analyze their learning and development, including their responses to your use of specific interaction strategies. It's obvious that you fully understand the interaction as described in this course.	Your reflection does show some insight and demonstrates basic understanding of instructional interactions, although it may not be clear that you fully understand the interaction as described in this course. Your response may draw on some evidence from the video and describe children's responses briefly, but is incomplete. Your reflection may not use objective, specific observations of children's words or behaviors to analyze their learning and development or of your actions.	Your reflection lacks depth, with minimal or no objective, specific observations of children's words and behaviors in the setting and with few references to specific interaction strategies. Your reflection may not include information about children's responses. It is unclear if you understand the interaction as described in this course.
REFLECTIVE COMMENT: Plans for Future Improvement	You draw on knowledge of this instructional interaction in plans for future improvement.	Your plans for improvement are vague and lack specificity and/or do not clearly draw on knowledge of this instructional interaction.	You do not include any plans for improvement.

Appendix B. Peer Feedback (Un-facilitated Student Learning Groups Course Section)

Give Feedback to PLC Members

- Come back to Coaching Companion and view your group members' videos and read their personal reflection comments. Write feedback to at least two of your peer's videos in the comment section, making sure that everyone has at least one comment.

	Accomplished	Emerging	Developing
Feedback to at Least 2 Group Members	Your feedback comments demonstrate insight and are well reasoned. Each of them (at least two) is three-four sentences in length.	Your feedback comments do show some insight. Each of them (at least two) is between one-two sentences in length.	Either no feedback comments are offered or they do not demonstrate any insight. Each (at least two) is a phrase or up to one sentence in length.

Appendix C. Peer Feedback (Facilitated Professional Learning Community Course Section)

Give Coach-Quality Feedback to PLC Members

- Return to Coaching Companion and view your group members' videos and read their personal reflection comments. Write coach-quality feedback to at least two of your group peers in the comment section, making sure that everyone has at least one feedback comment.
- High-quality comments include:
    - **Objective & Specific Observation*:** Support your comment with clearly articulated detailed and behavior-specific comments that are anchored to the teaching practice. Make sure to include observations of children and your group member.
    - **Focus on Back-and-Forth Interactions:** Bi-directionality of high quality interactions**:** What your group member did, how children responded, and how the group member followed up.
    - **Constructive Feedback:** Consider yourself a "coach" to your peer, qualifying your comments with *I-statements*. Provide well-reasoned comments, including both positive and constructive comments with specific examples from the video. Provide a helpful hint from your own experience, as you can.
- As you give feedback, consider including these components as appropriate...
    - **Seeing Multiple Perspectives** Help peers see multiple things happening in the recordings. For example, if your peer is very focused on one child's challenging behavior, help him or her to observe what other children are doing or how he or she responded. There is a lot going on in an early childhood setting at any given moment, and there is always something positive and constructive to point out in each video clip!
    - **Early Learning Guidelines** Especially if your group member did not identify one, what early learning guideline(s) do you think are addressed in the video interaction?

	Accomplished (Coach Quality)	**Emerging (Supportive Peer)**	**Developing (Observer)**
Feedback to at Least 2 Group Members	Your peer feedback to at least two of your group members demonstrates insight and is well reasoned with specific examples from the videos in the form of objective and specific observations of the children, your group member, and the interactions. You draw on knowledge of the specific interaction practices in the lesson and qualify your comments with I-statements. Feedback contains both positive comments and constructive guidance.	Your peer feedback to at least two group members does show some insight and demonstrates basic understanding of the specific interaction practices from the lesson. You may not include objective or specific observations of children, your group member and/or their interactions or you may not qualify your feedback with an I-statement. Feedback may contain positive comments but lacks constructive guidance.	Your peer feedback to group members lacks depth, with minimal observations from the video(s) and few references to features of the specific interaction practices from the lesson. You may mischaracterize features of the interactions or demonstrate an inability to recognize strategies from the lesson. Feedback is not qualified with an I-statement or is not supported with detailed observations and only consists of positive comments, lacking any constructive guidance.

Specific and Objective Observations

Should be Objective:	Should Not be Subjective
Based on fact Includes specific behaviors or actions Is what actually happened	Based on opinion Emotional reaction to behaviors or actions Personal thoughts about what happened
Should be Specific:	**Should Not be General:**
Describes discrete behaviors Includes teacher or child actions Provides a description of facts	Overview statements Tied to actions Descriptions of the overall classroom atmosphere
Example: Ms. Jones turned towards Sam, got down on his level and made eye contact to listen to what he said. Sam responded by continuing to explain what he was thinking and he moved closer to Ms. Jones.	*Example:* I liked the way she helped Sam. He was really happy.

Examples

High-Quality Comments

- *"You have close physical proximity to the child and are engaging in a back-and-forth exchange, using respectful language and a calm voice. The child is smiling and continuing to engage in the activity with you. I think this a high-quality example of fostering a connection with a young child."*

This is a great comment because it is based on the observed behavior, it is detailed and does not interpret the behavior, it is anchored to specific practices (for example, "you have close physical proximity," "you are engaging in a back-and-forth exchange, and so on), and ends with an I statement that seems supported by the descriptive notes.

- *"You are sitting at the small group table with the children and using the same materials as they are (play dough and cookie cutters). You are smiling and using a calm voice with the children. When the two children, José and Juanita. talked to you, you responded with a few words. For example, when José said, "Look at what I made, teacher!" you said, "Nice." And when Juanita said, "Teacher, I am using a lot of play dough," you said, "Yes. Lots." I think this is a good example of positive climate, but I think you might need to build on the student's initiations and try to elicit more back-and-forth exchanges in order to have this be considered a high-quality example of language modeling. I am working on this too—we can support each other!"*

This is another great comment. It is based on the observed behavior, it is detailed, it does not interpret, it is anchored to a specific practice(s) (e.g. making predictions), and provides feedback qualified with an I-statement. The constructive nature of the feedback will help your classmates improve their skills.

Not-So-High-Quality Comments:

- *"Fun activity!"*

This is a poor comment because it is not describing behavior, it is not detailed, it is not anchored to a practice, and while obviously an opinion, it does not start with an "I statement."

- *"You are a great teacher! I love the story you read to the children."*

While most people would like to hear this comment, it is not a good example.
It is not behavior specific. The person would not know what was so great about their teaching. It is also an opinion, but we do not know this because it is not started with an "I-statement" (for example, "I think you

are a great teacher!"). Finally, it lacks anchoring to a specific practice. The comment mentions a book, but there is not a comment about the literacy practice the teacher is engaging in other than reading.

- *"You are really making the boy feel happy and you are loving your interaction."*

This is not a good comment because it is based on your interpretation of the interactions, rather than the actual behaviors. We do not know if the boy *is* happy; we can only describe how he *looks* in the video.

Sample Thought-Provoking Questions Consider prompting your group member to further analyze their own practice with these questions:

Reflection prompts to encourage objective reflection

What happened when…?
What have you tried with…?
How did this child respond when you…?

Reflection prompts to encourage: process/planning reflection

What was your goal with that strategy?
What were you thinking at that moment?

Reflection prompts to encourage interpretive reflection

Why do you think…?
What do think would happen if...?
Why do you think this child responds the way he or she did when you…?

Reflection prompts to encourage comparative reflection

Now that…, what would you do next time?
How did that compare to…?

Appendix D. Teacher Noticing Coding Measure

MASTER CODES/ Codebook: 'Teacher Noticing' (van Es, 2011)

Level 1: Baseline	**Level 2: Mixed**	**Level 3: Focused**	**Level 4: Extended**
Attending: What Teachers Notice			
Attends to **whole group** behavior and/or whole group learning **and/or** to teacher pedagogy **and/or to particular students' behavior and/or to the environment**	Primarily (more than half) attends to **teacher pedagogy** Attends to **particular students'** thinking and behavior (less than half) [To get Level 2, **must** include **at least one** reference to a specific child's **thinking/ development**]	Primarily (more than half) attends to **particular students'** thinking/ development	Attends to the **relationship** between particular students' **thinking/ development** and **between teaching** strategies and **student thinking/ development**. (for more than half)
Analyzing: How Teachers Notice			
Forms **general** impressions of what occurred	Forms **general** impressions and highlights **specific** noteworthy events	Highlights **specific** noteworthy events	Highlights **specific** noteworthy events
Provides **descriptive** and **evaluative** comments	Provides primarily **evaluative** with some **interpretive** comments (may also include some comments midway between evaluative and interpretive)	Provides primarily **interpretive** comments	Provides **Interpretive** comments
Provides **little or no evidence** to support analysis	Begins to refer to specific events and interactions as **evidence** (doesn't have to be about a specific child's words/ thinking)	Refers to specific events and interactions as **evidence** (Does have to be about a specific child's words/ thinking)	Refers to specific events and interactions as **evidence** (Does have to be about a specific child's words/ thinking)
		Elaborates on events and interactions	**Elaborates** on events and interactions
			Makes **connections between events and principles** of teaching and learning/development
Proposing Alternative Practices: Deciding How to Respond			
Either offers no ideas for improvement or ideas that are unrelated to interaction of focus	Offers ideas for improvement that are general and/or are not connected to interpretation and evidence (from previous portion of the analysis, doesn't necessarily have to be about a specific child's words/ thinking)	Offers ideas for improvement that are specific, related to interaction of focus, start to be connected to interpretation and evidence (from previous portion of the analysis, doesn't necessarily have to be about a specific child's words/ thinking)	On the basis of interpretations, propose alternative pedagogical solutions based on evidence (from previous portion of the analysis, doesn't necessarily have to be about a specific child's words/ thinking)

Code Table

Attending: What Teachers Notice:	**Analyzing: How Teachers Notice:**
P: What the Teacher Planned/ Intent **WG-B: Whole Group- Behavior/ Engagement** **WG-Th: Whole Group- Thinking/Development/ Interactions** **WG-B/Th: BOTH** **IC-B: Individual Child(ren)- Behavior/ Engagement** **IC-Th: Individual Child(ren)- Thinking/ Development** **IC-B/Th: BOTH** **Env: Environment** **TP: Teacher Pedagogy** **Self: Something related to Self, as reviewer of video** **V: Process/ Quality of Videoing** **R: IC-Th to IC-Th….Relationship between IC's thinking/ development** **R: TP to IC-Th…..Relationship between teaching strategies and IC(ren) thinking/development**	**G: General impression** **SNE: Specific Noteworthy Event** **G/SNE- BOTH** **D: Descriptive comment** **E: Evaluate comment (uninformed judgements about what was good or bad or should have been done differently)** **Int: Interpretive comment (efforts to reason about what they observe, to understand the roots of an idea, and to explain what was meant by a particular statement, drawing, gesture, or expression)** **Ev: Evidence** **Elab: Elaborate** **C:SNE-P…...Connection between specific noteworthy events and principles of teaching and learning/ development.**
Proposing Alternative Practices **DHR: Deciding How to Respond**	

Detailed Codes with Examples

Code Abb.	Code- Full Name	Code- Definition	Code- Clarifying Notes/Examples
What Teachers Notice:			
P	**What the Teacher Planned/ Intent**	Description of what the teacher planned and/or why and/or how (e.g. decisions were based on information about a specific child's or children's developmental needs, etc.)	*"I chose this because I have started to teach him to read and part of reading is learning to understand the story line."* *"The strategy that I was focused on was being able to get all the children involved while also having them sharing. For this reason, I wanted them all around the puzzle as we would do during a circle time session."* *"I had a stretch goal to incorporate more complex vocabulary..."* *"I had noticed that she had been struggling with these concepts during group activities and planned to work on counting objects as well as a simple game of hiding part of a set of 5 to help her deconstruct and construct quantity. "*
WG-B	**Whole Group: Behavior/ Engagement**	Attends to **whole group (of children)** behavior and/or engagement	*"The children had good behavior."* *"The children were not listening."* *"The children were excited and engaged in the activity."*
WG-	**Whole Group:**	Attends to **whole group (of**	*"The children seemed to understand."*

Th	**Thinking/ Development/ Interactions**	**children)** thinking/ understanding/ learning/ development/ Interactions w/ teacher This includes references to <u>interactions</u> between WG and Teacher.	*"They were all…."* *"the group…"*
WG-B/Th-	**Whole Group: BOTH Behavior/ Engagement & Thinking/ Dev./ Int.**	Encompasses both WG-B AND WG-Th [See definitions above]	*"Upon watching the video I observed a positive adult-child interaction and a child wholly engrossed in play, when I observed the teacher saying..."*
IC-B	**Individual Child(ren) Behaviors/ Engagement**	Attends to **particular students'** behavior and/or engagement	*"The child was engaged in the activity."* *"He stopped moving around and sat down to focus."*
IC-Th	**Individual Child(ren) Thinking/ Development/ Interactions**	Attends to **particular students'** thinking/ understanding/ learning/ development/ Interactions w/ teacher Insight into what they are thinking, how they are making sense (could be from what they say/ what they do); This includes references to <u>interactions</u> between IC and Teacher.	*"...at 0:09 seconds in, Michael predicted that it would float because it was lighter than the stone, which had sunk."* *"At 2:54 when the sponge sank he wonders for a moment and then at 3:27 he watches the eyes float and expects they will then sink like the sponge, and the interactions between 4:35 and 4:59 when he retests the sponge demonstrate he is learning why items sink or float."* *"An impromptu moment I was happy with was leveraging one student's vocabulary knowledge (Anna) to teach another when I…"*
IC-Th/B:	**Ind. Child (ren): BOTH Behavior/ Engagement & Thinking/ Dev./ Int.**	Encompasses both WG-B AND WG-Th [See definitions above]	*"Another child, Jen, was very engaged in exploring the materials, and pressed on, saying 'I made a round circle with some M&Ms yesterday.'"*
Env	**Classroom Environment**	Attends to the environment in which the interactions take place.	*"The classroom space is so cozy and inviting!"* *"I love the way that center is arranged…"*
TP	**Teacher Pedagogy**	Attends to teacher pedagogical strategies/ decisions/ approaches	*"I see that you used open ended questions."* *"I encouraged the other child to take notice and we used her method to continue counting."* *"I know Marcos is comfortable with his colors and many opposite concepts, so when he…at 2:34, I….at 2:47…"*
Self	**Something related to the experience of Self (reviewer of the video)**	Teacher writing is concerned with her/himself, adopting a self-centered perspective and connecting what they observe to their own experiences/ feelings/ etc.	*"I was sick and it affected my interactions." (in response to video of self)* *"I like how you set up the activity. When I've tried that in my classroom, it hasn't really worked and the children were not very engaged." (in response to video of peer)*

V	**Videoing & Logistics**	Attends to process of capturing and/or quality of the video itself. Attends to logistical details during filming	*"I put the camera in the wrong place, so you couldn't see my face."* *"I don't like the way I look on the camera."* *"I was pretty happy with all of the filming I did this day."* *"Also, there was another cooking activity happening at the same time and these two children in the video at this particular time [painting with me] were the least interested in cooking."* NON EXAMPLE (this would be **IC-Th**) : *"Right before the clip, she was successful in doing this up to 3, and my recording starts when I upped the number to 5."*
R: IC-Th to IC-Th	**Relationship between IC's thinking/ development**	Teacher moves beyond a focus on individual children's thinking/ development to compare and contrast and make connections between and among individual children's thinking/ development.	*"I thought one of your best moments was at 2:13 when you asked "what do you think he's going to do with the toy?" and a child responded "throw it in the tree" and then you asked an excellent open-ended follow up question of "how do you think the cat could help him?" which prompted another child to explain that the cat could climb up the tree and "save it for good," an adorable phrase accompanied by some fine motor activity when his fingers imitated a cat climbing!"*
R: TP to IC-Th	**Relationship between teaching strategies and IC(ren) thinking/ development**	The important distinction between this and when teachers focus primarily on pedagogy and student thinking separately, is that here teachers connect their analysis of particular children's thinking/ development to specific teaching approaches observed in the clip and propose alternative teaching approaches on the bases of their analysis. It does not have to interpret.	**Ex:** A teacher may notice that particular children are constructing different solutions for solving a particular problem **and then** examine what the teacher did in the segment to create an environment to promote children's sharing multiple solutions. **Ex:** A teacher notices that a child offered an extended explanation about a strategy and also examines how the teacher's moves helped provide opportunities for thinking to emerge (e.g. *"When you asked her to share her solution again, it seemed like she could better explain it"*). Additionally upon analysis of student thinking, they revisit the tasks in the curriculum and examined how they helped or hindered children in making progress toward the learning goal. *"I thought one of your best moments was at 2:13 when you asked "what do you think he's going to do with the toy?" and a child responded "throw it in the tree" and then you asked an excellent open-ended follow up question of "how do you think the cat could help him?" which prompted another child to explain that the cat could climb up the tree and "save it for good," an adorable phrase accompanied by some fine motor activity when his fingers imitated a cat climbing!"* *"I wonder whether the responses would have differed if you had addressed some of the children individually, especially following up with the child in the blue hat after he said ____, you might have said _____."*
How Teachers Notice:			
G	**General impression**	Forms **general** impressions of what occurred often oversimplifying the complexity of the observed episode Vague observations	*"That was a nice lesson."* *"That lesson did not go well at all."* *"They had ideas."* *"A good foundation was laid here, because the children were with you and what you were talking about."*

SNE	**Specific Noteworthy Event**	Particular events and interactions (specific moments) Could refer to a specific action taken.	*"His interest starts to wane around 1:04"* *"We compared the cotton ball to the egg from the previous demonstration and at 0:09 seconds in..."* *"Also, when I had difficulty teaching a concept, a student implemented her own strategy for counting with drawn symbols."* *"I set two balls in front of her and later, a stuffed animal."* *"Instead, she picked up each ball, both different in shape and density and was able to conduct her own little "science experiment" by bouncing each one and testing each ball's shape and density."*
D	**Descriptive comment**	Observations of what teacher and/or children did and said, with no corresponding evaluation or interpretation.	*"They were making faces."* *"The child moved the blocks one at a time."*
E	**Evaluate comment**	Uninformed judgements about what was good or bad or should have been done differently. At times, judgment may start to incorporate some evidence, but it is incomplete and does not attempt to interpret observations.	-<u>Purely Evaluative</u> (uninformed): *"I was amazed with the vocabulary.", "The children were so focused."* *"I was excited to do that experiment with the kids but for some reason it doesn't really come across so much."* <u>-Evaluative with Some Evidence:</u> *"I also think you did a great job of introducing a novel word "flung" at 3:26 and was impressed by your ability to say "floyd flung."* *"I thought your questions had variety and you kept up the excitement of the story throughout."* *"I also noticed that I gave only one option how can she compare the size."* *"I had a stretch goal to incorporate more complex vocabulary and print, but <u>missed that opportunity</u> when interacting with these two. "*
Int	**Interpretive comment**	Efforts to reason about what teacher observes, to understand the roots of an idea, and to explain what was meant by a particular statement, drawing, gesture, or expression.	*"I presume that she has an understanding of why it sank but doesn't yet have a good enough grasp and knowledge on the concept to put it into words"* *"Her answer shows that she has a modest understanding of this scientific concept and seems to understand that by absorbing the water the cotton ball is now heavier."* *"I reason that the children have a slightly better concept of whether an object will float or sink but as of yet have no understanding of density and its relation to this lesson and experiment."*
Ev	**Evidence**	Refers to specific or general events and interactions as **evidence** to advance an interpretation and/or an evaluation - always <u>used to support</u> an interpretation and/or an evaluation (doesn't necessarily have to be about a specific child's words/ thinking, could be about any behaviors and teacher's as well; could be either specific or general)	*"I wonder whether the responses would have differed if you had __, because of what happened <u>at 2:34 after you asked __, and a child responded by saying __.</u>"* *"…because Anna responded by saying, 'It sinked because now it's sinking and Little "B" then said that the cotton ball sank because it's wet".* <u>Evidence for TP/ Evaluation (not Interpretive) :</u> *"I encourage a child to categorize by size and compare the buttons <u>by asking questions: "Do you think that green button is bigger than purple one?" (1:41-1:43)</u>."* *"I enacted the back and forth interaction by looking at the children while reading, by making them guess the next animal, also encouraging the use of animal sounds and turning my body toward the child I am talking to."*

Elab	**Elaborate**	**Elaborates** on events and interactions, develops the discussion with multiple (2-3) interpretations and explanations	*"I noticed that you did ask several open ended questions, such as "What do you think is going to happen when we mix the tablets?" (1:43), "Why do you think it's making bubbles?"(2:36), "Why do you think it turned purple?" (3:31), and "What do you think is going to happen with the tablets?" (3:56). These were good open-ended questions that were addressed to the group, but it seemed like many children either answered "I don't know" or didn't answer most of these questions. I wonder whether the responses would have differed if you had addressed some of the children individually. For example, after you asked what the children thought would happen when you added the tablets, 3 or 4 of them shouted that they thought it would explode (3:56), but the other two children sitting at the table did not participate. These were two children that were leaving and coming back, so I wonder if asking them directly or giving them more time to respond would have produced some alternative answers."*
C:SNE-P	**Connection between specific noteworthy events and principles of teaching and learning/ development.**	Connect an observation to central features of teaching, such as assessment, academic language, or classroom discourse. Teacher expresses the discussion in terms of broader issues they discussed, such as assessment or equity in learning (e.g. "So maybe we need to really rethink our assessment of students"). Extended analysis from a focus on student thinking to consider how the particulars in teaching influence student learning.	*"The child was also able to make decision "that she wanted to do sizes next". This shows that she is able/forming her decision making skills."* *"Another suggestion is using coffee filters and having the child drop just a little bit of the color on coffee filters to really see the colors combine; that way it may open up more opportunities to closely observe what is happening with the combining colors, and the children could engage in more aspects of the scientific experiement process."* *"I liked that when the children saw the ingredients they began talking about making cookies. One child commented, "I made cookies before using cinnamon," (1:00) connecting the experiment to prior knowledge, to which you replied, "Awesome, but does it look like we're going to make cookies using...?" Another child (or maybe the same one) pressed on, saying "I made one with some M&Ms". I think it might have been useful to explore this idea of mixing ingredients like previous experiences of mixing ingredients to bake cookies. More connections with previous knowledge would help support your learning outcomes here."* *["Next, I observe a student making a hypothesis, not about where the tubes might float in the cylinder, but how, if any, the additional weight of the vial could affect the final outcome. Martin starts questioning the fact that there are tubes being used in the experiment when he says, "Because the glass and that rubber thing on top, all that might change the density of the stuff inside." I believe the student has analyzed a possible scenario in his mind and in doing so, is trying to eliminate an outside variable which is the container." (van Es & Sherin, 2002).]* *[Next, I see myself acting as a moderator by rephrasing students responses so that the whole class could be aware of the current state of the conversation. This happens when I say, "Ok, Don said if we drop the tube in there we can figure out if they're the same thing by whether they stayed in the oil or stayed in the water. Oliver, tell him if he is right?" By defining and focusing the results of the experiment, I hope to increase the level of communication between myself and my students." (van Es & Sherin, 2002).]*

Deciding How to Respond			
DHR	**Deciding How to Respond**	On the basis of the written interpretations, propose alternative pedagogical solutions based on evidence Does not include references to better filming	"Next time, I could ask more open-ended questions to promote language such as " where can you see blue circle in our classroom", "what is a shape of the buttons on your jacket"" "I think that my strategy could have been more effective if I had allowed the children to be even more hands on with the experiment…I could have allowed them to measure and pour the tablespoon of soap into their cups themselves, while scaffolding observation, prediction, and testing with questions such as_____."

Teacher Noticing: Literature Grounding (van Es, 2011)

What Teachers Notice (p. 138)

- ***Whom*** *the teachers notice* in the video clip
    - Focus on the class as a whole, students as a group, particular students, the teacher in the clip, or themselves

- ***Topic*** *of analysis*
    - Issues they identify, such as remarks focused on the pedagogical strategies, behavior, or math thinking, or the classroom climate

How Teachers Notice (p. 138)

- ***Analytic Stance***
    - The approach teachers take to analyzing classroom episodes and captures whether teachers engage in a productive inquiry. Do they evaluate or interpret what they observe?
        - ***Evaluate*** = uninformed judgements about what was good or bad or should have been done differently
        - ***Interpret*** = refers to the group's efforts to reason about what they observe, to understand the roots of an idea, and to explain what was meant by a particular statement, drawing, gesture, or expression.
- ***Depth of Analysis***
    - Whether teachers provide few details to explain their thinking or ground their comments in evidence and elaborate on their analysis.

To what teachers attend (p.140)**:**

Level 1: Baseline

- Focus on a range of issues, including whole class behavior, participation, student learning, the overall classroom climate, and teachers' pedagogies.
    - Example: "The class is engaged. They're all following along."
    - "I like how you set up the problem. When I've tried that, it hasn't really worked."

- Teachers appear concerned primarily with themselves and their own practices, adopting a self-centered perspective and connecting what they observe to their own practices.

Level 2: Mixed

- More focused on teacher analysis, attending primarily to the teacher's pedagogy, student behaviors, and some on students' math thinking. ….
    - When focus is on teachers' pedagogies, it is not directly tied to children's thinking
- Focus begins to shift from a whole class perspective to attend also to particular students in the clip, still includes some focus on the whole class/ group, but not seeing children as individual.

Level 3: Focused

- Noticeable shift in focus to examining primarily particular students' math thinking as represented in the clip.
- Distinct from Levels 1 and 2….teacher is no longer concerned with the self and looks beyond the whole class.

Level 4: Extended

- Focused on particular students' math thinking AND the teacher's pedagogy as it was revealed in the clip, AND the events they noticed directly connect teachers' pedagogies and students' math thinking.
    - Example: a teacher may notice that particular students are constructing different solutions for solving a particular problem and then examine what the teacher did in the segment to create an environment to promote students' sharing multiple solutions.

How Teachers Notice (p. 140-141)**:**

Level 1: Baseline

- Offer *general* impressions, often oversimplifying the complexity of the classroom episode they observed.
    - Example: "That was a nice lesson."; "That lesson did not go well at all."
- Commentary is highly *judgmental and evaluative* in nature, with *little evidence* from the clip to support their critiques.
- Vague observations/ few details

Level 2: Mixed

- Continued to offer general impressions, but they also began to highlight noteworthy events.
- Continued to evaluate what they observed, but they also began to try to make sense of their observations in beginning to adopt an interpretive stance.
- Teachers began to refer to particular events and interactions (specific moments) as evidence to advance an interpretation, but doing this inconsistently (not elaborating/ providing much detail as evidence)

Level 3: Focused

- Teachers' comments are highly discriminate and identify particular noteworthy events in the segment.
- Grounded in the particular noteworthy events in the segment.
- Grounded in the particulars of the segment teachers had viewed, and these particulars were used as evidence to advance an interpretation.
- Teachers sought to elaborate and develop the discussion with multiple interpretations and explanations.

Level 4: Extended

- Conversations built on those that are characteristic of Level 3, but two additional defining features of noticing emerged at this level:
    - First, the teachers considered and proposed alternative pedagogical solutions. This evaluation of what could be done differently is distinct from the judgmental comments teachers made in levels 1 and 2, because it was now informed by analysis and substantive interpretation.
    - Second the teachers sought to make connections:
        - (a) between ideas they discussed and
        - (b) between particular events they noticed and broader principles of teaching and learning….
- Their discussions were based on what they had observed and different ways to interpret these interactions, but they also attempted to connect their observations to central features of teaching, such as assessment, academic language, or classroom discourse.

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