LEARNING TO ENACT EFFECTIVE TEACHER-CHILD INTERACTIONS IN A PRACTICE-BASED COURSE

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ABSTRACT

Teaching has been labeled as "complex, unnatural, intricate and problematic" (Ball & Forzani, 2009, p.501). Observing teachers, and reading or studying about teaching, is not enough to develop the body of knowledge and skills required to teach. It requires carefully designed learning opportunities that support pre-service teachers (PST) in deliberately and purposefully engaging with the practices of teaching (Grossman, Hammerness & McDonald, 2009).

This dissertation examines what happens when a course designed using practice-based teaching approaches, namely the *Framework for teaching practice* (Grossman, 2011), the *Learning cycle to enact core practices (*McDonald, Kazemi & Kavanagh, 2013) the *Classroom Assessment Scoring System* (CLASS; Pianta, LaParo & Hamre, 2008), and a sequence of practice-based learning activities using video-analysis and rehearsals, is implemented. I examined the implementation and outcomes of this course by analyzing course documents, observations and field notes, CLASS™ ratings, focus group and my researcher journal. Study findings include details about gains in PSTs' knowledge and skills related to effective interactions, particularly *Emotional Support* and *Classroom Organization* interactions, and challenges with *Instructional support* interactions. I also detail my instructional interactions with the ECE-PSTs in the course, to reflect on my enactment of practice-based pedagogy.

I present my findings in a portfolio that includes three artifacts: 1) a research article for publication in a scholarly journal for early childhood teacher educators; 2) an article for publication in a practitioner journal; and 3) a conference presentation on implications for practice based program design. The study will help my readers understand and use new ways of organizing practice-based learning opportunities in early childhood teacher preparation programs, while also providing guidance for much-needed research.

DEDICATION

I dedicate this dissertation to the devoted early childhood education pre-service students that I have had the privilege to work with. I am deeply indebted to the ECE students for participating in this study. I thank you for this interesting and eye-opening journey.

My heartfelt thanks to my family, who have been my steady support through this process. Your unconditional love, and encouragement has helped me sustain my motivation and effort.

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Chapter 1: Introduction to the Study

Problem of Practice

It is widely accepted that "what teachers know and can do is the most important influence on what students learn" (National Commission on Teaching and America's Future, 1996, p.10). Questions regarding how teachers acquire this knowledge remain moot. Teaching is complex because it involves understanding and responding to multiple learners and events, sometimes all at the same time. Experts have labeled this work as "unnatural and intricate" (Ball & Forzani, 2009, p.501) because it involves unique ways of talking, and moves enacted to make content available to different learners. Acquiring these skills is an arduous endeavor. Observing teachers, and reading or studying about teaching, is not enough to develop this body of knowledge and skills. It requires carefully designed learning opportunities (Ball & Forzani, 2009).

Teacher education reform discourses have alleged that such carefully designed learning opportunities are missing in teacher preparation programs in institutions of higher education (Darling-Hammond, 2010; Ziechner, 2010). Experts have argued that due to a knowledge-intensive focus, ineffective pedagogies, lack of appropriate connections across courses, and most importantly, inadequate opportunities to practice the work of teaching with support and feedback (Darling-Hammond, 2010; Ziechner, 2010), pre-service teachers (PST) struggle to translate knowledge into action and enact effective practices (Kennedy, 1999, 2016).

These challenges play out interestingly in the preparation of ECE teachers who work with young children in their most crucial and formative years. The ECE teacher's work is complex; given the roles and responsibilities of attending to a range of developmental needs of a diverse set of young learners while also engaging with families and communities. The fragmented nature of the ECE field, multiple entry points into the profession, unclear role expectations and

pathways for preparation, varied funding streams that influence program goals, and a lack of common language and standards to describe effective practices, add layers of complexity (Allen &Kelly, 2015;Whitebook, McLean & Austin, 2016). These and other factors have constrained the field of early childhood teacher education (ECTE) from developing a robust research agenda needed to generate a useful knowledge base on preparing ECE teachers to be effective (Whitebook, Austin, Ryan, Kipnis, Almaraz & Sakai, 2012; Ryan & Gibson, 2016). We do not know enough about ECTE's learning opportunities, and how specific course components are related to desired outcomes, specifically, candidates' enactment of effective practices (Couse & Rechia, 2016).

An ECE-PST is also unique in that, unlike K-12 PTSs, they may be already working in the field while preparing to teach. According to *The New Jersey Early Childhood Higher Education Inventory* (Kipnis, Whitebook, Austin & Sakai, 2013) about 82 percent of NJ community college ECE teacher education students are a mix of pre-service students and students already working in early childhood settings. These *working-novice* candidates bring with them preconceived ideas about children and teaching, which, in addition to their own schooling experiences, come from practices in their work place. This means that the design of the coursework has to consider the needs of the working-novice ECE PST so that they are able to enact effective practices in their own classrooms.

It is important to clarify what I mean by effective teaching practices in this study. In ECE classrooms, a widely accepted definition is one that focuses almost exclusively on the daily, responsive interactions between teachers and children in the classroom. Research in ECE has indicated that children develop many important social, emotional, cognitive, and language skills within high quality interactions with teachers in early childhood classrooms (Kontos, 1999;

Pianta, Barnett, Burchinal, & Thornburg, 2009; Howes, Burchinal, Pianta, Bryant, Early, Clifford & Barbarin, 2008; Mashburn, Pianta, Hamre, Downer, Barbarin, Bryant, Howes 2008). There have been significant efforts in the recent decade to define, promote, and measure effective interactions. The *Classroom Assessment Scoring System* (CLASS™) is a reliable and valid measure of effective teacher-child interactions (CLASS: Pianta, LaParo and Hamre, 2008) and has come to be regarded as the operational definition of effective teacher-child interactions. Studies using CLASS™ have found that in most ECE classrooms, children may interact infrequently with their teachers and when they do, these interactions are often far from effective (Pianta, Downer, & Hamre, 2016). A growing research base also shows that teachers can be supported in improving their interactions through professional development interventions, coaching and coursework (Hamre, 2014). However, majority of these studies feature in-service teachers. We need more systematic studies from early childhood teacher education to understand what kind of coursework and experiences can best prepare ECE PSTs to provide these rich interactions to children. This is a promising area of study, given that effective interactions stand out as significant predictors of child development and learning, and ECE-PSTs need to be ready to enact them when they begin teaching.

So where can we look for ideas useful in designing learning opportunities to prepare ECE-PSTs enact effective teaching interactions? Teacher education programs are typically organized into theory and content courses addressing the knowledge base of teaching, followed by field experiences to practice teaching in the classroom. This is slowly beginning to change as experts, researchers, and policy-makers have advocated for well-sequenced learning opportunities to deliberately practice the work of teaching throughout the program (Allen & Kelly, 2015; AACTE, 2013; NCATE, 2010). Repetitive and carefully planned opportunities to

engage with practices of the profession through observations, analysis and try-outs have been proposed as the best way to develop expertise (Grossman, Compton, Igra, Ronfeldt, Shahan, Williamson, 2009). This approach of grounding teacher learning through varied forms of engagement with practice is referred to as *practice-based, practice-focused*, or *practice-centered* teacher education (Ball & Cohen, 1999; Lampert, 2010, Forzani, 2014). K-12 teacher education has, in the recent years, generated a knowledge base on frameworks, approaches and pedagogies to guide the design of learning experiences to deliberately practice the work of teaching. There is little evidence that K-12 practice-based ideas have been utilized in the design of ECTE programs. Focused inquiry in this area can not only help to explore the applicability of the K-12 approaches for preparing ECE PSTs, but also build strong linkages between ECTE and K-12 teacher preparation, both of which are much needed.

Purpose of Study

The gaps in the knowledge base of ECTE have implications for my practice as an early childhood teacher educator in a 2-year institution in the Northeast. Many early childhood teachers begin their professional preparation in community college teacher education programs (Whitebook, McLean & Austin, 2016). The student population in my institution is predominantly non-traditional, usually women, 27 years and older, belonging to minority and low SES groups, who attend college part-time and work between 20-40 hours a week. A little over 60% of students work in a range of public and private ECE settings of variable levels of quality. This profile mirrors that of the state's preschool workforce (Whitebook, McLean, Austin, & Edwards, 2018). Despite research that shows strong linkages between effective teacher child interactions and child outcomes, the college's ECE associates degree has placed little emphasis on these practices. When addressed, teacher-child interactions were addressed theoretically using didactic

lecture-based approaches, which do little to support ECE-PSTs in learning to use interactions in enact-able ways. With a large percentage of the student population already working in ECE settings serving vulnerable children, the need to build this skill set was seen as pressing.

The purpose of this study was to design a course that used a practice-based approach to support ECE-PSTs in a community college ECTE program to enact effective interactions in preschool classrooms and examine its implementation and outcomes. By practice-based, I mean repetitive and coherently sequenced opportunities to engage with effective interactional practices by observing, analyzing and practicing them in instructional activities, to prepare to enact them with children. An action research study of the implementation of a practice-based course designed to support candidates' enactment of effective interactions can address existing research-gaps and offer recommendations to strengthen the preparation of ECE-PSTs. In action research, also referred to as practitioner inquiry (Cochran-Smith & Lytle, 2009), practitioners systematically examine a problem in their setting and try out approaches to improve their practice and reflect on what happens (Merriam & Tisdale, 2016).

An existing field experience course in the associate degree program was redesigned to focus on *teacher-child interactions,* and integrate the *Classroom Assessment Scoring System* (CLASS™*:* Pianta, LaParo & Hamre, 2008), and a sequence of practice-based learning activities using video-analysis and rehearsals. In particular, I wanted to study ECE-PSTs' experience of the course, and examine how the practice-based opportunities contributed to changes in PSTs' knowledge and observed practices related to effective interactions.

Portfolio Description

This portfolio contains three distinct artifacts: a scholarly research article, a practitioner article, and a conference presentation, developed as a result of my action research study,

"*Learning to Enact Effective Interactions in a Practice based course*." All three artifacts are designed to help me to reach teacher educators, and professional development providers to share ideas of organizing practice-based learning opportunities to prepare ECE teachers.

In Chapter II, I present the first component- a research article written for publication in a journal, like the *Journal of Early Childhood Teacher Education* the peer-reviewed journal of the National Association of Early Childhood Teacher Educators. Written in the format of a research study, the article details the problem of practice, setting, a review of relevant literature, data collection and analysis procedures, findings, and discussion of implications. In this article I draw upon findings related to *what* ECE-PSTs learned; specifically that video analysis and rehearsal pedagogies can benefit ECE PSTs' knowledge and skills related to certain kind of teacher-child interactions. PSTs' challenges with a specific set of interactions called instructional interactions are also discussed. The research literature is focused on in-service pre-K teachers and mentions little about how pre service ECE teachers can learn these practices, and how they would respond to teaching learning components found to be effective with in-service teachers. This article will address this gap in the ECTE research literature.

The second component is a reflection on practice, also intended for publication in the *Journal of Early Childhood Teacher Education*. Here, I detail *how* I implemented the practice-based components in the course to highlight how the structure and processes employed around facilitating these pedagogies helped ECE-PSTs' engage with *representations, decomposition,* and *approximations* of practice (Grossman et al., 2009) to learn about effective teacher-child interactions. This piece is written as a reflection on practice. It is also of interest to teacher educators as it details the implementation of the practice-based course components so that others

can replicate them. Here, a special focus is on the use of facilitation moves to leverage discourse and scaffold ECE-PSTs' learning.

The final component of my portfolio is a presentation targeting early childhood teacher education faculty in ECTE programs in 2 and 4-year institutions of higher education in NJ and is intended for the *NAEYC's Early Childhood Professional Learning Institute* held annually in June. Through this presentation, I share my experiences and recommendations for designing and implementing practice-based teaching and learning activities to prepare pre-service ECE teachers. The focus is to feature implications of my study findings for scaling up the practice based design elements to the program level. The goal here is to consider next steps, foster discussion, and explore interest in forming a community of practice focused on practice-based design of TE that will help to extend this work.

Each of the three products detailed above focus on different aspects of findings and implications that emerged from my study. Together these artifacts help to explain the affordances, limitations and dynamics of practice-based course design components and what this means for the preparation of ECTE-PSTs. It is my hope that this collection of theory and inquiry-driven artifacts helps to energize the much-needed research agenda in ECETE and set the stage for future research.

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Chapter 2: Teacher Research Article

Learning To Enact Effective Interactions In a Practice- Based Course

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Abstract

This article examines what early childhood pre-service teachers learned in a practice-based early childhood teacher education course focused on effective interactions. The course incorporated the Classroom Assessment Scoring System (CLASS™*:* Pianta, LaParo & Hamre, 2008), and a sequence of practice-based learning activities using video-analysis and rehearsals. Findings indicate that while ECTE PSTs showed improvements in knowledge and skills for interactions in the *Emotional Support* and *Classroom Organizatio*n domains (CLASS™*:* Pianta, LaParo & Hamre, 2008), they found the domain of *Instructional Support* challenging. Analysis suggests that novices' ability to attend to student thinking and pedagogical content knowledge, especially in Mathematics, influenced instructional interactions. Study findings help to understand the affordances and constraints of practice-based pedagogies in teacher education and help to zoom in on the challenges that PSTs face when learning to teach. Implications for learning of ECE-PSTs are discussed.

Introduction

In recent years, research has confirmed that quality of early childhood programs is intricately linked to teacher-child interactions, "the daily back-and-forth exchanges that teachers and children have with one another throughout each day, including those that are social and instructional in nature" (Hamre et al., 2012, p.89). Research has shown that effective interactions drive learning and translate early learning opportunities into positive life outcomes for young children (Howes et al., 2008; Mashburn et al., 2008), especially for children from low-income groups (Pianta, Downer, Mashburn, Hamre & Justice, 2008).

Given that these interactions are powerful predictors of children's development, how can we prepare teachers to enact them? The knowledge base on how early education teachers are prepared to perform the work of teaching is still nascent. Early childhood teacher education (ECTE) operates within a fragmented landscape and unlike K-12 teacher education, lacks shared models of specialized knowledge and competencies for teacher preparation (Whitebook, McLean & Austin, 2016). Little is known about the content and pedagogy of ECTE and still less about how learning opportunities within programs affect pre-service teachers' (PSTs') practices (Couse & Rechia, 2016). What we do know however is that courses have placed little emphasis on teacher talk and interactions (Ryan & Lobman, 2006), and this needs to change.

Teacher talk and interactions are performative, i.e., include behaviors that need to be enacted or performed. Therefore, it is not enough for PSTs to simply know them, they need systematically designed opportunities to observe, discuss, and enact these practices so that they can begin developing a flexible repertoire of these skills. There are promising ideas to borrow from a growing knowledge base in K-12 teacher education about conceptual frameworks and taxonomies of practice-based pedagogies to learn the work of teaching (Grossman & McDonald,

2008). Specifically, K-12 teacher education's shift from *knowing* to *doing* (Grossman & McDonald, 2008), through *pedagogies of enactment*, which allow PSTs to practice teaching practices before they enter the classroom, is worth examining in ECTE. Studying how practice-based learning can be applied in ECTE coursework to prepare PST's to enact high quality interactions with children can generate useful ideas to prepare ECE teachers, a need that is well documented (Couse & Rechia, 2016).

I contend that the frameworks and approaches of practice-based teacher learning available from K-12 teacher education can be utilized to support ECE-PSTs in learning about effective interactions. In this article, I describe what I learned about ECTE PSTs' learning in a course, designed for community college pre-service teachers (PSTs), focused on understanding and enacting effective teacher-child interactions. To this end, I incorporated the CLASS™ *(*Pianta, LaParo and Hamre, 2008) to provide a structure and meta-language for understanding and discussing effective interactions, and a sequence of practice-based pedagogies through which PSTs could observe, discuss, and purposefully enact these practices.

Literature Review

In this section, I briefly review the conceptual and empirical evidence in support of practice-based approaches to improve teacher-child interactions. First, I will introduce what is meant by practice based teacher education, the K-12 teacher education's conceptual frameworks, and the benefits of video analysis and rehearsal pedagogies in supporting PSTs learning. Then, I will dig deeper into effective interactions, as operationalized by the CLASS™ tool and examine empirical evidence on approaches to improve ECE teachers' interactions with children.

Practice based teacher education

Grounding teacher learning in practice through experiences designed to support novice

teachers in understanding and enacting teaching strategies, routines, and moves, is referred to as *practice-based, practice-focused*, or *practice-centered* teacher education (Ball & Cohen, 1999; Lampert, 2010, Grossman 2008, Forzani, 2014). Traditionally, teacher education programs have adopted a knowledge-based approach to emphasize the learning of theory and content and integrated practice through field experiences. When first introduced, Ball and Cohen (1999) defined practice based teacher education (PBTE), as "focused on learning professional performance, centered around key activities of the profession, and involving investigation of critical problems in teaching" (Forzani, 2014, p. 358). Since then, PBTE has been applied to other approaches like extended internships, and residency programs. However, in this study, practice based teacher education is to be understood in its original connotation, as an approach centered on specific practices of teaching, referred to as *core practices*, which are "identifiable components fundamental to teaching that teachers enact to support student learning" (Grossman, 2018, p.4). Core practices can be applied across content areas and instructional formats to support learning, and unpacked (Grossman & McDonald, 2008; McDonald, Kazemi & Kavanagh, 2013). In a core-practice based approach, teacher candidates first learn about the core practice in detail and then practice them repeatedly, first by engaging with videos and other practice records, then in tryouts with peers, before finally enacting in children's classrooms, with feedback and support from teacher educators (Lampert et al., 2013; McDonald et al., 2013).

Advocates of core-practice based teacher education also recognize teaching as a profession of fluid practice; it requires flexibility in actions, language, showing, and reasoning while attending to students, and content (Lampert, 2009, Forzani, 2014). Since the work of teaching is interactive and improvisational and proponents of PBTE have advocated that teacher candidates must experience this dynamic in learning to teach, through questioning, discussion

and reasoning (Forzani, 2014).

Conceptual frameworks for learning *Core Practices*

Two conceptual ideas are available from K-12 teacher education to inform well-designed learning opportunities to help preserve teachers learn core practices. The first, Grossman's (2011) *framework for teaching practice*, proposes three kinds of engagement with core practices through *representations* (i.e., observing and making practice visible), *decompositions* (i.e., breaking down and taking it apart), and *approximations* of practice (i.e., deliberate simulations of certain parts of practice that may be reduced in complexity). Each type of practice engagement can be seen as both distinct and overlapping with the others, and undergird teacher-education pedagogies like case-methods, modeling, video-analysis, microteaching, and rehearsals.

The second idea offers a cycle of scaffold, to support PST's engagement with core practices. The experiential *Learning Cycle to enact core practices* (McDonald, Kazemi & Kavanagh, 2013) outlines a four-step cycle for learning to unpack and enact core practices within instructional activities. In the first step of the cycle, PSTs are introduced to a core practice and the instructional activity through TE's modeling or by seeing it in videos of other's teaching. In the next step of the cycle, PSTs try the practice through rehearsals following which they enact the activity with students in the classroom. The cycle comes full circle with candidates' analysis of their enactments. The learning cycle offers a design principle, that helps to meaningfully sequence learning opportunities with varied types of practice-engagement-*representing, decomposing and approximating* (Grossman et al., 2009).

Although the frameworks described above offer the promise of robust learning, experts have advised that a practice-focus should not be understood to mean emphasis on isolated practices and moves without attending to their purpose or how they fit specific contexts

(Kennedy, 2016). To learn to enact teaching that is responsive to students' ideas and understandings, novice teachers need to be able to integrate practice and knowledge domains flexibly to analyze what they are doing and reason why/how to meet intended learning goals (Hiebert & Morris, 2012). Core practices have been described as routine parts of the teaching that PSTs need to learn to use in ways that best fit the children and classroom context, which may be unpredictable. In such a model, learning to deal with the complexities and uncertainties emerging from children's ideas and context is as important as learning routine parts. Therefore, this conception of PBTE requires PSTs to develop skills at questioning and discussion to develop the professional judgment to adapt practices in contingent ways. This is why reasoning and responding to classroom situations is practiced just as often as the core practices, in a practice-based approach (Forzani, 2014).

The frameworks and approaches of core practice-based teacher education have not been applied or studied in ECTE. The present study features a course that uses these ideas. The course provides three kinds of practice-engagement: *representation, decomposition*, and *approximation* (Grossman et al., 2011) and uses the *learning cycle* (McDonald et al., 2013*)* with a sequence of practice based pedagogies to support PSTs' learning about effective teacher-child interactions.

Video analysis

Pedagogies that help PSTs engage with elements of core practices are an important part of practice based teacher education design. Two are particularly noteworthy: 1) video analysis and 2) rehearsals. In video analysis, PSTs view video clips of teaching, and identify examples of modeled core practices, and discuss their pedagogical value and use in varied contexts. Video analysis enables *representations and decompositions* of practice (Grossman, 2011). Past studies have shown that video analysis can improve PSTs' abilities in noticing and identifying targeted

skills (van Es & Sherin, 2002; Jacob et al, 2010; Santagata & Guarino, 2011) and help PSTs to recall and think critically about the pedagogical reasons of practices seen in the video (Arya et al., 2014). An extensive literature review of 110 published studies on the use of video in teacher education has shown that supports like viewing guides, structured prompts, questions, rubrics, and protocols can add to the productivity of video as a learning tool in the teacher education classroom (Beacher, Kung, Ward & Kem, 2018).

The extant literature has shown that video analysis can improve teacher's knowledge (Jacob et al., 2010; Boling, 2007; Arya et al, 2014). There is some evidence that analysis of own teaching videos can promote change in teachers' practice (Tripp & Rich, 2012). Especially in ECTE, a small body of research, shows that teachers with higher level of skill in detecting and identifying effective interactions in videos tend to use rich interactions with children in the classroom (Hamre et al., 2012, Jamil, Hamre & Pianta, 2015; Williford et al, 2017). However, these studies have examined in-service teachers. Pre-service teachers bring different education and experiential backgrounds, which makes them different as learners. Studies have found that teachers with more years of education were better at detecting and identifying effective interactions from video (Jamil, Sabol, Hamre & Pianta, 2015) and that pre-service teachers showed greater variability in their video analysis skills suggesting that these skills may still be emerging (Wiens, Hessberg, LoCasale-Crouch, & DeCoster, 2013). Clearly, the utility of video analysis with pre-service teachers needs more examination. We also do not know what happens when video analysis is used along with other practice-based pedagogies. This study will attempt to address this gap in the research literature.

Rehearsals

Rehearsals, a *pedagogy of enactment* (Grossman & McDonald, 2008), feature

prominently in a practice-based teacher education design. In rehearsals, the PST moves through *simulations,* where he/she leads an instructional activity with peers and teacher educator reacting as students, and *pauses* for in-the-moment feedback from the teacher educator who may ask questions, present an unanticipated situation or use other moves to facilitate collective problem solving and learning (Lampert et al., 2013). By providing concurrent opportunities for deliberate practice, reflection and discourse around that practice (Lampert, Franke, Kazemi, Ghousseini, Torrou, Beasley, Cunard, & Crowe, 2013), rehearsals provide a close simulation or *approximation* of the work of teaching (Grossman et al., 2009).

The research base on this pedagogy has shed light on events that happen inside the rehearsal space: teacher educator roles, the discourse, and feedback that occur within the pauses (Lampert et al., 2013, Kazemi & Waege, 2015). Understandings about how novice teachers' make use of the ideas raised in the rehearsals to adjust and refine their classroom enactment afterwards, is still emerging. Further, studies on rehearsals have been primarily done in Math and science education courses. We do not know how or what rehearsals might look like in ECTE classrooms. By examining what happens when rehearsals are used in a course focused on effective interactions, the current study addresses this gap in the extant literature.

Effective interactions: A core practice in ECE

In early childhood classrooms, teacher-child interactions are recognized as core practice. There is empirical evidence that the nature of interactions that young children experience in ECE classroom influences their social skills, and language and cognitive development, particularly when teachers' interactions are of high quality (Mashburn et al., 2008; Pianta, Barnett, Burchinal, & Thornburg, 2009). Longitudinal research shows that these benefits persist as children move through elementary school (Vandell, Belsky, Burchinal, Steinberg, & Vandergrift,

2010) and that these effects can be particularly significant for low-income children (Howes, Bryant, Burchinal, Clifford, Early, Pianta, Barbarin, & Ritchie, 2006).

The CLASS™ tool is a valid and reliable framework that provides the language to describe effective teacher-child interactions. The CLASS™ tool measures three broad domains of effective interactions—*Emotional Support, Classroom Organization, and Instructional Support*—that characterize children's experiences in early childhood education (ECE) classrooms. Table 2.1 shows, the Pre K -CLASS™ dimensions.

Table 2.1
CLASS™ Domains and Dimensions

Domain	Emotional Support	Classroom Organization	Instructional Support
Dimension	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Behavior Management Productivity Instructional Learning Formats	Concept Development Quality of Feedback Language Modeling

Research studies on teacher-child interactions using the CLASS™ tool have revealed some important findings. In preschool and kindergarten classrooms with high CLASS scores in the Emotional Support and Classroom organization domains, children were found to demonstrate higher social competence and self-regulation skills (Howes et al., 2008; Mashburn et al., 2008). Children in classrooms with higher CLASS scores in the *Quality of Feedback* and *Concept Development* dimensions (of CLASS domain *Instructional Support*) showed more academic progress in both pre-k and kindergarten than their peers in classrooms with lower scores in these dimensions (Mashburn et al., 2008).

Another important research finding is that the quality of effective interactions in early childhood settings varies across CLASS domains. Many large national studies of ECE settings, including state pre-k, Head Start, and community-based child care centers have indicated that while classrooms score between moderate to high level of quality in the *Emotional*

Support and *Classroom Organization* domains, they evidence low quality in the I*nstructional Support* domain (Maxwell et al., 2009). Preliminary evidence suggests that a minimum threshold score in each of the three CLASS domains can be correlated to positive outcomes (Burchinal, Vandergrift, Pianta, & Mashburn, 2010). In the *Emotional Support* and *Classroom Organization* domains, a score of around 5 on the 7-point CLASS rating scale has been associated with positive social skills and in the I*nstructional Support* domain, a score of 3 or higher is associated with higher academic and language skills (Burchinal et al., 2010).

Studies have also shown that when ECE teachers receive training and targeted support on teacher-child interactions, their classroom practices improve (Hamre, Pianta, Burchinal, Field, LoCasale-Crouch, Downer, Howes, LaParo & Scott-Little, 2012; Early, Maxwell, Ponder & Yi-Pan, 2017; Willford et al., 2017). Majority of research in this area has been with in-service teachers. One study featuring pre-service teachers described a course from the *National Center for Research on Early Childhood Education (NCRECE)* focused on effective interactions and early language and literacy, implemented in three ECE teacher education programs, including a community college (Scott-Little et al, 2011). Part of the course content in the study focused on understanding effective interactions as defined by the CLASS™ tool, by observing and identifying CLASS™ practices in videos of other teachers. The study found that students' knowledge of effective teacher-child interactions showed significant gains from the beginning to the end of the course. However, findings were limited to knowledge about effective interactions and did not include data on students' actual enactment of interactions with children. Obviously, CLASS™-framework supported video analysis holds promise but clarity how it can be used to benefit PST's classroom enactments, is still needed.

In terms of course components to support change in practice, studies of coursework and coaching interventions have shown structured video analysis to be associated with improvements in enacted interactions (Williford et al., 2017), especially instructional support interactions (Jamil, Hamre & Pianta, 2015). Williford and colleagues, specifically found that teachers' skills in explaining effective interactions, detected in the video and matched accurately to the CLASS™ dimensions, using specific and behaviorally descriptive language, was found to be a salient predictor of the teacher's ability to enact these practices in their classrooms (Williford et al., 2017). The sample in this study comprised of practicing teachers; so we do not know to what extent findings would apply to pre-service teachers' learning. Nevertheless, it provided ideas to structure video analysis tasks in my study.

It may also be argued that because interactions are responsive and interactive, trying them out in a simulated setting, that is rehearsing them within instructional activities may offer meaningful opportunities to learn by doing. Rehearsals can provide the space to *approximate* interactive practice. As mentioned earlier, a small research base in K-12 teacher education has shown how rehearsals can be used to engage PSTs in learning to flexibly use core practices and respond to students (Ball, 2009; Lampert et al., 2013). I assume that tying rehearsals with video analysis within a learning cycle can support PSTs in *approximating* effective interactions to prepare for classroom enactments. The use of rehearsals in ECTE is unexplored, so examining what happens when PSTs rehearse interactions in the TE classroom ahead of enacting them with children, can provide new ideas to support ECE-PSTs' learning.

To conclude, the literature points to five valuable principles useful for designing teacher learning. First is to use Grossman's (2011) *framework for teaching practice*, to enable teacher candidates to learn *representing, decomposing* and *approximating* practice. Second was to align

the course curriculum on *core practices* (Grossman & McDonald, 2008). Accordingly, the course in this study centered on effective teacher child interactions and used the CLASS™ tool to operationalize this core practice. Third, it employed video-analysis using CLASS™ to help teacher-candidates *represent* and *decompose* the core practice. Video analysis has been shown to be useful for teachers with in-service teachers. Since the typical student in a community college ECE associate degree program works in ECE settings already, perhaps video analysis may be advantageous for this group of TE students. Fourth, the course incorporated *pedagogies of enactment* (Grossman & McDonald, 2009) through rehearsals (Lampert et al., 2013), to support teacher candidates in *approximating* the effective interactions with feedback. Finally, the experiential *learning cycle to enact core practices*, helped to organize practice-learning opportunities in coherent and scaffolded cycles beginning with introduction, rehearsals, and followed by enactment, and culminating with analysis of enactment (McDonald et al., 2013)

Purpose of the study

The purpose of the current action research study was to examine the implementation and outcomes of a course designed to incorporate components, informed by frameworks of practice-based teacher learning. This study joins the growing body of research on "practice-based teacher education" (Zeichner, 2012). As mentioned in the preceding section, there is little evidence that conceptual frameworks and pedagogies part of the K-12 practice based teacher education knowledge base have been applied in ECETE.

Specifically, in this article, my goal is to present findings that answer the research question:

1. How did PSTs' knowledge and enacted practices related to teacher-child interactions change throughout the course?

2. In what ways did the practice-based course components help PSTs learn and enact effective teacher-child interactions?

The article discusses what the PSTs learned, by capturing changes in their knowledge and enacted practices related to effective teacher-child interactions and how these changes were associated with the content and pedagogies used in the course. In light of the interest in the field to identify effective ways to improve the quality of teachers' interactions in early learning classrooms, the study findings may provide new directions for ECETE.

Methods

Study Design

The study used an action research design using mixed methods to examine the implementation and outcomes of a newly designed field experience course. Action research involves a systematic study of practice, and is designed to examine problems of practice and possible solutions for these problems (Merriam & Tisdale, 2016). Educators engage in action research as a way improve their practice, by implementing a new strategy or approach and by studying what happens when the approach is implemented. This form of action research increasingly referred to as practitioner research or practitioner inquiry (Cochran-Smith & Lytle, 2009), emphasizes teaching as an iterative practice, and positions the education-practitioner at the center of efforts to generate knowledge for practice from practice (Cochran-Smith & Lytle, 2009).

Context

The course in this study was the capstone field experience in the Associate's degree program at a community college in the Northeast. The course required participants to complete 9 hours a week for a total of 135 hours of fieldwork and attend weekly seminar meetings. The lead teacher in the student's fieldwork classroom, designated as the cooperating teacher supported

participants' learning by facilitating observations, activity implementation, and feedback.

Participants

Eight early childhood pre-service teachers (referred to henceforth as 'participants') participated in the 15-week-long course. All were female ranging in age from approximately 23 – 62 years. Six were Hispanic/Latino, one was North African/Moroccan, and one was Caucasian. Seven participants were bilingual and had learned English as a second language. At the time of the course, all participants had completed about 50 college credits in the associate's degree, including 30 credits of ECE courses. Four participants possessed the *Child Development Associate* certificate, an entry-level national credential in ECE. Three participants were employed as teachers in private childcare centers and were working with three and four-year-old children; one had worked as a Head-start paraprofessional for three years prior to the course. Two were employed full time and one was a part time employee, earning hourly wages ranging $10 - $16. The three working participants used their classrooms, as field sites while the rest were placed in classrooms in state-mandated preschool programs.

Description of course

The course intervention focused on the *core practice* (McDonald, Kazemi & Kavanagh, 2013) of *teacher-child interactions*, and incorporated the CLASS™ *(*Pianta, LaParo and Hamre, 2008). Practice-based pedagogies aligned with Grossman's (2011) *framework for teaching practice,* especially video-analysis and rehearsals, were integrated into the course so that teacher candidates could learn by representing, decomposing and approximating effective interactions (Grossman, 2011). McDonald and colleagues' (2013) *learning cycle to enact core practices* was utilized to structure the practice-engagements and sequence course activities. The theory of change underlying the course design shows how the research literature informed the structure

and activities and links course to teacher behaviors that when enacted can promote positive child outcomes (Pianta, Hamre & Downer, 2011) (See Appendix A).

The course emphasized the importance of using effective teacher-child interactions (See Guiding principles in Appendix B1). The course was delivered over 14 sessions. In the first half, teacher-child interactions outlined in the three CLASS™ domains and their respective dimensions and indicators were unpacked in detail through readings, discussion and written case examples. For each domain, participants also watched between 2-3 video clips, which *represented* interactions within the domain. The videos showed teachers facilitating large and small-group activities, and were selected from the CLASS™ video library and other sources. Initially, the videos were viewed together during the seminar meetings to guide participants in detecting teacher behaviors that illustrated the CLASS™ dimensions. Following instructor-guided analysis, participants completed written video analysis assignments to develop skill in detecting effective interactions. The goal of both instructor-guided and independent CLASS™-facilitated video analysis component of the course was to engage in *representation* (i.e. observe examples of CLASS™ practices) and *decomposition* (i.e. identify elements of interactions) by connecting them to CLASS™ dimensions and indicators.

In the second half of the course, participants engaged with four instructional activities (IA), one each in the content areas of English Language Arts, Math, Science, and Creative arts. The IAs enabled them to engage with effective instructional interactions aligned to CLASS™ through *approximations* in rehearsals. The activities were selected because they were 1) appropriate for early learning classrooms, 2) offered a structure within which participants could enact effective CLASS™ interactions, and 3) could be organized into meaningful units for practice-engagement (See Appendix B2). Each of the four instructional activities was presented

using steps suggested in the *Learning Cycle to Enact Core Practices* (McDonald, Kazemi and Kavanagh, 2013). Each IA was first introduced through readings, and discussion. In this step, participants learned about the IA and engaged with content area concepts in the IA. Next, the activity was *represented* either through instructor modeling or guided analysis of practice records including videos. In this step discussion helped to *decompose* specific CLASS™ practices within the IA and why and how of these interactions helped children learn (See Appendix C)

Following this, participants took turns to rehearse it with peers and the TE acting as students. The rehearsals were structured so that each participant simulated a meaningful unit of the activity by *approximating* talking, questioning, and other interactional moves, and received feedback from peers and instructor. In essence, rehearsals also engaged the non-rehearsing PSTs in *representations* and *decompositions* and another kind of *approximation* as they took on children's role and responded to the rehearsing PSTs' teaching. Each rehearsal featured multiple pauses or interjections called by the TE to either direct the rehearsing PST to try a specific interaction, or to highlight or reason about a move used.

Following the rehearsal, participants enacted the activity in their field classroom and completed written reflection of the interactions they used in the enactments. Toward the end of the semester, participants selected one of the four rehearsed IAs to re-teach in their field classroom, which they videotaped. Participants then reflected on their enactment to discuss effective interactions they used in their teaching and how they supported children's learning.

This way, the pedagogies used through the steps of the cycle supported all three forms of practice-engagement (Grossman et al., 2009). Viewing and analyzing video clips, instructor modeling, observing the cooperating teacher, and peers' activity rehearsal and own teaching video enabled *representation.* Learning about the three CLASS™ domains and dimensions,

detecting them in video-analysis tasks, CT observations, and peers' rehearsals and own teaching video enabled *decomposition.* Rehearsing instructional activities using effective interactions with peers supported *approximation*.

Data Collection

The study will collected, analyzed and triangulated varied qualitative and quantitative data. Course documents, researcher-journal and field notes, observations, standardized measures, and a focus group were used to answer the research questions.

Course documents. Three types of course documents were collected for analysis. The first included six video analysis assignments, which required participants to watch a video clip and complete a written analysis. The video analysis assignments were graded using a rubric on a four-point scale from 'needs improvement' to 4 'exemplary', which assessed participants' skill in 1) detecting the most important teacher-child interactions in the clip, 2) identifying the CLASS dimensions, and indicators that the behavior is an example of, and 3) explaining why the identified behavior was effective (See Appendix D). Second, participants also completed six field journals using structured prompts to reflect on their participation in IA rehearsals in the roles of students and teacher, and weekly IA enactments in the field classroom. Third, participants submitted a final written reflection with their videotaped enactment of an IA.

Standardized measures. Two standardized measures were used to assess participants' knowledge and enacted interactions. First, participants completed the *Teacher's Knowledge of Effective Teacher-Child Interactions* measure (Hamre & LoCasale-Crouch, 2009), a 14-item scale, which required participants to read scenarios of a preschool teaching activity and select the best teacher response from a set of four choices, based on high-quality interactions using the CLASS™ framework. The scale was piloted with students in other ECE courses to ensure

readability. Although validity data for this scale is not available, versions of the scale have been used in previous studies (Hamre et al., 2012; Early, Maxwell, Ponder & Pan, 2017). The scale is scored as percent correct out of fourteen. The scale was first administered in the second week and a post-test occurred in the 15th week, to examine changes in participants' knowledge about effective teacher-child interactions.

Second, the *Classroom Assessment Scoring System* (CLASS - Pre K) was used to assess students' practices as they relate to effective teacher-child interactions (Pianta, LaParo, & Hamre, 2008). The Pre K CLASS™ comprises of three domains: Emotional Support, Classroom Organization and Instructional formats. Each dimension is scored on a 1 to 7 scale from low to high quality. A low score indicates an absence or lack of interactions related to a dimension, while a high score indicates a high frequency of such behaviors. In past studies, the tool has shown high internal consistency reflected by a Cronbach's alpha of 0.84 for Emotional Support domain, 0.86 for Classroom Organization domain, and 0.91 for Instructional Support domain. For this study, a full observation comprised of 3 or 4 cycles of 20 minutes, with 10 minute coding breaks. A certified and reliable CLASS™ rater completed the observations and scoring twice, first in weeks 3-4 and then in weeks 13-14.

Researcher Journal. A weekly practitioner-researcher journal allowed me to record my thoughts and feelings about course activities and student responses. Discussions during a few class meetings and IA rehearsals were audiotaped to aid note-taking about classroom exchanges.

Field observations. The TE observed participants in their classrooms between 3rd and 4th week, interacting during free choice, and a small group activity. Immediately after the observation, the instructor and participant discussed the teaching interactions that the participant used in their teaching. The TE recorded field notes during this observation. At the end of the course,

participants submitted a video of their teaching of one of the instructional activities rehearsed in the TE classroom. These videos were between 20 minutes to 30 minutes in duration.

Focus Group: Six participants attended a focus group conducted after the completion of the course. A semi-structured interview protocol to gain insights about students' individual and collective perceptions and experiences of the course activities was used. The focus group was audio-recorded and transcribed.

Data Analysis

Data analysis was conducted in phases and different procedures were used for the varied data sources in the study. As the course progressed, the researcher journal enabled ongoing memo-ing to record observations, events and in-class exchanges with participants. Data analysis occurred concurrently with data collection. Figure 1 shows how the varied data sets were analyzed and triangulated. All course documents were tagged individually and then organized by participant aliases to prepare for data analysis.

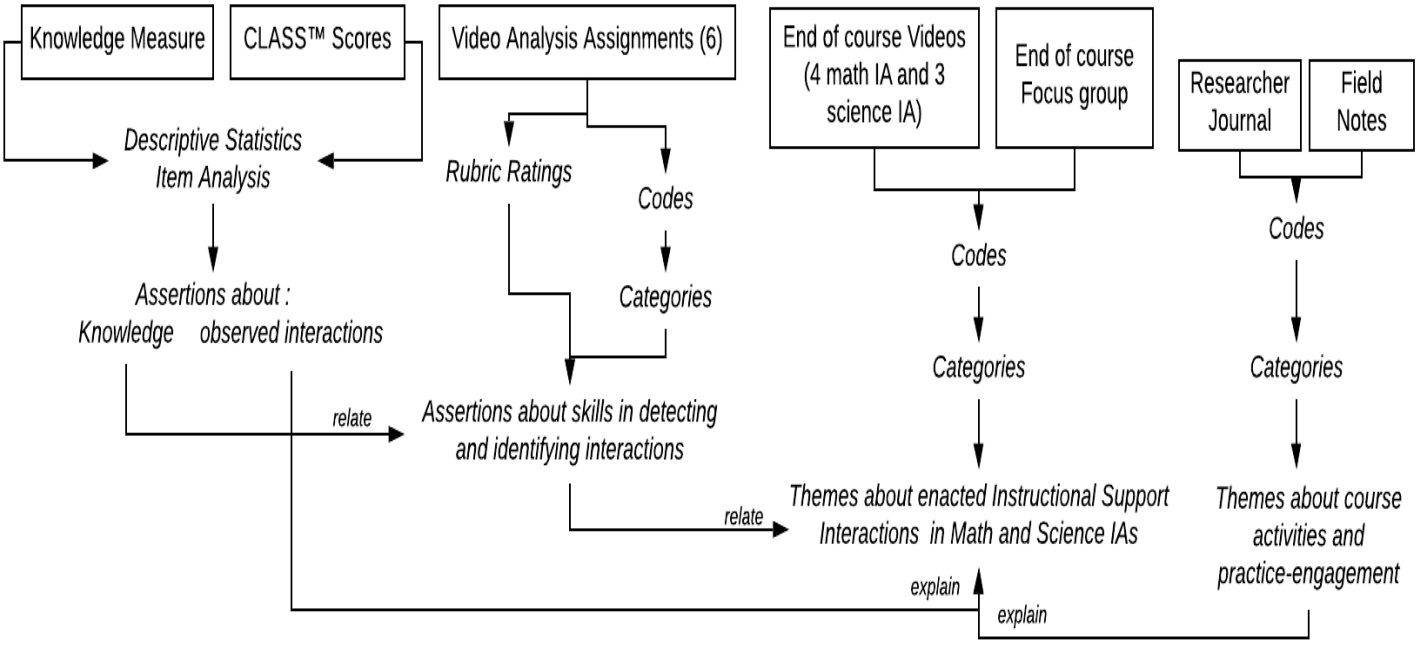

Figure 2.1. Data Analysis Procedures

Firstly, to examine what participants learned about effective interactions, pre and post scores of the two standardized measures, *Teacher's Knowledge of Effective Teacher-Child Interactions* measure (Hamre & LoCasale-Crouch, 2009) and *Classroom Assessment Scoring System* CLASS™ (Pianta, LaParo, & Hamre, 2008), were compared using descriptive statistics to capture changes in knowledge and skills respectively. Item analysis of data from both measures yielded information about the specific interactions that participants improved in and those they did not, both in terms of knowledge and observed practices.

Next, the video analysis assignments were analyzed using 1) the rubric ratings and 2) coding using deductive codes based on 1) CLASS™, and some inductive codes that emerged while directly examining the data. The codes were grouped into categories. The categories and pattern in the rubric ratings were combined to come up with assertions about participants' skill in detecting and identifying effective interactions.

To further examine participants' enacted practices, a set of end of course videos which included four math IA enactments and 3 science IA enactments, and the end of course focus group transcript, were analyzed using qualitatatively. Here again, first deductive codes based on 1) CLASS™ were applied to all course assignments, to examine engagement with CLASS™ practices, and 2) conceptual framework of decomposing, representing, and approximating, to examine the levels of engagement (Appendix E). A few inductive codes: codes developed by the researcher in the process of directly examining the data, were also applied to excerpts. Together these codes helped to chunk and reduce data into excerpts that could be organized and explored by code-labels. All coded excerpts were then re-read, and triangulated across documents and participants. Then, similar or related codes were connected and organized into categories using words/phrases that described a group of codes. Following this, by analyzing how they related to

each other, categories were organized into larger themes or assertions that described a pattern discerned in a group of coded excerpts. In Table 2.2, I show an example to illustrate how themes emerged from categories and codes assigned to data excerpts.

Table 2.2
Example of codes, categories and themes

Data Excerpt	Code	Category	Theme
Paula shows a card with four dots in a diagonal and asks 'how many?" Child says 3. Paula points at the dots one by one and says 1-2-3-4. How many? (Final video)	• Low-An Reason • Low –SCF • Math content Knowledge (inductive code)	Low IS Not understanding math content in children's responses	Challenges with Instructional Support practices in Math Dot card due to lack of understanding of math content in children's thinking.
Child placed one counter under each number numeral 1 – 5 and said, "see I put one… every one has a one." Bella removed counters from child's card, said, "Look" and made sets under each numeral one by one, and said, "do like this." (Final Video)	• Low Create • Low-Prompt • Math content Knowledge		
In dot card….how to ask questions.. to see what child was thinking.. to persist …was difficult for me. (Focus group - Noor)	• Low Scaffold • Low Prompt		

The themes that emerged from the qualitative analysis of end of course videos and focus group helped to validate and further explain the assertions that emerged from the analysis of data from the knowledge measure and CLASS scores, and video analysis assignments. For example, participants end of course videos and focus group helped to understand the nature of their difficulties with *Instructional Support* practices, evident in the findings from the knowledge measure and CLASS™ scores.

After the first set of themes were developed, a similar process of coding was applied to the researcher journal and field notes to generate themes about course activities and participants'

practice engagement, and especially, to examine how some specific practices were addressed repeatedly through the various steps of the learning cycle of an instructional activity. This helped to further explain initial themes. For example, rehearsals were examined to study which aspects of the IA were addressed and to identify how rehearsals suggestions could be traced to participants' final videotaped IA enactments. Major themes that emerged from this data analysis are described in the next section.

Findings

Results indicated three broad themes. Firstly, participants showed gains in knowledge about effective interactions. Secondly, an improved ability to detect and identify effective interactions in videos was also evident. Third, participants showed improvements in observed interactions related to *Emotional Support* and *Classroom Organization* domains of CLASS™ (Pianta, LaParo, & Hamre, 2008), but not in the domain of *Instructional Support*.

Change in Knowledge

Analysis of scores on the *Knowledge of Effective Teacher-Child Interactions measure (*Hamre & LoCasale-Crouch, 2009) showed that participants' knowledge about effective interactions improved from the beginning to the end of the course.

Table 2.3
Scores on Pre and post knowledge measure

Pre and Post administration	Composite Mean	Emotional support (3)	Classroom organization (5)	Instructional support (6)
Time 1 (pre)	48.2	58.33	42.5	47.9
Time 2 (post)	75.0	91.66	80	63.5

Additionally, at the CLASS domain level, while large improvements were evident for *Emotional Support* and *Classroom organization* related items, gains were more modest for the *Instructional Support* items in the scale. Patterns of change at the CLASS dimension level were

also investigated. Within the *Emotional Support* domain, all items showed growth in correct responses. However, participants showed most improvement for two items: 1) related to interactions that support children's interests and autonomy (*Regard for student perspectives*, increased from 25% correct responses in pretest to 87.5 % correct responses in posttest), and 2) related to using social conversations to build relationships (*Positive climate*, increased from 37.5% correct responses in pretest to 87.5 % correct responses in posttest).

Within the *Classroom Organization* domain, improvements were noted for all items. Specifically, most improvement was evident for an item related to interactions that maximize children's engagement in learning activities (*Instructional Learning formats*, increased from 50% correct responses in pretest to 100 % correct responses in posttest). Additionally, two items related to teachers' ability to anticipate problem behaviors and respond proactively also showed substantial gains (*Behavior Management*, increased from 50% correct responses in pretest to 87.5% correct responses in posttest).

Within the *Instructional Support* domain, participants showed most improvement for an item related to interactions that help children connect previous learning to current concepts (*Concept development*, increased from 50% correct responses in pretest to 100 % correct responses in posttest). An item related to interactions that get children thinking about similarities and differences showed a small gain (*Concept development*, increased from 0% correct responses in pretest to 12.5 % correct responses in posttest). Additionally, two items showed no change. The first related to teachers' use of linguistic scaffolding to describe children's or own actions (*Language modeling- Self and parallel talk*, showed 25% of correct responses in both pretest and posttest). The second no-change item related to teachers' ability to provide hints and scaffolds (*Quality of feedback,* showed 25% of correct responses in both pretest and posttest).

In summary, participants showed gains in knowledge related to all three domains of CLASS. However, these gains were stronger for *Emotional Support* and *Classroom Organization* domains, in comparison to I*nstructional Support*. Specifically, within Instructional Support, items that were difficult required participants to focus on ways to help children think deeply about concepts. This finding indicates that participants' understanding about instructional interactions was still emerging.

Change in Skill of Detecting and Identifying Effective Interactions

There is research evidence that teachers' skill in detecting and identifying effective interactions in videos is linked to their ability to enact these practices (Jamil et al, 2015; Williford et al., 2017). Participants' responses in the six video analysis (VA) assignments were used to assess patterns of change in their skills in detecting and identifying effective interactions.

Table 2.4 shows the mean rubric ratings on graded attributes for the six video analysis assignments that participants completed throughout the course.

Table 2.4
Mean Rubric ratings on Video Analysis assignments

Video Analysis	CLASS domain focus	Mean Rubric Rating	
		Detecting effective interactions	Identifying CLASS dimensions/ indicators
VA 1: Wk. 3 Circle time	Emotional Support	2.38	1.75
VA 2: Wk. 4 Centre time	Classroom Organization	2.57	2.14
VA 3: Wk. 5 Block play	Instructional Support	3.13	2.25
VA 4: Wk. 9 Counting to 5	Instructional Support	3.25	2.38
VA 5: Wk. 11 Plant study	Instructional Support	3.38	2.25
VA 6: Wk. 13 Fire Art	Instructional Support	3.25	2.50

Overall, participants demonstrated growth in detecting effective interactions, moving from a 'developing' level to a 'satisfactory' level through the six VAs. In the first assignment, participants documented less-significant events, suggesting a difficulty in knowing what to attend to in the video. By the 3rd video analysis assignment, their responses indicated that they were 1) focusing on the most salient teacher interactions in the clip, and 2) including more specifics about teacher behaviors, i.e., what the teacher and child/children said and did in the interaction. The excerpt below shows an example of the change in specificity of descriptions in participants' responses.

> The teacher in the class is conversing with the children in circle time. The teacher is listening and responding to the children's questions. (Karina[†] in VA 1).
>
> The teacher asked an open-ended question, "So, tell me about this, how did you make your fire?" When the child said, "I used chalk.. with a pencil,", the teacher repeated a correction of the child's language, "You used chalk and a pencil?" (Karina in VA 6).

The excerpt shows the participant's response moved from broad to a specific narrative recounting finer and nuanced elements of teacher's actions and words with references to indicators within CLASS™ dimensions, namely open-ended questions and repetition within the *language modeling* dimension (CLASS: Pianta, LaParo, & Hamre, 2008). It is noteworthy that the detection skill, showed the most growth between assignments 2 and 3 compared to 3-6. Evidently, participants began to develop the skill of noticing salient and fine details of interactions aligned to CLASS™ practices at this time and then maintained this growth.

In terms of identifying interactions by marking them accurately with CLASS™ domains, dimensions and indicators, participants displayed growth, moving from a low 'developing' level

[†] pseudonym

to a moderately high 'developing' level through six VAs. As participants progressed through the VA assignments, they matched the detected interactions accurately to correct domains, but at times, missed at the *dimension* or the *indicator* level. Two excerpts illustrate this pattern.

In the first example, in VA 4, the teacher in the video clip asked children in her group, "Does anyone have any other way we can show five (using fingers in both hands)?" The teacher here made use of *brainstorming* (in the *Concept Development* dimension within the *Instructional support* domain of CLASS™) as a way to make children think. Seven of eight participants marked this interaction as an example of *open-ended questions* (in the *Language Modeling* dimension within the Instructional Support domain), indicating confusion about the purpose of this interaction. Another excerpt illustrates a similar pattern. In VA 5, a teacher pointed to the roots of a small plant that a child was examining through a magnifier and said "Look, kind of looks like hairs". Five of eight participants labeled this as an example of *frequent conversations* (in the *Language Modeling* dimension within the Instructional Support domain), instead of *Analysis and Reasoning* (in the *Concept Development* dimension within the *Instructional support* domain of CLASS™). In both these instances, participants mislabeled the teacher's talk as a way to stimulate language instead of promoting higher-level thinking. This indicates that participants' grasp of the CLASS™ tool's organizational structure was still emerging or that they may not be attending to the more nuanced interactions needed to think deeply about concepts.

The assertion that participants' schema about the CLASS™ tool was still emerging is further supported by the finding that at times when they misidentified CLASS practices, their explanations indicated an understanding of the correct practice. For example, for the teacher's comment in the above example, "Look, kind of looks like hairs", a participant Yenny* labeled

* Pseudonym

this as an example of *Frequent Conversations* (in the *Language modeling dimension* within the *Instructional Support* domain) and explained that, "the teacher's conversation with children is scaffolding their understanding of what roots look like by comparing them to hairs." From their explanations, it seemed like PSTs were developing understanding of practices, but were not marking the interaction with the correct CLASS™ terminology. These patterns are understandable and point to the challenges that novices may face around building a more complex, and layered understanding of interactional processes.

Finally, a comparison of participants' responses in VA 3 and VA 6 further helps support the finding of gains in the skill of detecting and identifying effective interactions and that despite the growth, identifying some CLASS™ practices in videos continued to be challenging. Table 5 shows a comparative analysis of interactional practices that participants detected and identified in VA 3 and VA 6

Table 2.5
Comparative analysis of VA 3 and VA 6

Video Analysis	Number of participants who identified interactional practices	
	VA 3 Block play	VA 6 Fire Art
Self talk	2	4
Parallel talk	0	2
Back & forth exchanges	7	7
Contingent responding	1	4
Repetition and Extension	7	8
Advanced Language	1	4

The video clips in both assignments featured examples of the same language scaffolding practices (within the *Instructional Support* domain). The videos featured different settings; VA 3 captured a one-on-one interaction during free block-play and VA 6 featured discussion of children's artwork after a small group art activity. The analysis shows that across the two VAs,

1) participants improved in their identification of most practices, and 2) interactions like parallel talk, contingent responding and advanced language remained challenging for some participants. These results suggest that, in the eight weeks between VA 3 and VA 6, repeated and ongoing engagement with these practices through in-class video-analysis, and rehearsing and enacting IAs, contributed to gains in skills of detecting and identifying these practices in videos.

In summary, PSTs skills in detecting and identifying effective interactions showed improvements. Participants' focus group responses attributed this growth to instruction about the CLASS™ domains, and repeated use of the tool as the observation lens. One participant Noor said, "Before, I never paid attention to how teachers do the teaching, how they know the questions to ask, how to persist… what is happening inside the teaching. With CLASS™, I see this." Past studies have shown that teacher's skill in identifying and describing effective interactions relies on "a cognitive organizational structure, or schema and language to describe these interactions" (Jamil et al., 2015, p. 417). The structure of the CLASS™ tool seemed to be guiding participants' *noticing* of effective interactions. Participants also shared that repeatedly hearing about the practices during class meetings, feedback on VA assignments, the CLASS™ book, and in-class practice helped with the video-analysis tasks.

However, the results are clear that the gains were larger for the detection skill than for identification. Experts have argued that detection and identification are closely related and both these skills are determined by the "quality of teacher's schema for effective interaction" (Jamil et al., 2015 p.424). Clearly, participants' schema, that is their understanding of CLASS™ tool, was not well developed enough to support accurate identification of interactions. Participants acknowledged these difficulties and expressed that they found the CLASS™ terms at the indicator and behavioral marker levels to be confusing, and that "there were too many new

names for practices" (Lina* focus group). It is likely that participants found the technical language of CLASS™ *Instructional Support* domain to be heavy. Another participant Cindy* said, "In the beginning, it seemed like a lot of names for different kinds of questions, each did something different for kids' learning. When I started the activities (IAs), I understood why (we need) these different questions." This participant noted the difficulties in taking on the technical language of the instrument, but also that course activities provided the practice to begin to develop understanding about effective interactions and their purpose. It is also noteworthy that within the domain of *Instructional Support* participants' continued to struggle with interactions to promote deeper thinking and analysis, first evident in the knowledge measure items and then in detecting and identifying these practices in videos.

A majority of the VA assignments in the dataset focused on *Instructional support* interactions, so it is not possible to make assertions about detection and identification skills comparatively across the domains of *Emotional Support* and *Classroom Organization*. Further, past studies have shown teachers' skill in detecting and identifying effective interactions to be associated with the quality of their classroom interactions (Jamil, Hamre & Pianta, 2015; Williford et al., 2017). Therefore, the next step in the analysis was to examine how the pattern of emerging skills in detection and identification of *Instructional Support* interactions play out in participants' enacted interactions.

Changes in Enacted Interactions

In terms of changes in the enactment of effective interactions, the quantitative data from pre and post CLASS observations in Table 2.6 provides a snapshot of this change. Participants evidenced near-high quality scores in the *Emotional Support* domain, moderate level in

* Pseudonym

Classroom organization domain and low quality in *Instructional Support*. Interestingly, they started strong in the *Emotional Support* domain and sustained this advantage through the end of the course. While a small gain is evident in the *Emotional Support and Classroom organization* domains, mean scores for Instructional Support decreased, resulting in the CLASS™ mean showing no change.

Table 2.6
Scores on pre and post CLASS™ *measure*

Pre and Post scores	N	CLASS Mean	Emotional Support Mean	Classroom Organization Mean	Instructional Support Mean
Time 1	8	3.99	5.57	4.06	2.35
Time 2	8	3.91	5.69	4.36	1.67

Examining the dimension scores within the three domains showed that, within the *Emotional Support* domain all participants increased scores for *Teacher Sensitivity* (100%) and 75% showed higher scores for the *Regard for Student Perspective* dimension. This indicates that participants' observed interactions at the end of the course were more child-focused, flexible and supportive of children's autonomy. Field notes from participants' classroom observations in weeks 3 and 4, and their final lesson videos validated this finding. Even at the beginning of the course, participants demonstrated eye contact, a warm and calm voice, respectful language, and positive affect when interacting with children. However, in their final lesson videos, in addition to these interactions, participants took on more practices in this domain like greater sensitivity and responsiveness to children's ideas and challenges and providing individualized support within the activities. For example, in a video of a collage activity, a participant Lina* was observed saying to a child trying to cut paper to fit in a corner on the collage board, "I can see

* Pseudonym

that you are working hard to get that shape. Would you like my help?" This comment was coded as an example for *Teacher Sensitivity* (Pianta, Hamre & LaParo, 2008), as Lina's response was sensitive to the child's effort and intent to carry out her idea. In another example, while introducing the planting activity, a participant Karina* asked students, "What do you want to know about plants" and another participant Cindy*, allowed students to choose the book they wanted to read. These two observations were coded as an example of *Regard for Student Perspectives* (Pianta, Harme & LaParo, 2008), as this showed participants' willingness to go along with children's ideas. That, participants took on student-autonomy supporting interactions and enacted them within a teacher-directed small group activity is particularly noteworthy. Also, both these observations were also tagged with the code 'rehearsal suggestion' indicating that these ideas were raised and discussed during the IA rehearsal pauses, indicating uptake of rehearsal feedback.

In the *Classroom Organization* domain, 7 of 8 participants showed higher scores for the *Productivity* dimension, and 62.5% increased scores for the *Instructional Learning Format* dimension. This implies an improved ability to use classroom time and routines and appropriately engage children in learning activities. This improved ability was evident in participants' end-of-course teaching videos. All participants began their activities by clearly stating the learning goals of the activity. In her activity, Cindy began with a discussion to invite children to share what they knew about plants and then gave a walk through the lesson by saying, "Let's find out more by reading this book about how plants grow, so we'll know how to plant seeds and grow our own plants. Then we can also draw pictures of our plants. Are you ready?" The PST's intentionality in stating the objectives and learning plan so children were prepared to

* Pseudonym

focus their attention on the learning activities was coded as an example of the *Instructional Learning Format* dimension (Pianta, Harme & LaParo, 2008). In the end of course videos, participants were observed using a mix of activities and materials to engage students (e.g., read a book, used dot cards, fingers, counters and dice to engage with numbers). These were also coded as examples of *Instructional Learning Format* practice. Again, the interactions that participants adopted in their enactments could be traced back to specific suggestions presented during the teaching-learning activities of the IAs.

While growth was evident in the *Emotional Support* and *Classroom organization* domains, mean CLASS™ ratings for the *Instructional Support* domain decreased indicating the use of less effective practices to support children's thinking and language skills. Within this domain, 5 of 8 participants showed an increase for the *Language Modeling* dimension, indicating a small improvement in the ability to use interactions to stimulate language. Additionally, 3 of 8 participants showed an increase for the *Quality of Feedback* dimension indicating that participants showed a small growth in the ways in which they provided feedback in response to children's ideas. More problematically, for the *Concept Development* dimension, scores for 6 of the 8 participants, decreased implying lesser focus on stretching children's thinking and engaging them in reasoning during instructional activities or routines. This finding is understandable considering the pattern of participants' difficulty with this dimension (i.e. supporting children to think deeply to build understanding about concepts) in the knowledge domain and with regard to skills in identifying these practices in video.

It is important to point out the classroom settings in which CLASS™ ratings were assigned. In time 1, most of the CLASS™ observation cycles were conducted during free choice center time when children explored center materials freely, and during meals and transitions. In

time 2, at least 2 of the 3 or 4 observation cycles for each participant included small group adult-guided IAs that participants had rehearsed in the college classroom. Free choice is a child-guided setting and therefore may provide more opportunities for responsive teacher talk. Evidence from a large-scale study of 314 classrooms indicates that teachers show highest levels of *Instructional Support* during *free choice* and large group (Cabell, DeCoster, LoCasale-Crouch, Hamre & Pianta, 2013). Like large group time, it may be assumed that teachers may view content-specific small group activities as valuable instructional time. However, if the small group activities were enacted in a didactic manner with less focus on encouraging student talk and deep thinking, as they tend to be in prekindergarten classrooms (Early et al., 2010), then there may be few opportunities to observe high quality instructional interactions, specifically related to teacher-feedback and stretching children's thinking.

The next section will zoom in on participants' end-of-course teaching enactments and examine evidence that helps to understand participants' challenges with *Instructional Support* interactions.

Challenges with Instructional Support Interactions

Analysis of participants' end-of-course videos showing their final classroom enactment of an instructional activity rehearsed in the college classroom, indicated patterns of didactic instructional interactions in the Math dot card enactments and reasonably well-scaffolded instructional interactions in the science planting activity enactment. In this section, I illustrate the differences in the enactment of these two IAs.

Two excerpts from the Math dot-card IA enactment illustrated that participants enacted the activity in a didactic manner with little engagement with content area concepts, students'

ideas, or feedback to support thinking. In the first excerpt, Paula* showed a child a card with four dots arranged in a diagonal and asked, "How many dots?" When the child looked at the card, and said "three", Paula told the child, "Point and count the dots on your card." Here was an opportunity for Paula to ask the child how he saw the dots and explain why he thought it was 3 to assess the child's emerging number sense and build from his response. By asking the child to count, Paula lost the opportunity to find out what the child knew already and turned this into a drill style counting activity.

In another example, when a child placed one counter under each number numeral 1-5, and said, "see, I put one… every one has a one", her teacher, Bella*, removed all the counters from the child's card, modeled how to move and place the dot counters to make sets under the number numerals and told the child, "do like this". In this example, Bella missed the opportunity to recognize mathematical content in the child's response by not asking the child to explain what she did and thought. Further, by undoing the child's work, Bella showed that the child's effort and ideas were not valued. By modeling how to make sets and asking the child to repeat the modeled method, Bella communicated that there was only one way to count out sets, making this a rote activity.

Both of these excerpts were coded as examples of low levels of *Concept Development* and *Quality of feedback*), because participants did not attend to and build on children's mathematical ideas. They offered perfunctory feedback that did little to stretch children's thinking. That participants may have conducted one or more of the IAs during the Time 2 CLASS™ observation cycles, using low level instructional interactions like the kind described above, helps to explain the pattern of low *Instructional Support* scores.

* Pseudonym

Interestingly, in comparison to the dot card math IA, in their enactment of science planting IA, participants' showed evidence of using interactions to build on students' thinking and provide feedback to expand engagement and learning. Excerpts from two participants' end of course videos illustrate this finding. In the first example, Cindy* asked students what they knew about the parts of a plant and used the children's responses to draw a picture of the plant, adding each part on her drawing as the children shared their ideas. She used a variety of questions to draw children's ideas like "where can I draw the flower, what does it look like, why does it make sense to draw the fruit here?" and these exchanges sustained the discussion. Cindy also shared the marker with children on two occasions to have children add details like 'seeds inside the fruit" and "hairs sticking out from the flower" to complete the drawing. The interactions featured multiple open-ended questions intended to elicit children' thinking and the exchanges were responsive to children's ideas.

Another participant also used a similar drawing-supported-discussion practice. Yenny*, put a white board in the middle of the table and said, "Let's make a drawing that shows all the things plants need to grow?" This time children took turns to add their marks and pictures, and Yenny's questions helped students articulate their ideas and how they were portraying those ideas in the drawing. As a result, children added ideas like, "the rain comes down like this (vertically) but sometimes goes like this (horizontally)", "they (plants) need shade from the sun", "when tomatoes are growing, they cannot stand", "plants need love and then they grow fast." Yenny repeated and affirmed the ideas and helped students illustrate these ideas, adding more information, as they drew. Participants' practices in both these examples were coded as good

* Pseudonym

examples of *Concept development, Quality of Feedback,* and *Language Modeling* within the *Instructional Support* domain.

So, what data is available to make sense of these different patterns in enactment? To begin with, there was evidence that participant's mathematical content and pedagogical knowledge, and knowledge of children's developmental progressions of number and counting concepts, played a part in PSTs' enactments of the Math dot card IA. Evidence from participants' enactment of the dot card Math activity showed a lack of understanding how to analyze and recognize the mathematical content in children's actions and responses, which determined how they responded to children (e.g., repeatedly asking how many were in the set, even when children skipped counting objects or made errors in number order, having children count sets laid out in a scattered way instead of straight line arrangements and repeating a point-and-count strategy instead of a move-and-count strategy to address skipping objects while counting). Participants also had children count large sets instead of reducing set sizes to build counting accuracy. These observations indicate that a lack of mathematical content knowledge may be influencing participants' instructional interactions in the dot card IA.

On the other hand, all three participants who submitted videos of their science planting IA, showed evidence of engaging and building on children's science and process related ideas. A brief excerpt from Yenny's introduction, illustrates this.

> Lets begin, tell me what you know about plants. Many children responded. A boy said, "A tree is a plant. Another child, pointed to a potted plant hanging in the room and said, "there!" Yenny said, "Ben and Lane are right. A tree is a plant and a potted plant is also a plant. So how is a tree and plant in a pot same and how are they different? Some discussion follows about differences in size. Then, Ben said, "All plants are green."

> Yenny responded, "Yes, Ben, plants are green. They have something inside them that we call chlorophyll that gives them their green color."

This excerpt shows Yenny using effective questioning as well as feedback loops to elicit and stretch thinking about science content. The flexibility to engage with science content was more easily evident in the enactment of the planting IA.

Analyses of the IA rehearsals also offer some insights into participants' enactment of instructional activities. Rehearsals allowed participants to enact meaningful segments of the IAs with their peers and TE. During rehearsals, the TE called out pauses to draw attention to specific elements of practice and coach participants through their instructional decision-making. An examination of what was worked on during these pauses, referred to as the substance of these teaching-learning conversations (Lampert et al., 2013) within the IA rehearsals, helps to discern a pattern, as shown in Table 2.7.

Table 2.7
Substance of IA Rehearsal pauses

Substance codes assigned to Rehearsal Pauses	Frequency of substance codes in a rehearsal			
	IA 1 Read Aloud ELA	IA 2 Math Dot card	IA 3 Science planting	IA 4 Process art - collage
Attending to IA: structural aspects organization, materials, & pacing	5	9	7	6
Student thinking: eliciting, analyzing, & building on student ideas and actions	3	3	3	4
Content goals: Attending to specific content goals of the IA	3	6	5	3
Process goals: Attending to specific process goals of the lesson	5	6	4	3

Table 2.7 shows that rehearsal pauses predominantly focused on the structural and content

aspects, and with less focus on student thinking. Given that the participants were new to the IA, a focus on these aspects may have been most beneficial to PSTs to rehearse, so that they could think through how CLASS interactions could be used in consistent ways, regardless of the student ideas that come up in teaching. This analysis suggests that rehearsing the IAs in this way, while they did teach instructional routines, may have been less authentic (Grossman et al., 2009) because they did not adequately *approximate* how to address students' ideas. Even though there were some attempts to represent student thinking in the rehearsals through TE or peers illustrating common students' ideas, structural aspects took precedence over this aspect. Therefore, *approximating* the IA in one rehearsal may not be enough to prepare PSTs to meaningfully notice and attend to students' ideas in their classroom enactments. Perhaps, repeating rehearsals after an initial classroom enactment can help PSTs can bring students' ideas into the rehearsals space more effectively and learn from repeated cycles of *approximations* and enactments.

A more in-depth examination of what was worked on in the dot card IA helps to understand the challenges related to this activity. Two practices were repeatedly emphasized in the learning cycle of this IA: 1) asking children to explain their response, e.g. "tell me why you think there are four, how do know it is four or how do you see the four", and 2) repeating children's responses or explanations. In the dot card rehearsal debriefing, most participants voiced these practices as important ideas to incorporate in their enactments. However, in their classroom enactments, few participants asked the "how do you know it is (number)?" question or asked this question when students' counting responses were inaccurate. Further, on the few occasions that they asked this question, participants did not repeat students' explanations and either asked students to "check and make sure" or gave the correct answer. This illustrates that

even though some practices may have caught PSTs' attention, they were not transferred into practice.

In comparison, the rehearsals of the learning cycle of the planting IA looked different. The learning cycle activities repeatedly addressed allowing children to draw what they know or observed as a science process skill. There was also an emphasis on using open-ended questions to elicit children's thinking and tap into observation and sensory experiences. Many of these ideas were emphasized repeatedly in the video analysis and rehearsals of the planting IA's learning cycle and were evident in participants' use of this drawing-facilitated discussion and interactions to prompt and elicit children's thinking. This implies that participants attended to these ideas in the learning cycle's activities and were able to transfer them into their classroom enactments.

Thus far, this section has discussed evidence from participants' end of course enactments to understand challenges with *Instructional Support* domain practices. To summarize, low-level instructional support interactions were evident in participants' enactment of the Math dot card IA and this may be attributed to a lack of ability to recognize mathematical content in children's actions, which possibly constrained participants from using appropriate interactions. On the contrary, participants' relative ease in engaging with science content contributed to richer instructional interactions while enacting the planting IA. Additionally, analysis of rehearsal interjections, suggest that few opportunities to attend and engage with student's ideas in rehearsals may have also played a part in shaping the enactments to be didactic and less scaffolded, especially for the dot card IA. For the planting IA, participants' enactments showed that they incorporated the suggestions and ideas raised in the steps of the IA learning cycle.

However, in the Math IA, this transfer was not evident. In the next section I discuss these inferences in more detail and consider implications for the learning of ECE PSTs.

Discussion and Implications

The purpose of the present study was to examine changes in knowledge and practices related to effective teacher-child interactions, from participating in a practice-based teacher education course. The study findings indicated improvements in participants' knowledge, skills in detecting and identifying effective interactions and enacted teacher-child interactions. While these gains were clearly visible for *Emotional Support* and *Classroom organization* interactions, improvements in *Instructional Support* interactions were not evident in their classroom enactment, particularly when teaching mathematics. In this section I will first discuss what I learned about utility of practice-based course components to support ECE-PSTs learning about effective interactions. Then I will examine the natural difficulties that PSTs' encounter learning to enact ambitious practices and in light of these challenges consider implications for the design of a practice-based curriculum and pedagogies of educating ECE PSTs.

Practice based course components

First, in terms of inferences about the components of the practice-based course that played a part, all components had both affordances and limitations. Participants expressed that the use of CLASS™, videos, and rehearsals greatly facilitated their learning. Data analysis showed that repeated and consistent use of the CLASS™ tool as the observational lens maintained a focus on effective interactions. However, participants also expressed that there was a substantial amount of sophisticated terminology especially, in the *Instructional Support* domain, in the short duration of the course. This possibly increased the level of complexity around learning about these practices. Participants were analyzing and applying this content in

video analysis tasks and approximating them in the rehearsals before enacting them in their field classrooms, even as they were still trying to understand and build their initial schemas about these practices. This has implications for novice teachers because they have not accrued enough experience and knowledge about teaching, to meaningfully organize, and use this new information (Bransford, Brown & Cocking, 2000).

Video analysis offered many learning benefits. Video analysis supported participants in detecting effective interactions and to some extent identifying CLASS practices. There were challenges in identifying specific *Instructional Support* practices, and this is understandable given that as novices, their organizational schema about effective interactions was still evolving. Clearly, compared to in-service teachers, pre-service teachers respond differently to video analysis. PSTs may benefit from different kinds of video supports like non-exemplars, or questions to draw attention to practices, that they may miss. A recent large-scale study showed findings similar to the present study; that watching videos of others' high quality teaching was related to growth in emotional support but had no effect on teachers' instructional support practices (Pianta, DeCoster, Cabell, Burchinal, Hamre, Downer, LoCasele-Crouch, Williford & Howes, 2014). Instead, changes in instructional interactions were found to be associated with coaching prompts used to analyze one's own teaching (Pianta et al., 2014). This makes sense, as individualized coaching prompts can draw PSTs' attention to meaningful aspects of the teaching context in order to improve responsiveness, as suggested by Dreyfus (2004).

Rehearsals were highly rated by the participants who expressed that watching others try out the IA gave them ideas to use in their own enactment. Indeed, qualitative analysis of the teaching learning activities showed multiple instances when participants utilized ideas raised during rehearsals in their classroom enactment. However, data analysis showed that the

rehearsals were primarily focused on engaging with structural or routine aspects of doing the IA, and less focused on engaging with students' ideas, a salient characteristic of instructional interactions. Lampert and colleagues (2013, p.239) have said, "Approximations of practice can be categorized as more or less authentic based on a number of characteristics, but those characteristics must be considered in relation to the teaching that one is trying to approximate." Given that the goal of the IAs was to *approximate* responding to children's ideas and comments about the content in the IAs, I argue that the rehearsals in the present study with their predominant focus on what to do in the IA, were less authentic. Repeating the rehearsals after an initial enactment, and using repeated cycles of rehearsals, might assist in bringing about the desired shift to more student-centered practices, and therefore offer a more authentic design (Kazemi & Waege, 2015).

Problem spaces in ECE-PSTs' Learning

Study findings help to illuminate what may be naturally problematic for pre-service teachers to learn. We know that instructional interactions, especially stretching children's thinking to support deep analysis and reasoning, are challenging. This is not surprising given that large-scale studies have shown *Instructional Support* scores for preschool classrooms to be in the low to low-moderate range (LoCasale-Crouch et al., 2007). Studies have also found in-service teacher's *Instructional Support* practices to be more resistant to change than those in other domains (Pianta, DeCoster, et al, 2014). This kind of teaching is complex to begin with, since it requires teachers to meaningfully utilize knowledge of content, context, and students. Given their developmental progression, this is particularly hard for novices (Dreyfus, 2004). In fact, we know that novice teachers focus more on the teacher, materials and set up when watching teaching videos (Kerrins & Cushing, 2001) and find it difficult to *notice* student thinking (Jacobs

& Phillips, 2010). It is only after their early classroom experiences and with an instructor's coaching, that novices begin to acknowledge "meaningful additional aspects of the situation or domain" (Dreyfus, 2004, p. 177). A suggestion to address this difficulty would be to provide repeated opportunities to enact and analyze one's own teaching through reflection and TE's coaching-feedback. Such targeted supports would have helped participants to make sense of their successes in the planting IA and challenges in the dot card enactment. This is recommendation for future iterations of the course.

The study found a pattern of participants' use of didactic teaching approaches characterized by a focus on correct answers, rote-learning of facts and drill-based teaching approaches. One reason why interactional routines to engage students' thinking are difficult for novices to take on is because they conflict with their understanding of teaching built from years of experience with IRE (Initiate-Respond- Evaluate) style teaching-learning exchanges (Lampert & Graziani, 2009). Cognitive science experts believe that when confronted with new ways of teaching, a teacher's prior knowledge and beliefs interact with their ability to make sense of this new information. It is important TEs help PSTs access and challenge these long-held beliefs and applying it to guide reconstruction of schemas, through non-exemplars, dilemmas and individual feedback (Spillane, Reiser & Reimer, 2002).

The study findings related to PSTs' challenges with enacting instructional interactions in mathematics, supports recent research that has stressed the need for ECE teachers to strengthen their knowledge of mathematical content, pedagogical and children's mathematic development (Hyson & Woods, 2014). The content area of mathematics has received little attention from ECE teachers (Ginsberg, Lee & Boyd, 2008) and has shown to be associated with low levels of instructional support (Early, Iruka, Barbarin, Ritchie, Winn, Crwaford & Pianta, 2010) due to

"lack of explicit attention to mathematical concepts and procedures along with a lack of intentionality to engage in mathematical practices" (Clements & Saram, 2011, p. 968). We also know that ECE teachers show significantly lower levels of ECE teachers' self efficacy for mathematics compared to that for literacy and science (Gerde, Pierce, Lee & Egeren, 2017) which in turn may be associated with their own negative educational experiences (Edwards & Loveridge, 2011). This lack of confidence in their math abilities can explain the lack of intentionality to engage students in mathematical conversations, which was evident in this study.

On the bright side, PSTS' in the study enacted richer and more responsive instructional interactions in their science-planting IA enactments. Past studies validate this finding. A large scale study of 314 head start programs examining the quality of instructional support in early education classrooms across content areas showed the highest scores for science activities while scores for math activities were found to be among the lowest (Cabell et al., 2013). It is possible that science activities like examining and planting seeds, and recording growth naturally support teacher's instructional responsiveness to children's ideas.

It is also important to note that each of the four instructional activities featured in the course required participants to take on many general and content specific instructional practices The three dimensions of CLASS *Instructional Support* domain: *Concept development*, *Quality of feedback* and *Language Modeling* have been referred to as global or foundational to learning across content areas (Pianta, Hamre, 2009) but the four IAs in the course required additional content-specific knowledge and strategies, which were only superficially, addressed during the initial pre-rehearsal steps of the IAs learning cycle. This means that there was extensive ground to cover in the enactment of the IAs. Understandably, learning to change practice in this way can

happen only gradually. This has implications for sequencing these concepts and skills in the design of our ECTE program.

A few limitations of this study are important to mention here. The findings discussed here emerged from eight students. Even while the characteristics of these students mirrors the well-documented profile of the nation's preschool workforce, the study findings are limited in generalizability. The findings are also limited to changes in participants' knowledge and practices at the end of the 15-week course. No claims can be made about the long-term effects of the practice-based course on participants' future teaching or its effect on children's learning gains. A single observer assigning CLASS ratings based on a single day of observation may not be valid. The use of CLASS as a course component and for measuring course outcomes may pose a " teach to the test" effect, although other outcome measures were also utilized. The action research design of the current study limits claims about the effects of the course interventions and can only offer suggestions for early childhood teacher educators to try in their own contexts.

Conclusion

Findings about PSTs' learning and the course components provide valuable insights for the design of practice-based teacher education. This study integrated the core practice of effective interactions in one course. Given the high stakes nature of effective teacher-child interactions, more work is needed to study the integration of this core practice, and practice-based pedagogies across courses in a program.

Finally, in considering how this work can benefit ECTE, the study lends support to Grossman and colleagues' (2011) *framework for teaching professional practice* utilizing varied pedagogies to engage PSTs in continuous and iterative cycles of *representations, decompositions,* and *approximations* to learn the work of teaching. The framework supported the

design of the practice-based course in this study and helped examine the affordances and limitations of course activities. The conceptual framework can help to bring together faculty, programs, and institutions to generate answers to pressing questions in the field. Early childhood teacher education, in particular, needs such a research agenda to build a meaningful and coherent knowledge base better poised to support early educators to influence positive outcomes for young children and to fully realize the promise of the field.

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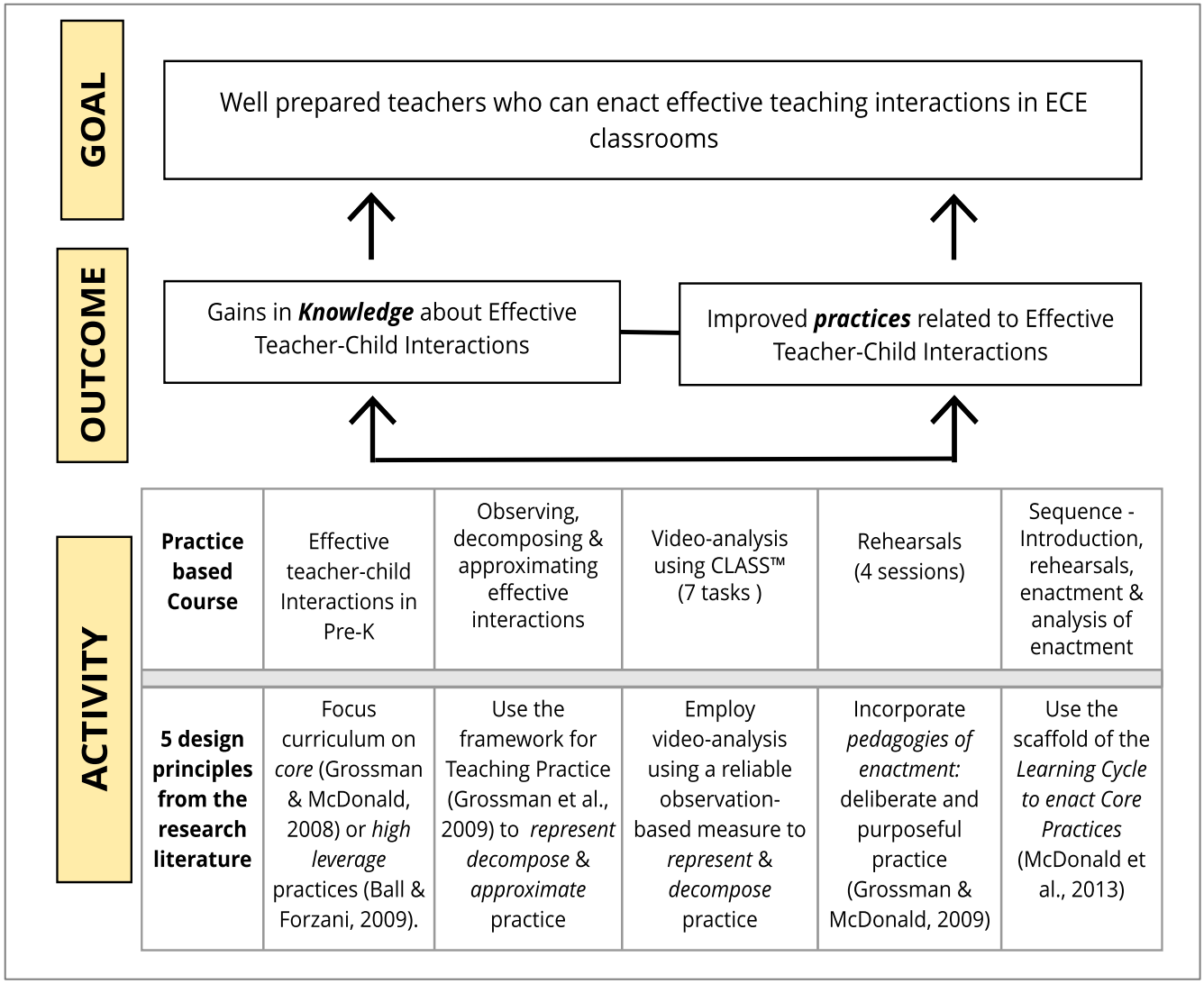
Appendix – A
Theory of change for course-intervention on effective teacher-child interaction



Appendix B
Course Syllabus Elements

Part 1: Guiding Principles

Principles Guiding Course Content And Goals
1. Effective teaching is about effective teacher- child interactions, the back and forth exchanges that happen through out the day. 2. Effective teacher-child interactions are responsive to student's needs, ideas and thinking. 3. PSTs must learn to be intentional in addressing clear instructional goals. 4. PSTs must learn to enact responsive and improvisational interactions, contingent on the ideas and needs raised in the classroom. 5. PSTs can learn to enact effective interactions by learning routine and non-routine elements of instructional activities, and learning to exercise judgment while using practices, depending on goals, contexts and needs.

Part 2: Instructional Activities

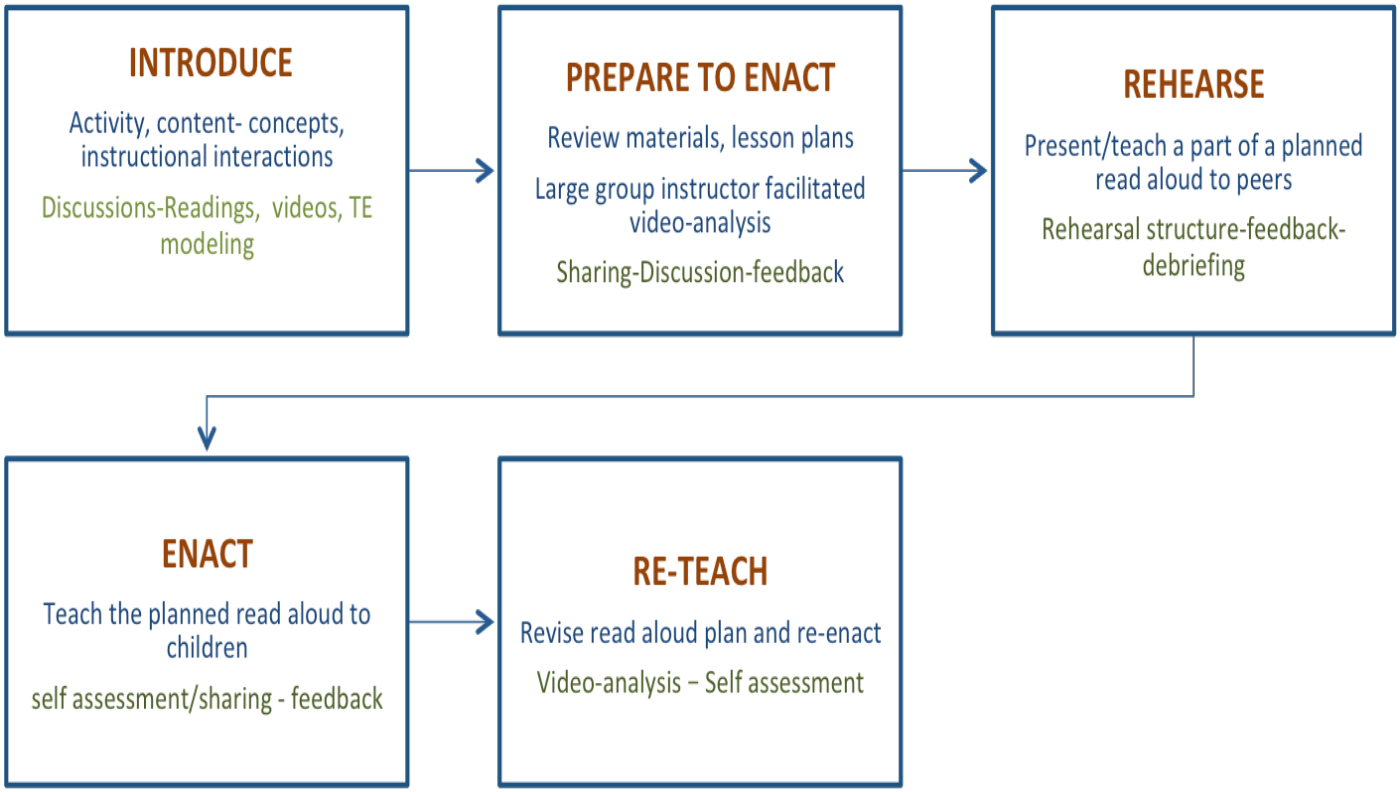
Table 2. Instructional Activities (IA)

IA	Description	Core practice focus
1. ELA- Read Aloud	Teacher orally reads an appropriate children's book, using questions to help children engage in talk around ideas in the book to develop comprehension.	Asking questions to support student talk about book (Instructional support Interactions)
2. Math – Dot card game	Teacher shows cards with variety of dot-arrangements and ask how many they see, hold up the same number of fingers, or cover with counters to learn number sense concepts – subitizing, cardinality, one-one correspondence.	Observing and asking questions to elicit and respond to children's ideas about emerging number sense. (Instructional Support interactions)
3. Science - Planting seeds	Teacher engages children in discussions around observations when they plant seeds, and record their growth.	Asking questions to engage children in science talk (Instructional Support interactions)
4. Process Art - Collage	Teacher supports children in making a collage using torn paper and engages them conversations about art elements.	Asking questions to engage children in talking about their collage (Instructional Support interactions)

Appendix C

Learning Cycle for Instructional Activities (IA)

Adapted from Cycle for collectively learning to engage in an authentic and ambitious instructional activity (McDonald et al. 2013, p. 382)



Appendix D

Rubric for Video Analysis Assignments

Rubric elements	***1 Needs improvement***	***2 Developing***	***3 Satisfactory***	***4 Exemplary***
Detecting effective interactions	Did not detect any important teacher-child interaction or identified unimportant behaviors.	Detected some (<50%) important interactions	Detected most of the important interactions. At least half are described with appropriate behavior specificity.	Detected all important interactions. All are described with high behavior specificity
Identifying effective interactions	No accurate connections to CLASS dimensions/ Indicators	Some (<50%) accurate connections to CLASS domains, dimensions, and Indicators	Most connections to CLASS domains, dimensions, and Indicators are accurate.	All connections to CLASS domains, dimensions, and Indicators are accurate.
Explanations	Explanation for why the identified behavior is effective, is not provided.	Explanations are provided but do not clearly describe the benefit of the practice	Most explanations describe some aspects/benefits of effective practice and/or some may lack specific detail.	Explanation for all identified behaviors include clear and specific description of the benefit of the practice i.e., why they are important to children's learning and development

Appendix E
Coding Scheme

Framework of Teaching Practice (Grossman et al., 2011)

Code	***Description***
REP	Representing – making practice visible
DEC	Decomposition – analyzing constituent elements of practice
APPROX • APPROX-Teacher • APPROX-Child	Approximations – trying out/simulating practice • Approximating teaching role • Approximating child role

Classroom Assessment Scoring System (CLASS: Pianta, LaParo & Hamre, 2008) Codes in parenthesis. Includes only dimensions and indicators coded.

Domain	Dimension	Indicators
Emotional Support (ES)	Positive Climate (PC)	Relationships (REL) Positive Affect (Pos Aff) Positive Communication (Pos Com) Respect (RES)
	Teacher Sensitivity (TS)	Awareness (Aware) Responsiveness (RESPON) Address Problems (AD-Prob)
	Regard for Student perspective (RSP)	Flexibility & Student Focus (FLEX) Support for Autonomy & Leadership (AUTO) Restriction of Movement (Res-Movt)
Classroom Organization (CO)	Behavior Management (BM)	Clear Behavior Expectations (Beh-Exp) Proactive (Pr-activ) Redirection of Misbehavior (Redirect)
	Productivity (PR)	Maximizing Learning Time (Max-Learn) Routines (Rt) Transitions (TrS) Preparation (Prep)
	Instructional	Effective Facilitation (Facil)

	Learning Formats (ILF)	Variety of Modalities & Materials (M& M) Student Interest (St-Int) Clarity of Learning Objectives (L-Obj)
Instructional Support (IS)	Concept development	Analysis & Reasoning (AN-Reason) Creating (Create) Integration (INTG) Connections to real world (CON)
	Quality of Feedback	Scaffolding (SCF) Feedback loops (Fd-loops) Prompting thought processes (Prompt) Providing information (PR-Info) Encouragement and Affirmation (Affirm)
	Language Modeling	Frequent conversation (CONVS) Open ended question (OE-Ques) Repetition & Extension (Rep-Ext) Self and parallel talk (ST-PT) Advanced language (Ad-Lang)

Chapter 3 Reflection on Practice Article

Facilitating Engagement with Practice: Enacting a Practice-Based Design to Support Teacher Learning

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Abstract

This article describes the structure and facilitation used to support teacher candidates in engaging with practice-records and pedagogies, in an early childhood teacher education class. The structural and process elements employed around the teaching-learning activities helped teacher-candidates engage with representations, decomposition, and approximations of practice (Grossman et al., 2009) to learn about effective teacher-child interactions, a core practice in early childhood education. In this paper, I reflect on my experience of facilitating and enacting a practice-focused course design and discuss implications for early childhood teacher educators.

Introduction

In an attempt to address the conundrum over best ways to prepare teachers, experts, researchers, and policy-makers have advocated that teacher education "turns to practice" (Zeichner, 2012; Allen & Kelly, 2015; AACTE, 2013; NCATE, 2010). Practice based teacher education is based on the assertion that the best way to learn to teach is by engaging with tasks and activities to practice the work of teaching and construct knowledge entailed in that work (Ball & Forzani 2009; Lampert, 2010). Such a premise implies that traditional transmission-oriented pedagogies will not suffice; pedagogies to support pre-service teachers (PSTs) to actively and deliberately observe, enact, reason and reflect on teaching practices are needed.

Research in K-12 teacher education has begun to build a knowledge base on pedagogies of practice. A now-popular taxonomy of practice-based pedagogies to learn the work of teaching, proposed by Grossmann, Hammerness, and McDonald (2009), comprises three elements: *representations* of practice (i.e., making practice visible by analyzing videos, or other practice-records like teacher or student work); decompositions of practice (i.e., identifying constituent parts of complex practices by using observation tools); and *approximations* of practice (i.e., trying out practice through role plays and rehearsals). Engaging with *core practices* (Grossman & McDonald, 2008; McDonald, Kazemi & Kavanagh, 2013), the high impact and high frequency teaching practices that can be applied across content areas and instructional formats, is now recognized as an effective way to organize and implement practice-based learning for PSTs.

However, we do not know enough about how teacher educators are implementing these pedagogies, especially how they are facilitating discourse within these activities to optimize practice-engagement and learning. For example, we know that simply watching a video record is not enough. Teacher educators' (TE) questions and probes that elicit and build on responses,

drawing students to the underlying principles of practice, and conversational moves that mediate discussions to scaffold collective sense-making play a vital role in shaping PSTs' learning. Examining facilitation approaches used within the pedagogies of practice can be beneficial for a number of reasons. It can help to understand the TE's positioning as a facilitator, and that of the PSTs as active and collaborative participants in the learning process. Clear descriptions of facilitation of practice-pedagogies can assist in replicating and advancing this work to generate a useable knowledge base of practice-focused teacher education. This knowledge base is particularly needed in early childhood teacher education (ECTE); a field grappling with the complexity of preparing teachers to work in diverse roles and settings (Couse & Recchia, 2016)

This article addresses this gap by describing the implementation of a course that I designed for early childhood education PSTs, using practice-based learning opportunities to learn and enact the important core practice of effective teacher talk and interactions. The course incorporated the CLASS™ *(*Pianta, LaParo and Hamre, 2008) to provide a structure and meta-language for understanding and discussing effective interactions, and a cycle of practice-based pedagogies, including video analysis and rehearsals, through which PSTs could see, discuss and deliberately enact the core practice. In this article my goal is to describe my enactment of the practice-focused design and highlight approaches that facilitated PSTs' engagement with elements of practice. After a review of the theoretical frameworks, I will describe the course design. Then, I will zoom into the teaching learning discourse that occurred through the steps of a learning cycle of an instructional activity to facilitate PSTs in engaging with representations, decompositions, and approximations of practice. I will conclude with my reflections and a discussion of implications.

Conceptual framework: Toward a practice-based approach

Grounding teacher learning in practice through experiences designed to support novice teachers in understanding and enacting teaching practice is referred to as *practice-based, practice-focused*, or *practice-centered* teacher education (Ball & Cohen, 1999; Lampert, 2010). Grossman's (2011) *framework for teaching practice*, consisting of representations, decompositions, and approximations of practice offers a range of formats to engage with the work of teaching. Each type can be seen as both distinct and overlapping with the others, and undergird popularly used teacher-education pedagogies like case-methods, modeling, video-analysis, microteaching, and rehearsals.

Video analysis and rehearsal pedagogies, in particular can support varied kinds of practice engagement. Analyzing videos of others or one's own teaching can support both representation and decomposition of practice. Rehearsal, a newer version of microteaching, provides authentic opportunities for approximating practice, and the discourse around it facilitates decomposition (Lampert, Franke, Kazemi, Ghousseini, Torrou, Beasley, Cunard, & Crowe, 2013). In a rehearsal, a PST moves through *simulations,* where he/she leads an instructional activity with peers and the TE reacting as students, and *pauses* for in-the-moment feedback from the TE who may ask questions, present an unanticipated situation or use other moves to facilitate collective problem solving and learning (Lampert et al., 2013).

Another promising idea is to focus the teacher education curriculum on *core practices* (Grossman & McDonald, 2008; McDonald, Kazemi & Kavanagh, 2013). In early childhood classrooms, teacher-child talk and interactions, which have been shown to predict improved social, language and math skills in young children, are recognized as core practice. Effective talk

has been referred to as "the central tool of a teacher's trade. With it they mediate children's activity and experience, and help them make sense of learning" (Johnston, 2004, p.4).

The CLASS™ tool is a valid and reliable framework that provides the language to describe effective talk and interactions. The CLASS™ tool measures three broad domains of effective interactions—*Emotional Support, Classroom Organization, and Instructional Support*. Table 3.1 shows, the CLASS™ dimensions from the pre-k version of the tool.

Table 3.1
CLASS™ Domains and Dimensions

Domain	Emotional Support	Classroom Organization	Instructional Support
Dimension	Positive Climate Negative Climate Teacher Sensitivity Regard for Student Perspectives	Behavior Management Productivity Instructional Learning Formats	Concept Development Quality of Feedback Language Modeling

Research studies on teacher-child interactions using the CLASS tool have revealed high scores in the *Emotional Support* and *Classroom organization* domains, to be associated with higher social competence and self-regulation skills in children and higher scores in *Instructional Support* domain to be associated with better language and cognitive skills (Howes et al., 2008; Mashburn et al., 2008). The quality of interactions in early childhood settings varies across CLASS domains. Many large national studies of ECE settings have indicated that while classrooms score between moderate to high level of quality in the *Emotional Support* and *Classroom Organization* domains, they evidence low quality in the I*nstructional Support* domain (Maxwell et al., 2009). The CLASS™ research base that has shown how effective teacher child interactions can lead to positive child outcomes, has firmly established teacher-child interactions as core practice in ECE.

To explore how to teach core practices, McDonald and colleagues (2013) have proposed the experiential *learning cycle to enact core practices*, in which candidates are first introduced

to a core practice, and then try the practice through rehearsals following which they enact the activity with students in the classroom. The cycle comes full circle with candidates' analysis of their enactments. The learning cycle serves to bring together different approaches with varying types of practice-engagement- representing, decomposing, and approximating, into the fold of learning to enact complex practices (Figure 1). However, there are not many examples of teacher educators taking pre-service teachers through this cycle, especially in early childhood teacher education.

Figure 3.1. Cycle for collectively learning to engage in an authentic and ambitious instructional activity (McDonald et al. 2013, p. 382)

Although the models described in this section offer the promise of robust learning, experts have advised that a practice-focus should not be understood to mean a didactic

prescription of visible behaviors or moves to be enacted without attending to their purpose or how they fit specific contexts (Kennedy, 2016). Teaching is interactional and improvisational, so novice teachers need to be able to connect the practice and knowledge domains flexibly to analyze what they are doing and reason why/how to meet intended learning goals (Hiebert & Morris, 2012). Therefore, researchers have recommended that when new teachers learn core practices by engaging with varied practice-pedagogies, they do so by participating in teacher-inquiry communities (Ziechner, 2012; Hiebert & Morris, 2012). In such communities through discussion and with the TE's facilitation, PSTs can examine practices with respect to learning goals, contexts, and students' needs. This kind of rich practice-engagement can help PSTs in developing the analysis and reasoning mindset necessary for adapting instruction, and the vision and skill to learn from each other and through collective activity (Ziechner, 2012). The next section examines what is known about facilitating such practice-engagement.

Facilitation of practice engagement

Implementing practice-based pedagogies effectively requires a different pedagogical stance; one that requires the TE to play the role of *facilitators* of practice engagement, discussion, and co-construction of knowledge about practice, in comparison to the traditional role of *provider* of information. The TE's facilitation role may include some elements that can be pre-planned like selecting practice records, and planning the structure and question/discussion prompts to use within the practice-focused activities. However, given that supporting PSTs in using reasoning and judgment to make sense of the work of teaching is an important goal, much of this role is interactional and therefore needs to be adequately facilitated. It involves enacting moves to manage productive discussions, encouraging participation and building on PSTs' ideas and takes in-the-moment thinking to decide which ideas to lift and follow to connect learner's

ideas to practice elements (Borko, Koellner, Jacobs & Seago, 2010; Arya, Christ & Chiu, 2016; Gonzalez, Deal & Skultety, 2016; Beacher, Kung, Ward & Kern, 2018; vanEs, 2014). Clearly, effective facilitation is key to realizing the learning benefits of practice-pedagogies.

From a theoretical perspective, facilitation and its benefits can be understood using *Sociocultural theory* (Vygotsky, 1978), which points out the important role of social interactions. Discourse, modeling, and scaffolding support guided participation in social activities with others to facilitate knowledge construction (Rogoff, 1990). Within group discussions around practice records, and rehearsals, PSTs can engage in seeing, analyzing, and trying out practices while receiving support from teacher educators or peers, through their questions, probes, feedback comments, and suggestions. With the TE's facilitation, PSTs are able to construct their own understanding based on the interplay of prior experience, knowledge of their settings, and ideas raised by peers and TE as a result of the scaffolding. Sociocultural theory also asserts that the activity and context are integral to learning (Brown, Collins & Duguid, 1989). Learning occurs when there are opportunities to actively create understanding with peers and others in tasks and settings that are close to those where the constructed knowledge will be used.

Information about facilitation of video analysis is available from a systematic literature review of 110 published studies on the use of video in teacher education (Beacher, Kung, Ward & Kem, 2018). Specifically, 34 studies provided information about facilitation protocols and tools. The authors found a diverse set of practices were used including: group discussion, observation rubrics, online video annotation, reflective writing, viewing guides, and semi-structured protocol with a few pre-planned guiding questions (Beacher et al., 2018). The amount and nature of feedback offered during video analysis varied greatly among the studies, with learners receiving feedback from experts or peers or both (Beacher et al., 2018). It is to be noted

that details of processes used to support teacher's thinking about practices, were not available from most published studies, which makes it difficult to replicate the work.

However, we do know that discussions around videos of others' teaching have been shown to offer rich opportunities to scaffold PST's *noticing* (van Es & Sherin, 2002; Jacob et al, 2010). Based on their studies of two video-based professional development programs for Mathematics teachers, van Es, Tunney, Goldsmith & Seago (2014) developed a facilitation framework for engaging learners in productive discussions around videos. The framework categorized conversational moves by four goals: "orienting the group to the video analysis task, sustaining an inquiry stance, maintaining a focus on the video and the mathematics, and supporting group collaboration" (van Es et al., 2014, p. 347). Other studies have also shown that asking learners to recall information from the video, thinking critically about the pedagogical reasons of these actions, and connecting ideas raised in discussions can set up high quality discussions (Arya et al., 2014). Finally, one study found that teachers' skill in identifying practices using specific behavioral evidence from videos predicted improvements in their classroom interactions (Williford et al., 2017). Knowing this provides a rationale to scaffold this skill during video discussions.

Similarly, facilitation structures and processes for use during rehearsals have been documented (Lampert, Franke, Kazemi, Ghousseini, Turrou, Beasley, Cunard & Crowe, 2013). After analyzing video data from 90 rehearsals conducted across three teacher education programs, a group of elementary mathematics teacher educators proposed a set of feedback moves for TEs to use during rehearsals (Lampert et al., 2013). They may provide 1) directive feedback by making a specific suggestion, 2) highlight a rehearsing teacher's effective practice for others to see, 3) act like the teacher, 4) play the role of a child to push PSTs' thinking or 5)

raise an idea for the groups' discussion (Lampert et al., 2013).

The theoretical and research literature on pedagogies of practice and facilitation structures and processes, provides valuable ideas to integrate into the design of teacher learning. Practice records and pedagogies like video analysis and rehearsals can provide the broad structures to support PSTs' to engage with and learn from practice. Discourse around these records and pedagogies, when skillfully facilitated by the TE can open up meaningful possibilities to negotiate understanding of practices and their purpose collaboratively, and to construct useable knowledge entailed in the practices. The next section describes how these ideas were used in the course design.

Description of the practice-based course

The course intervention focused on the *core practice* (McDonald, Kazemi & Kavanagh, 2013) of *teacher-child interactions*, and incorporated the CLASS™ *(*Pianta, LaParo and Hamre, 2008). Practice-based pedagogies aligned with Grossman's (2011) *framework for teaching practice,* especially video-analysis and rehearsals, were integrated into the course design to facilitate PSTs to learn through observing, unpacking, and simulating effective interactions. The *learning cycle to enact core practices* (McDonald et al., 2013) was utilized to sequence the practice-engagements.

Eight (8) early childhood PSTs (referred to as 'participants' hereafter in this article) took the 15-week-long course. The course was the final capstone field experience in the Early Childhood Associates degree at a community college in Northern NJ. All were female ranging between 23 – 62 years. 6 were Hispanic/Latino, one was North African/Moroccan, and one was Caucasian. Seven (7) participants were bilingual and had learned English as a second language. Participants had completed a minimum of 50 college credits in the associate's degree, and about

28 credits of ECE courses. Three participants were employed as teachers in private childcare centers and were working with three and four-year-old children.

The course was delivered over 14 sessions. In the first half, teacher-child interactions outlined in the three CLASS™ domains and their respective dimensions were introduced. The three domains and selected practices within them were unpacked in detail through readings, discussion, and written and video cases. The videos showed teachers facilitating large and small-group activities, and were selected from the CLASS™ video library and other sources. Initially, the videos were viewed together during the seminar meetings to guide participants in detecting teacher behaviors that illustrated the CLASS™ dimensions. Following instructor-guided analysis, participants completed written video analysis assignments to develop skill in detecting effective interactions and received feedback from the instructor. Participants also completed weekly journals where they documented their CT's and their own interactions with children.

In the second half of the course, participants learned how to implement four instructional activities. Instructional Activities (IA) are routine classroom tasks in which the content is structured so that PSTs can learn to teach them using effective interactions (Lampert & Graziani, 2009; Kazemi, Franke & Lampert, 2009). The IAs, one each in the content areas of English Language Arts, Math, Science, and Creative arts, were designed to support participants in learning to enact effective teacher talk related to content concepts, and therefore served as a means to apply interactions in the Instructional Support domain of CLASS™. Table 2 shows the four instructional activities. The IAs were selected because they: 1) are commonly used in preschool classrooms, 2) can be organized into meaningful units for practice-engagement, and 3) offer structure within which participants could use effective CLASS™ interactions.

Table 3.2
Instructional Activities (IA)

IA	Description	Core practice focus
1. ELA-Read Aloud	Teacher orally reads an appropriate children's book, using questions to help children engage in talk around ideas in the book to develop comprehension.	Asking questions to support student talk about book (Instructional support Interactions)
2. Math – Dot card game	Teacher shows cards with variety of dot-arrangements and ask how many they see, hold up the same number of fingers, or cover with counters to learn number sense concepts – subitizing, cardinality, one-one correspondence.	Observing and asking questions to elicit and respond to children's ideas about emerging number sense. (Instructional Support interactions)
3. Science - Planting seeds	Teacher engages children in discussions around observations when they plant seeds, and record their growth.	Asking questions to engage children in science talk (Instructional Support interactions)
4. Process Art - Collage	Teacher supports children in making a collage using torn paper and engages them conversations about art elements.	Asking questions to engage children in talking about their collage (Instructional Support interactions)

Each instructional activity was presented using steps suggested in the *Learning Cycle to Enact Core Practices* (McDonald, Kazemi and Kavanagh, 2013). Each activity was first introduced through readings to learn about the activity and engage with main concepts in the content area of the activity. In this step, the core practice was represented either through TE's modeling, or video or teacher/student practice records. Next, participants took turns to rehearse it with peers acting as students. The rehearsals were structured so that each participant tried out talking and questioning moves in a segment of the activity and received feedback from peers and the TE. Next, participants enacted the activity in their field-classroom and reflected on their teaching. Toward the end of the semester, participants selected one of the instructional activities to re-teach in their field classroom, which they video-recorded and analyzed.

This way, the pedagogies used in the learning cycle supported all three forms of practice-engagement (Grossman et al., 2009). Viewing and analyzing video clips, instructor modeling, observing the cooperating teacher, and peers' activity rehearsal and own teaching video enabled *representation.* Learning about the three CLASS™ domains and dimensions, detecting them in video-analysis, and peers' rehearsals and own teaching video enabled *decomposition.* Rehearsing instructional activities using effective interactions with peers supported *approximation*.

Implementing the course: Facilitating practice engagement

Studies on pedagogies of practice do describe how TEs have facilitated discourse around selected pedagogies (Lampert et al., 2013; van Es et al., 2014; Kazemi, Ghousseini, Cunard & Turrou, 2016, Arya et al, 2014). However, a complete picture of how these can be enacted within a learning cycle of an instructional activity involving multiple practice pedagogies has not been documented. Through a series of vignettes in this section, I will illustrate how the PSTs and TE worked on important elements of science teacher talk at different steps of the learning cycle.

Figure 2 illustrates the learning cycle for the third instructional activity of planting seeds. The goal of the IA was to engage children in science talk. Effective science teaching in early grades is about using talk and questioning moves that elicit and build on children's ideas and engage them in discussions to get them thinking about big ideas and concepts, instead of learning facts. As a first step, discussions around a lesson script and video of another teacher's teaching were used to make the content and interactions within the IA visible. Next, two participants rehearsed a part of the IA with the TE and their peers. In step 3, participants enacted the IA with students and wrote a written reflection and received TE's feedback. Next, participants re-taught the lesson to students. This time they recorded their teaching, and completed a video analysis of their own teaching to receive feedback.

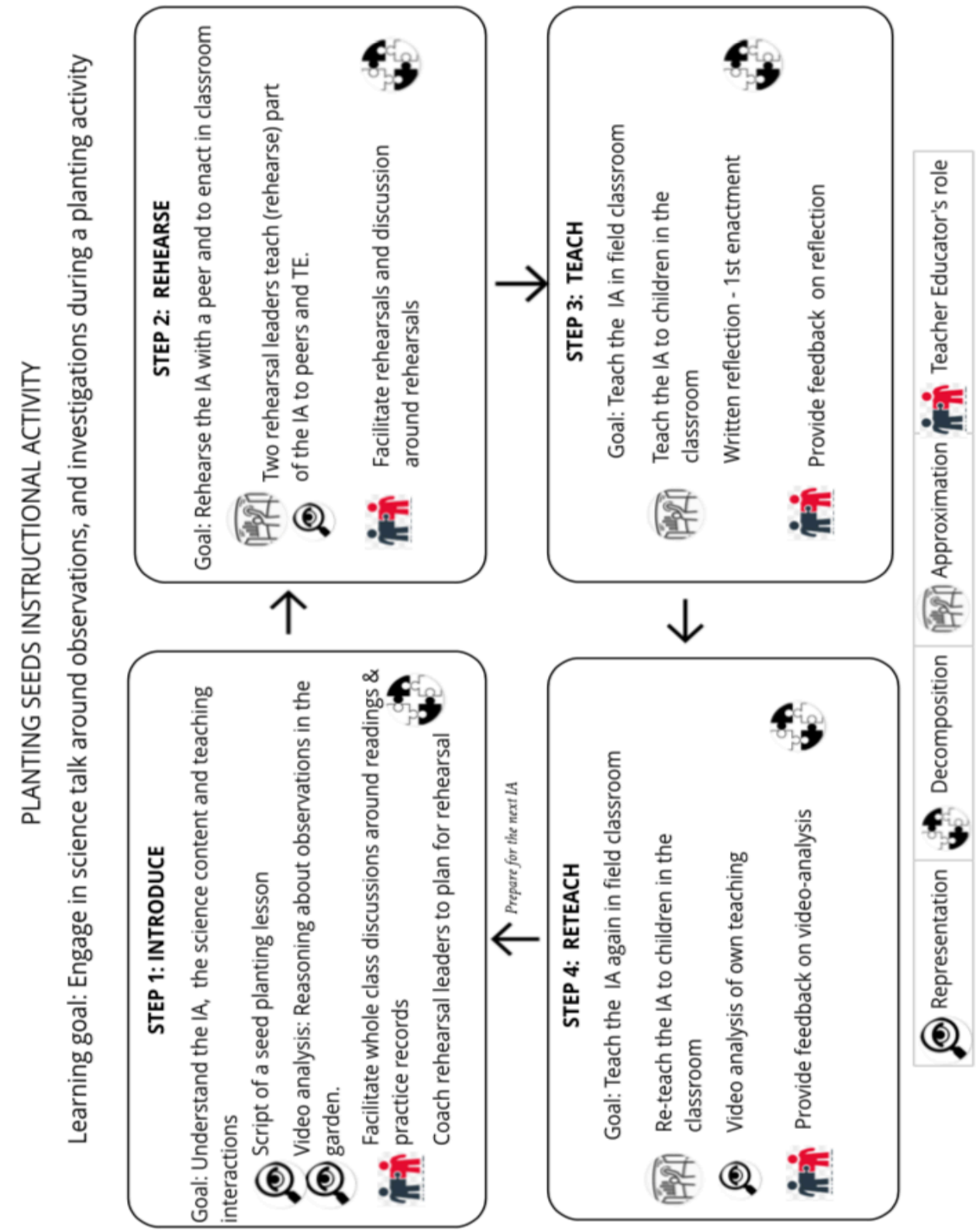

Figure 3.2. Learning Cycle of Science Planting IA

I turn now to a series of vignettes to illustrate the discourse around practice records and pedagogies that occurred within the learning cycle of this IA.

Discourse around practice records while introducing the IA

Two practice records, first a lesson script and then a video, were used to introduce the IA. A semi-structured facilitation protocol was used comprising: 1) an introduction of the artifact, 2) an open-ended question to focus discussion: "what opportunities for science talk are available within the activity, as reflected in the artifact?" and 3) debriefing.

To begin engaging with the IA, the TE and participants first reviewed science process skills of observing, predicting, experimenting, and communicating, through readings. The group then discussed opportunities for engaging children in these skills within a scripted lesson plan. This way, the lesson plan script was used to set up the first representation. TE-facilitated large group-discussion around opportunities for science talk in the lesson plan script enabled the group to decompose the activity and make more practices noticeable.

In the excerpt below the TE *elicits and affirms participants' ideas* (van Es, Tunney, Goldsmith & Seago, 2014)

TE: Think of what you can say or ask here (before the first step in the scripted procedure)

Participant 1: Introduce the activity. Boys and girls, today we are going to plant seeds.

TE: That framing is good to share the learning goal. How can children connect to this goal?

Participant 4: Check if they've done this before. Find out what they know.

Participant 1: Tell me - how do plants grow?

Participant 8: Have you grown plants? Have you seen anyone grow plants? Tell me about it.

TE: That will work. Let children share and then connect their ideas to this activity.

This excerpt illustrates the affordances of the lesson-script as a practice-record in that it made visible some practices, and through discussion and brainstorming, facilitated in unveiling others. In this exchange, the TE asked a question to draw attention to a point in the lesson script which scaffolded a discussion of CLASS™ practices like introducing the learning goal, and activating prior learning by eliciting children's ideas. Participants responses indicated that they were drawing upon previously-learned CLASS™ practices and revisiting them in the context of studying and refining a lesson script, thereby reinforcing their understanding of how these practices are enacted inside a lesson to achieve the lesson's goals.

A little later in the same discussion, the TE offered *cues* to think of questions to ask when children get ready to open a sprouting lima bean seed with their fingers.

TE: How can you prepare them to open the lima bean?

Participant 5: Show them how to open it.

TE: Yes, you can demonstrate and remind them to be gentle. Do you think they know what they'll find inside?

Participant 2: I can ask them what they think is inside. When we read a book, we ask them to look at the cover picture and guess.

TE: That's a good way to connect the two practices. Both are about making predictions.

Participant 4: Prediction goes well with science.

TE: Yes, so that's important to do here.

In the above exchange the TE's cues help to deepen participants' reasoning. It helps to bring to light important practices; namely, the need to attend to children's scientific thinking by allowing them to predict, and in the process focusing on an important element of science talk. The excerpt

also shows participants adding their thinking to each others' ideas and making connections between elements of teacher-talk across content areas, which the TE affirmed, highlighted, and labeled using CLASS™ terminology: connection and prediction to develop conceptual knowledge *(*Pianta, LaParo & Hamre, 2008). A participant's comment about prediction going well with science opened up an opportunity to delve deeper into that idea, which the TE decided not to follow. This illustrates the trade-offs associated with the in-the-moment decision-making that occur when facilitating, but also the complexity in managing multiple possible intentions when orchestrating discussions.

After the lesson-script, the group engaged with a second representation, a video clip showing a teacher with a group of children in the class garden. The video featured children observing plants, fruits, and vegetables growing in their class garden and the teacher, through his talk and questioning supporting the children to look closely at the plants and fruits and describe what they saw. The group watched the clip once together with a prompt to identify the CLASS™ practices that the teacher used to help children use science process skills – observe, predict, reason, and communicate. Afterwards, a large group discussion around the video was facilitated.

The excerpt below illustrates the conversational moves that set up a productive decomposition around this second representation. In the excerpt below the TE *elicits participant's ideas* (van Es, et al., 2014).

Participant 1: I liked what the teacher did when the apple fell off (as he and a child were looking at it).

Participant 2: Yes. He went along with it.

Participant 3: I don't know if he planned to do what he did (afterwards) but it made sense.

TE: Sounds like that part (event) stood out for many of you. Let's see... why did it make

sense?

Participant 1: He gave the child the apple so she could look at it.

Participant 4: and hold it… touch it and feel it.

TE: And what was he (teacher) trying to accomplish with that?

Participant 4: He wanted her (the child) to observe… know what it looked and felt like.

In this excerpt, the TE lifted an important event when three participants voiced it, highlighting their noticing. The TE's question, "why did it make sense?" was intended to push them to explain and elaborate beyond a simple move, to focus on the core practice. Similarly, the question, "what was he trying to accomplish" was intended to make participants pedagogically reason about the purpose of the teacher's visible behaviors.

As the discussion continued, the TE *presses participants to elaborate on their ideas* (van Es, et al., 2014), which generated more talk about the process skill of predicting.

Participant 5: Then he cut the apple in front of the children.

Participant 1: He asked for their predictions before cutting.

TE: Now why do you think he did that?

Participant 2: To check what they know. He asked many open-ended questions to make them talk, you know… describe.

When a participant talked about the teacher in the video asking for predictions, the TE raised that idea for further discussion. Since the group had discussed predictions in their previous engagement with the lesson script, through her question, "Now why do you think he did that", the TE decided to push participants understanding of predicting as a thinking-reasoning skill.

The excerpt below TE cues and *draws attention to additional evidence* to direct participants noticing (van Es, et al., 2014).

TE: That makes sense; open-ended questions are good for drawing language… having longer discussions. What happens in these discussions? I am thinking that he might be trying something more. For example, when he asks, 'Does it look like the apple seeds you get in your apples?'

Participant 4: It is to compare… make them think. He's connecting to children's lives. There's more when they taste the apple.

TE: What did he say? Should we watch that section again?

When a participant linked the teacher's open-ended questions to a language benefit, the TE acknowledged the response indicating that there might be another goal. She then deliberately drew attention to another event as a cue to help participants understand the teacher's intention to support children's thinking. The cue led to repeated viewing and analysis. The TE's question, "What did he say?" was intended to nudge participants to recall observations and offer evidence to support their claim that the teacher's goal was to get children thinking.

The video analysis discussion ended with a debriefing. Here again the TE presses for explanations and additional ideas and *points to evidence* to reason about the effect of the teacher's behavior on children's engagement (van Es, et al., 2014). Participants' responses indicated that the discussion had facilitated their learning, as illustrated in the excerpt below.

Participant 3: He's a good teacher.

TE: So what makes him a good teacher?

Participant 1: He asks good questions, open-ended questions to make children think about what they are doing.

TE: Yes, and…

Participant 2: His questions make sense to children because they are… relatable like when he asked, 'Do store raspberries have bugs?' and 'Why not?'

TE: What else?

Participant 2: The children are involved... they are looking, drawing, talking, tasting.

TE: Right, that's important. Think of how the teacher's actions help with that… children's involvement.

Participant 7: He's thought this out.

Participant 3: Yes, he knows what he wants to do, so when the apple falls off; he uses it to do more observation.

In this exchange, the TE used the clarifying question, "what makes him a good teacher", to facilitate a recall of specific CLASS™ practices that they now understood to be effective in supporting children's thinking. She also affirmed responses and pressed for more ideas. Participants were active in recounting the prominent interactions that helped children engage with science and provided evidence for their arguments.

The excerpts in this section provide evidence that discussions maximized the opportunities provided by the two practice records, the lesson script and the video. Discourse moves like eliciting observations, cueing, clarifying and highlighting, analyzing pedagogical actions, and connecting to CLASS™ practices helped participants to attend to important elements of science talk. They could see the teacher's intentionality and provided principled explanations for the teacher's actions by making references to CLASS™ practices and their effect on children. Previous studies have identified this kind of facilitation to be crucial for scaffolding novice teachers' noticing of teacher behaviors in the video and understanding the pedagogical purpose of these behaviors (van Es, Tunney, Goldsmith & Seago, 2014). Additionally, moves like affirming responses and encouraging participants to build on each other's ideas, encouraged participation and collective meaning making. While the semi-structured protocol provided the structure, the exchanges emerged in unpredictable ways and many valuable ideas emerged from the collaborative actions of the participants and the TE.

Discourse around rehearsing the IA

The following week, participants engaged with the IA through rehearsals. Rehearsals offered a more active, participant-led way of practice-engagement, one that involved approximation for the rehearsal presenter and a representation for others. In rehearsals, participants learned about science talk by enacting it for their peers and TE. Rehearsals supported decomposition of practice through discussion, and because the IA was broken into smaller units, to provide adequate time for practice-engagement, feedback, and discussion. The rehearsals also used a 3-part structure consisting of introduction, rehearsal, and debriefing. Norms for participation were discussed before the first rehearsal and discussed at each session. In this section, I present five excerpts from a rehearsal of the science IA led by Cindy*, to illustrate the opportunities created by discourse to work on important elements of the core practice of science talk.

The first excerpt features an exchange when Cindy began her rehearsal by asking 'students' to describe pictures of plants they had made previously. The TE called a pause to ask an open-ended question to highlight Cindy's choice of approach.

Cindy: Tell me about your picture.

Participant 3: This is my plant and here's the pot.

Cindy: Tell me what parts does your plant have? (Pause) Here I can see leaves. What other parts did you make?

Participant 3: Here's the stem. You can't see the roots coz they are inside the pot.

Cindy then asks another 'student' to talk about her picture.

TE: Cindy, please share why you thought to begin your activity this way.

* Pseudonym

Cindy: I wanted students to talk about their drawings so I can find out what they know about plants and plant parts before I start my activity. That way I can relate it better to them. They communicate with their drawings… Like in the video. I want them to think, draw, and explain.

Through the open-ended question, the TE *highlighted* (Lampert et al., 2013) Cindy's actions and enabled her to explain the pedagogical reasoning behind the approach she chose. Cindy made a reference to the video clip from the previous week where a similar practice was illustrated. It is interesting she was able to take a practice represented in the video in a different context and use it to serve a goal appropriate for her activity. Her explanation illustrated her intentionality in making students think and explain. This public sharing of pedagogical reasoning prompted a discussion about possible problems with managing time, attention, and how to address them.

The second excerpt features an interjection that occurred soon after Cindy had introduced the activity and begun asking questions to invite students to share what they knew about plant growth. Here, the TE made a move *as a student* (Lampert et al., 2013) to push Cindy to respond to student's ideas.

Cindy (Presenting Participant): Anyone knows what plants need to grow?

Participant 2: Sun

Cindy: Yes, the light from the sun.

Participant 3: Soil

Cindy: Soil, or dirt yes.

TE: My mommy once grew seeds in a wet tissue

Cindy: Yes, they can grow that way also. Not all plants need soil; some can also grow in water.

In this case, the TE's response as a child was intended to push Cindy to provide additional information in her feedback to the student's idea *(*Pianta, LaParo & Hamre, 2008). Cindy acknowledged the comment and added a little more information in her reply to the 'student'.

The third excerpt also began with an open-ended question to prompt thinking about another approach after which the TE suggested what move to make next in the rehearsal. The TE's interjections in this excerpt were coded as examples of *directive feedback* (Lampert et al., 2013). Here, Cindy was getting children ready to prepare their dirt cups to begin planting seeds. As she handed seeds to the 'students', the TE interjected to direct Cindy to ask children what they noticed about the seeds.

TE: Let's back up. The children are active; they are looking, touching and feeling the dirt, seeds… You want to find out what they are thinking. What can you do?

Participant 3: Ask how does it feel?

TE: Yeah, maybe try having them look at the seeds, describe them, even smell them, touch them and describe them. That way you are tapping into observation… remember the video we saw. That's a science process skill you want to use. You did that when you started your activity. Lets try that…

Cindy: I'd like you guys to look at the seeds. Tell me what you see...

In this interjection the TE directed Cindy to make a teaching move aimed at encouraging children to describe their observations and ideas about seeds. The TE's comments served as a cue to bring a representation of the recommended practice from the video analysis in a previous session. When she labeled the practice as supporting observation, it helped to connect it to the

IA's process goals. As the exchange continued, the TE provided more directive feedback.

Participant 4: teeny

Cindy: Does it smell like anything? Touch it. What it does feel like?

Participant 5: Hard.

Participant 6: they look like tiny worms.

Cindy: Yeah, you are right. What else do you see?

TE: Time out. When you ask them to see and touch and describe, give wait time. You want to give them the time and then come back again with another question or comment. You also want them to pay attention to each other's ideas? What can you say?

Cindy: Emily says the seeds look like tiny worms. What do you think?

Here, with her peers responding as children, Cindy moved forward with scaffolding observation skills. This time the TE's directive feedback was aimed at reminding Cindy about the importance of giving wait time and supporting students in attending to each other's ideas. Cindy responded to the interjection by re-voicing a student's idea to make it available for discussion among children. This exchange also illustrates the unpredictability of what will emerge in unscripted exchanges. The TE's call for other kinds of questions was open-ended enough to take the group to examine other concept development questions like asking to compare and contrast (Pianta, LaParo & Hamre, 2008). But instead of probing that practice, the TE's cue to Cindy led the group to focus on another practice, that of encouraging student talk with peers.

In the fourth excerpt, the TE's intention was to draw the group's attention to specific practices that Cindy enacted. This excerpt was coded as an example of *evaluative feedback* (Lampert et al., 2013).

Participant 2: It is like bird food.

Cindy: Yes, good job, seeds are food for birds. Because small birds like to eat them and sometimes the birds take them far away.

TE: Nice job. What Cindy just did. What CLASS strategy is that?

Participant 2: The kid makes a connection to bird food.

TE: Right, the reminding question did that. And what Cindy did after that?… In response to what you said?

Participant 7: Feedback?

TE: Yes, and what was good about Cindy's feedback?

Participant 3: She gave more information.

Participant 4: Expansion

TE: Yes, that's right, Cindy acknowledged, repeated and added just a tiny bit more.

The excerpt above illustrates how the TE highlighted an effective practice enacted by Cindy for the rest of the group to see and discuss. The TE's questions provided hints, which the participants followed. The exchanges also helped participants connect practices to CLASS™ terms and strengthen their in-the-moment pedagogical decision-making. It is also evident that the exchanges helped participants attend and add to each other's ideas.

The vignettes above illustrate how the TE's moves opened up opportunities to learn and enact important elements of science talk in rehearsals and discussions within the activity. The TE's moves provided Cindy with specific guidance to adjust and enact her teaching as she rehearsed. Other participants learned from both Cindy's modeling and the whole-group discussion. Within Cindy's IA rehearsal, the TE called seven facilitation pauses. All pauses involved some kind of questioning; including open-ended questions to prompt explanations and sharing of reasoning and cueing questions to facilitate a specific line of thinking and connections

to CLASS™ practices. Open-ended questioning during rehearsals has been documented as a productive way of supporting PSTs' engagement, pedagogical reasoning, and co-construction of knowledge (Averil, Drake, Anderson & Anthony, 2016).

Facilitation moves outlined by Lampert et al., (2013) to study the nature of TE-PST exchanges were reflected in the exchanges within the pauses as well. Many exchanges were coded as involving multiple kinds of moves. Four (4) instances of directive feedback (i.e., suggesting specific moves to make), and five (5) instances of evaluative feedback (i.e. highlighting an effective practice) were coded. In only two instances did the TE played the part of a student. Two excerpts were also coded as examples of TE's lifting a question or idea for the group's discussion.

In terms of what was focused on within these exchanges, although many were tagged with multiple substance codes, *attending to the IA* (i.e., learning about structural aspects and how to do the IA) (Lampert et al., 2013) was a major focus, as was the case in the Averil et al. (2016) study. *Content goals and process goals* (i.e. attending to the science content and process goals of the lesson) (Lampert et al., 2013) was another frequently used substance code. *Attending to student thinking* (Lampert et al., 2013) was coded less frequently. Given that PSTs were new to both IAs and rehearsals, it is likely that more attention was focused on learning how to enact the IA in preparation for enactment in the classroom. Perhaps, enacting the IA with students would help PSTs experience students' thinking and the improvisation needed to respond to the same. Repeating rehearsals after initial enactments would likely help surface students' ideas and thinking more in the exchanges.

An excerpt from the debriefing at the end of the rehearsal gives a glimpse of how the facilitation supported Cindy's learning. In response to the TE's question, "How did your teaching moves (within the rehearsed activity) engage children in science talk?" Cindy said,

> I was nervous so some of my questions didn't come out right. I should have them talk about what they see and do. I like the idea of using drawings and giving them chances to predict, you know make guesses. I think I need to see how much information to give. And how to manage time. I need to see how to always connect it to what they know.

It is clear that the debriefing question helped Cindy to focus on teaching moves to support children in engaging with appropriate science process skills in the activity. It is also evident that teaching moves like connecting to prior-knowledge and observing to reason were reinforced repeatedly through different steps of the learning cycle for this instructional activity. Clearly, this summative reflection of her rehearsal gave Cindy the chance to make sense of her try-out and collect ideas to adjust and prepare for teaching.

In her enactment in her field classroom the following week, Cindy made a few changes to the activity she rehearsed. Inspired by her peer's rehearsal, she provided a tray with seeds that ranged in shape, size and color for children to touch and observe. Her students investigated seeds and discussed their findings from observing them under magnifiers, and touching, smelling, and tasting. They read an informational book titled, "From seed to plants" by Gail Gibbons, and made drawings to predict what kind of plants their favorite seeds would produce. Cindy explained in her reflection that she had decided to adapt the activity to include more exploration, and talking because, "in Lina's* (her peer) rehearsal, her seed tray kept us engaged for a long time. I can see that working well with my kids." Clearly Cindy's activity enactment

* Pseudonym

showed uptake of ideas that were raised in discussions in the large group video analysis, her own rehearsal of the IA, that of her peer's, and a consideration of her students and field setting.

Reflections and Implications

Implementing the pedagogies and studying my own enactment brought a set of process elements central to teacher learning into light. These process elements lend weight to the idea that PSTs' experiences in learning to teach has the power to shape their views and understanding about practice. Therefore, *how* teacher-educators teach may be equally or even more important than *what* we teach. In this section, I share my reflections about three broad processes: 1) modeling the work of teaching, 2) using discourse to reason about practice and engage in co-constructing knowledge, and 3) using responsive improvisations in *teaching to teach*. I believe that these process elements are integral to creating meaningful learning for PSTs.

The course utilized various forms of modeling. Traditional modeling, i.e., demonstrating practice through practice records like lessons scripts, materials, and videos, provided models to begin noticing practice, which were then examined through discussions, questioning, and probing. Secondly, discourse around the practice records and pedagogies provided the TE with opportunities to use effective teacher talk and interactions with the PSTs, to role-model examples of the core practice at the heart of the course. For example, acknowledging and building on student responses, asking open-ended questions to prompt thinking, connecting responses, and lifting ideas for others to hear and respond, were frequently used in discussions at various steps of the learning cycle. As a result, PSTs were able to experience as students, the very practices that they were expected to enact as teachers, in addition to reading and seeing them. The promise of this complex dual role of teacher educators, who teach about teaching by modeling the views

and practices they want PSTs to imbibe, is documented in the teacher education literature (Loughran & Berry, 2003; Lunenberg, Korthagen & Sweeny, 2007).

In addition, a third form of modeling, described by Loughran and Berry (2003) as *explicit modeling*, the practice of making teaching decisions explicit was also utilized through the TE's 'thinking aloud' to provide a window into her thinking about teaching choices. These think alouds occurred during session introductions and closings, and sometimes after debriefing of specific activities. During session introductions, the TE shared how the session was informed by observations and discussions from previous sessions or PSTs' homework assignments. For example, in one of her introductions she stated, 'I chose the video we are going to analyze together because it will let us look into self and parallel talk, which we have discussed in some sessions. Many of you have asked what to do when children are not verbal, so I thought this will give us some ideas." Doing this helped the TE make pedagogical reasoning public while teaching, and model the emphasis on thinking about the purpose of teaching practices.

Valuable as modeling is, teaching to teach is not about modeling practices for PSTs to use in imitative ways. The practice records, role modeling, and think alouds added to PSTs learning experience. However, more was needed to engage them in making sense of the practices and purposefully applying them in their own teaching. Guided discourse around practice engagements served this function. The discourse moves described earlier helped to set up conversations that enabled the group to make decisions about how to enact the IA. The discourse created room to engage in reasoning to focus on pedagogical purpose, which enabled PSTs to move from observations to why and how the practices effect students' learning and how they can be applied in their individual contexts to serve intended goals. Emphasizing the purpose of

teaching behaviors has been cited to be particularly important for PSTs because novices may have misconceptions about teaching behaviors (Kennedy, 2016).

Discourse was beneficial also because it helped PSTs learn from and with each other. The back and forth, and reciprocal conversations helped PSTs to bring their experiences to interact with that of others and the TE's, thereby allowing them to collectively co-construct new refined ideas which were then available for the whole group to use. The examples in the transcripts described earlier, show how participants worked together to build on each other's ideas and responses. Donato (2004) has explained that such discourse leads to the collective creation of "new knowledge that goes beyond any knowledge possessed by a single member in isolation" (p. 287). Experts have recommended that opportunities to learn actively with peers become part of PST's learning experiences so that they can develop habits and skills of learning with others (Ziechner, 2012).

Examining the enactment also reiterated the complexities in *teaching to teach*. Similar to the work of a teacher in a classroom, teaching PSTs using practice records and pedagogies is interactional and improvisational and therefore, rife with the affordances and limitations of spontaneous and emergent decisions and exchanges. These discourses were challenging to plan because of limited prior experience to anticipate student responses. As illustrated in some examples in the analysis of transcripts, teaching moments, emerging out of participants' ideas or other concerns, required the TE to think in-the-moment, adapt and sometime change direction and improvise to attend to felt needs. The TE has to walk a tight rope to balance keeping the discourse generative, addressing intended goals and ensuring everyone's participation. It is hard to assess that the path taken in a discourse was the most appropriate; it was what made sense in that moment given the dynamics of the exchanges. This also has benefit for PSTs; when enacted

well, improvisations can help to understand that multiple paths and approaches are always available within teaching-learning activities and that strategies are fluid, subjective, and tied to the learning context. It makes sense to argue that if we expect PSTs to learn to be responsive to students' needs and be able to improvise, they need to experience it in their teacher education classrooms.

Reflecting on my role as a facilitator, while the analysis shows that as the TE, I was able to use facilitation moves to initiate and at times deepen PSTs' engagement with practice elements, I realize that this is a skill that needs development. My facilitation was predominately in the form of questions and mostly focused on the interactions. I realize that I relied on many cueing and evaluation-focused questions and would have done better to use a more open-ended questioning stance. Also I did not do much to trigger discussion about participants' beliefs about teaching young children. This would have helped to get a more in-depth look at their per-existing ideas and how they were making sense of this new information. Also, because discourse is a rich and collective activity shaped by the actions and responses of all participants, I need to work on engaging reticent speakers. Studying my enactment has helped me realize the value of cultivating an improvisational disposition and a repertoire of moves to identify, assess and respond to teaching moments, within discourse. These ideas have far reaching implications for our work, in preparing teachers to enact responsive, interactional and improvisational practices.

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Chapter 4

A presentation for ECTE faculty

Teaching to teach: Zooming into a practice-based design

Anita R. Kumar

Rutgers University

Abstract

This presentation is designed for an audience of Early Childhood Teacher Educators (ECTE) in 2-year and 4-year institutions of higher education. The presentation may be shared at state meeting of NJ community college early childhood teacher educators or at a meeting of Associate degree Early Childhood Teacher Educators (ACCESS-ECE) or National Association of Early Childhood Teacher Educators (NAECTE). The presentation describes my experiences with implementing a practice-based course and students' learning in the course. A major focus of this presentation is to examine implications from my study findings for scaling up practice-based design principles to the program level, so as to provide a scaffolded and coherent sequence of opportunities to support PSTs learning of effective teacher-child interactions.

Teaching to Teach: Zooming into a practice-based design

A presentation by
Anita R. Kumar
Graduate School of Education
Rutgers, The State University of New Jersey

My goals today

- Share my experiences of creating and implementing a practice-focused ECTE course
- Discuss what I learned from teaching the course.
- Discuss my plans for moving toward practice-based program design
- Explore interest in collaborating on studying practice-based TE course design and pedagogy

Slides 1 -2 introduce the goals of my presentation

Practice-based Teacher Education: What is it?

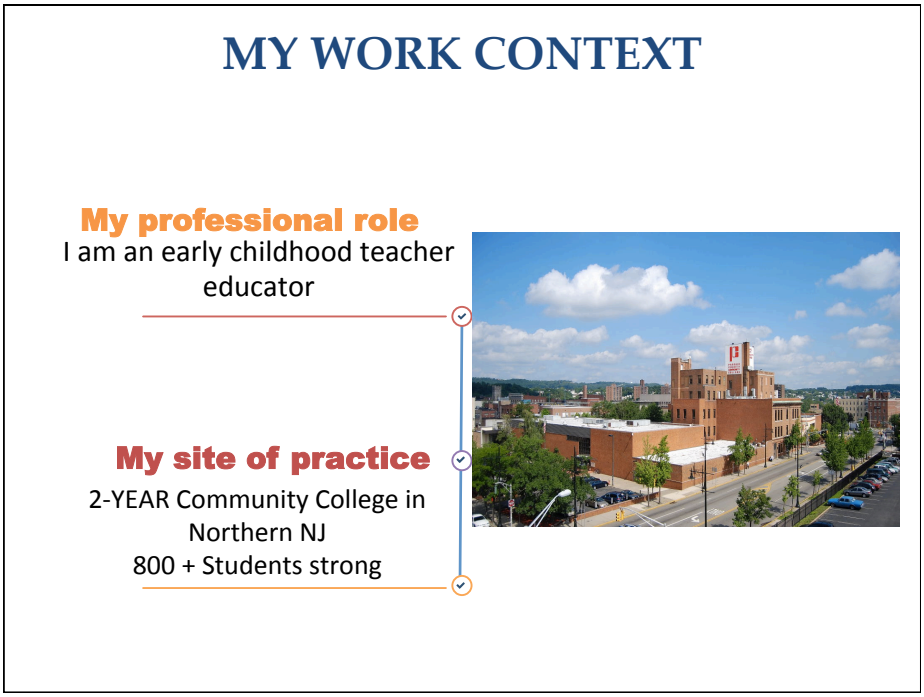
- Turn and talk
  - What does the term mean?
  - What does **practice based teacher learning** look like in your institution?

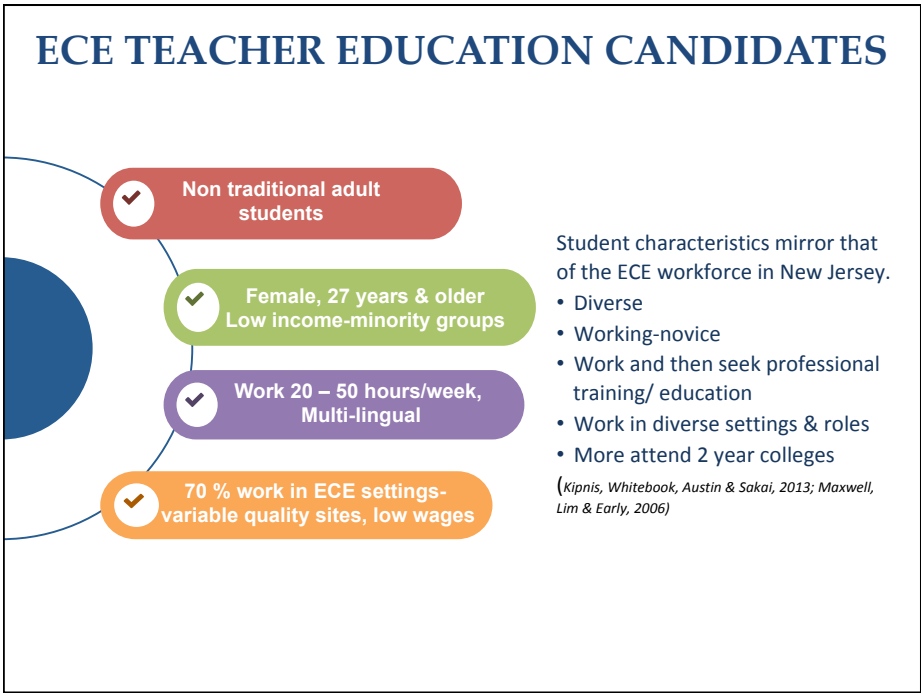
Practice based? What do you think?

Plan lessons / units	Rehearse activities	Analyze case studies/ classroom transcripts
Analyze and annotate lesson plans	Examine students work/ work samples/ observation records	Watch videos and analyze children's thinking
Analyze curriculum	Examine learning materials, books and manipulatives	Watch videos and analyze teacher's practices
Field experiences	Child Study projects	Others?

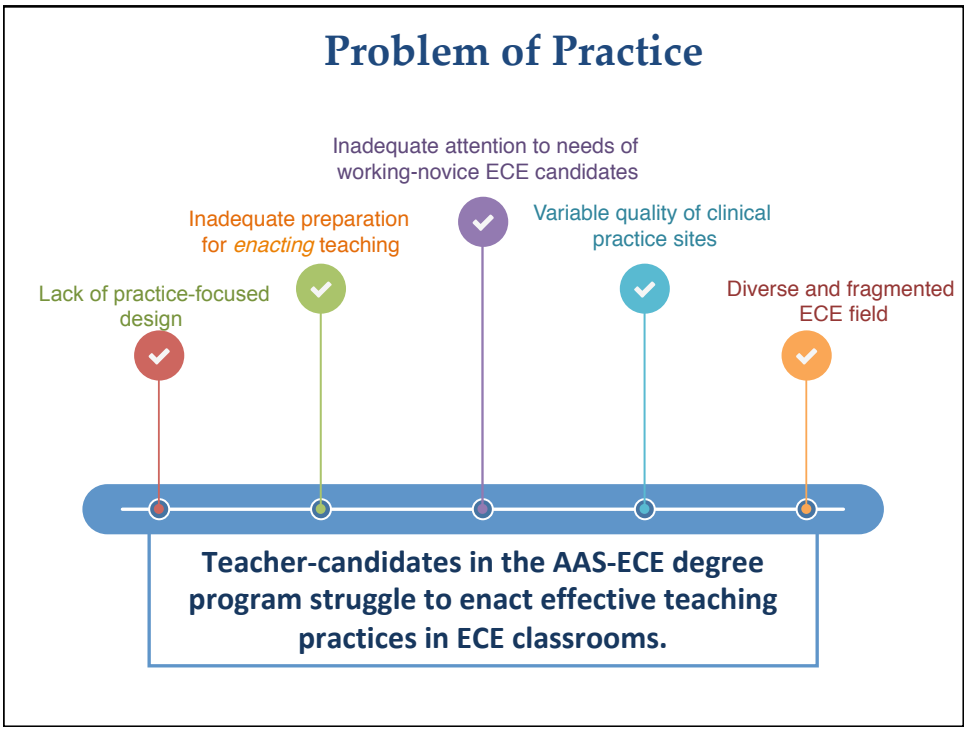
Jenset, I. S., Klette, K., & Hammerness, K. (2018). Grounding teacher education in practice around the world: An examination of teacher education coursework in teacher education programs in Finland, Norway, and the United States. *Journal of Teacher Education*, *69*(2), 184-197.

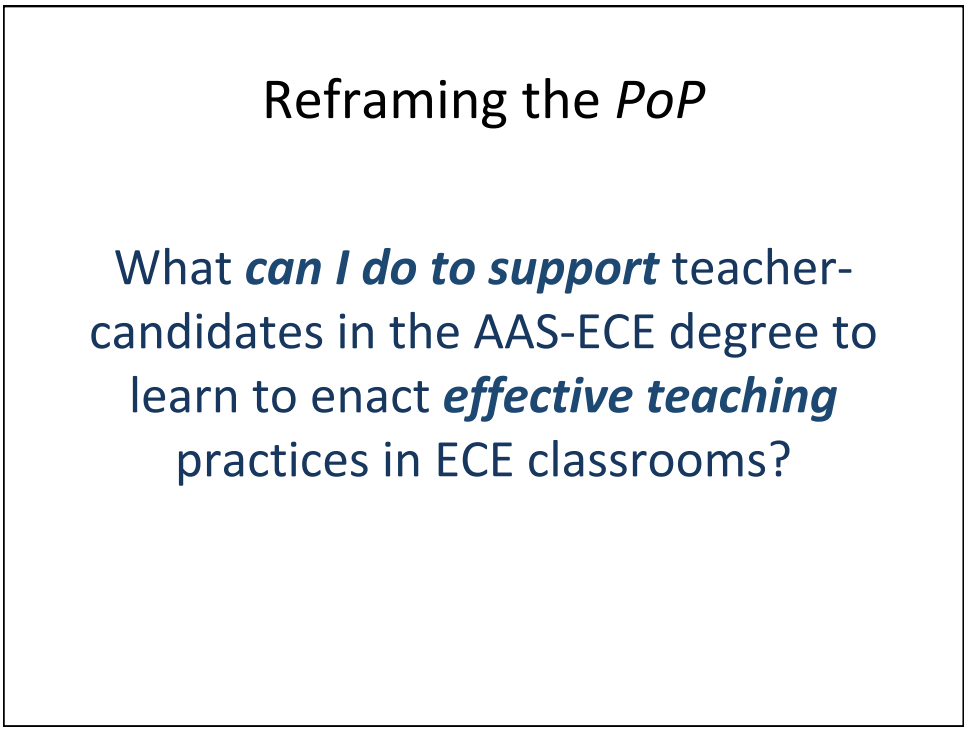
Slides 3 – 4: The presentation will begin with a warm-up discussion with open-ended questions and specific examples. Participants will discuss and share. Reiterate that most of us may already be doing some practice based work. How do pull this together to serve program goals?



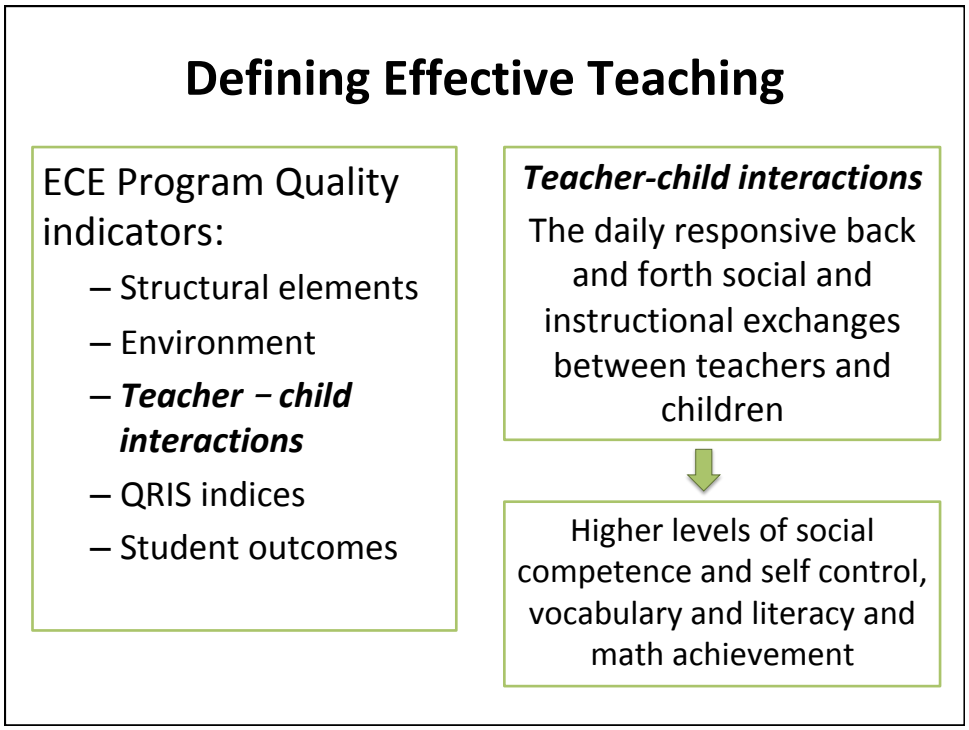


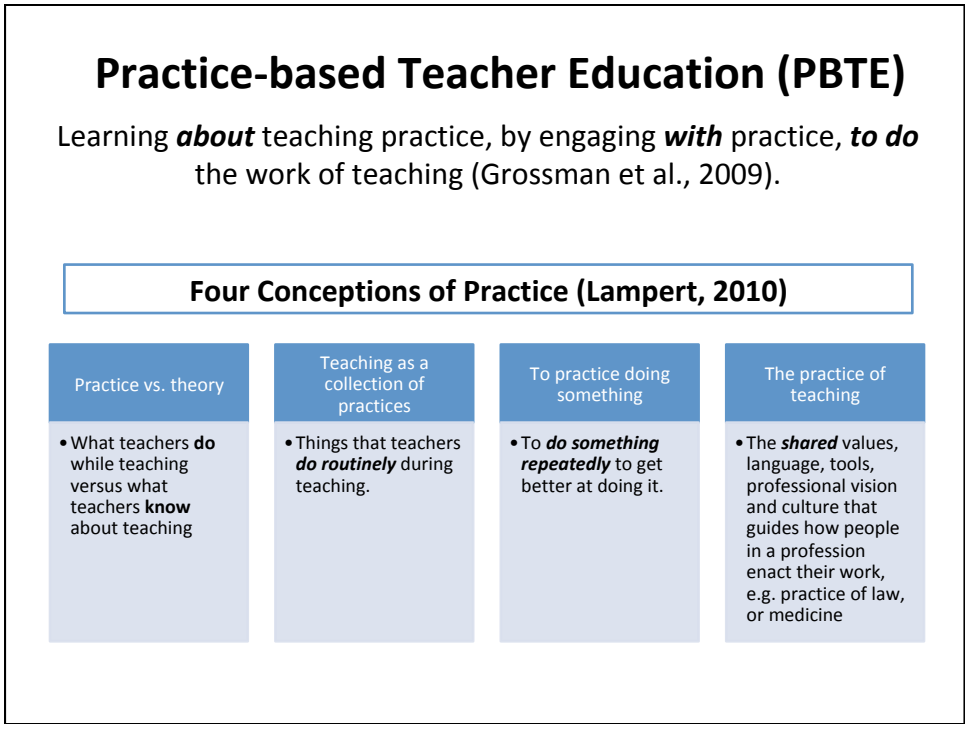
Slides 5 – 6 describe my work context and provide a demographic profile of my students.





Slides 7 – 8 describe and frame the problem of practice that motivated this study.





Slides 9 – 10 operationally define “effective teaching” and “practice based teacher education”.

What challenges do experts cite around PBTE?

Finding the "right grain size" of practice (Kennedy, 2016)

Decomposing/parsing knowledge and/or practices vs. recomposing (Kennedy, 2016; Grossman et al., 2008)

Prescriptive and mechanical presentation of discrete practices lacking adequate connections to purpose/goal, context and student needs.

Inadequate focus on engaging PSTs in analyzing and reasoning about practice (Ziechner, 2012; Kennedy, 2016)

Lack of attention to persistent complexities related to teaching (Kennedy, 2016)

FIVE Principles of PBTE that guide my work

Focus on core- practice **(effective interactions)** applicable across content & settings (Ball & Forzani, 2009, McDonald & Grossman, 2008)

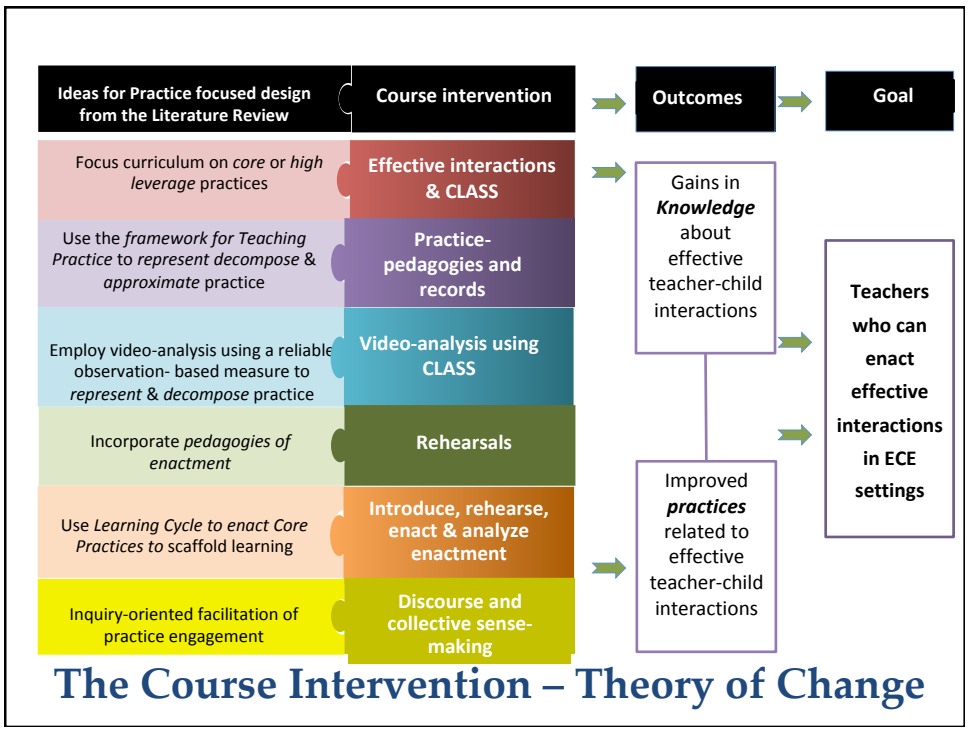
Features task & activities **(through IAs)** in the work of teaching and knowledge entailed in that work (Ball & Forzani, 2009)

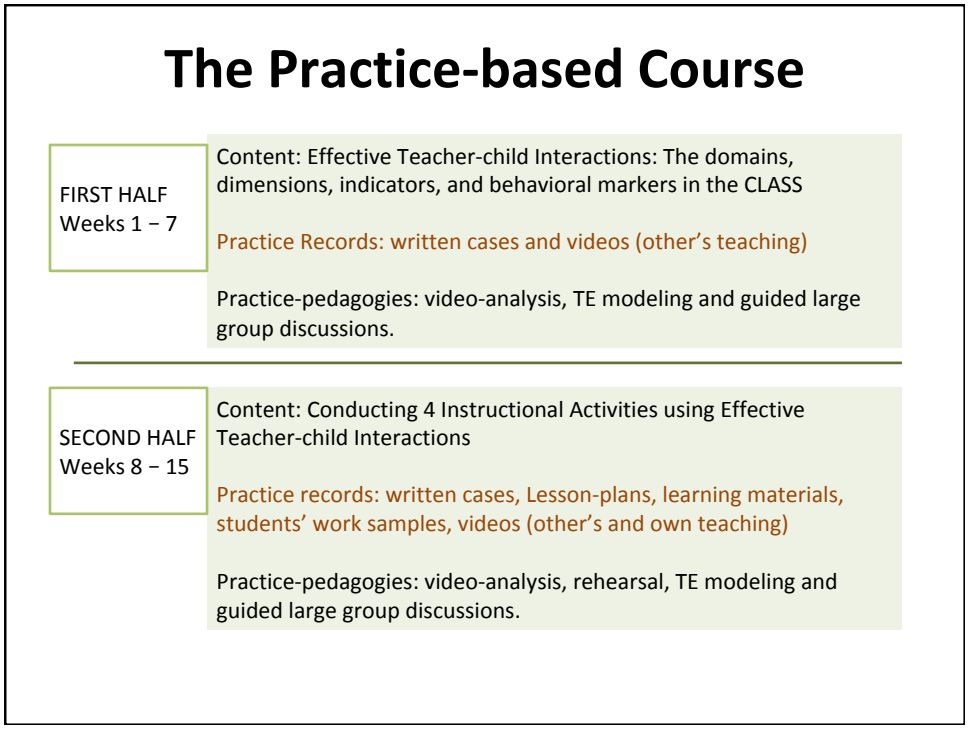
Repeated opportunities to engage with practice **(through practice records and pedagogies)** by seeing, decomposing and approximating (Grossman et al., 2009)

Use both pedagogies of investigation & enactment in well sequenced steps **(through the learning cycle)**

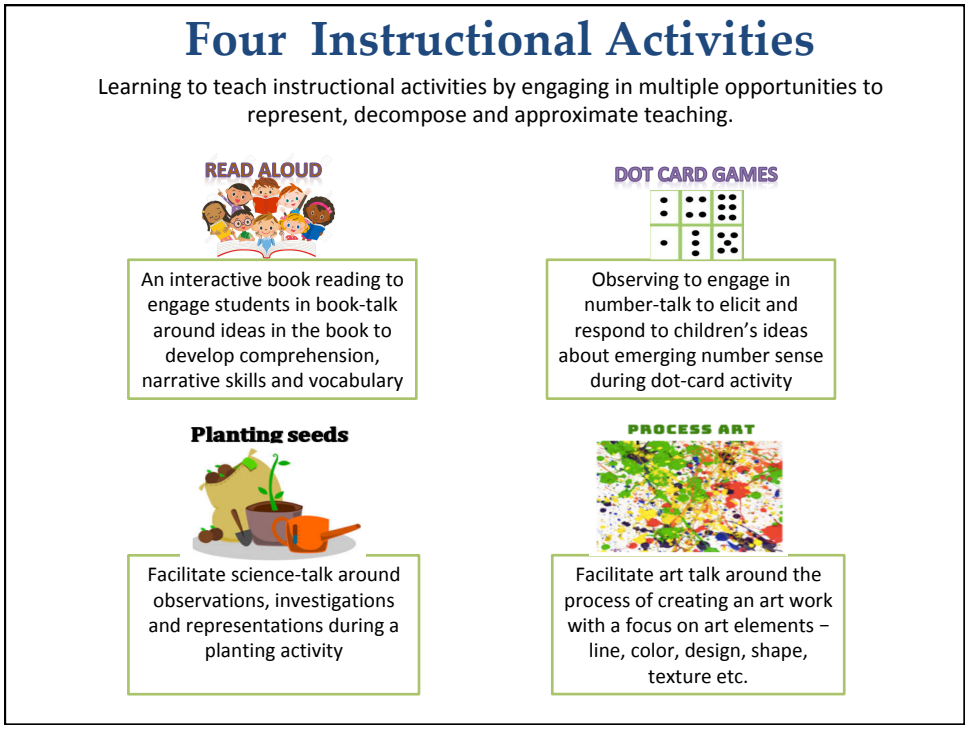
Focus on supporting judgment and reasoning when using practices, depending on goals, context, and needs (Ball & Forzani, 2009) **(by facilitating collaborative and inquiry - oriented discourse around practice)**

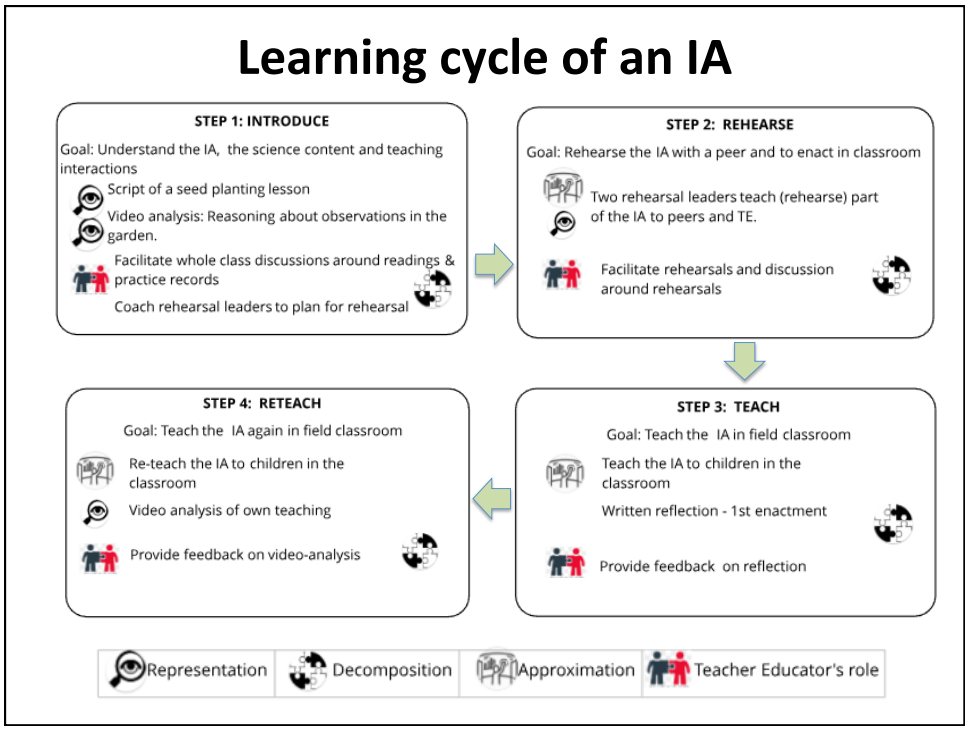
Slides 11 – 12 cull the research literature around PBTE and challenges with it.





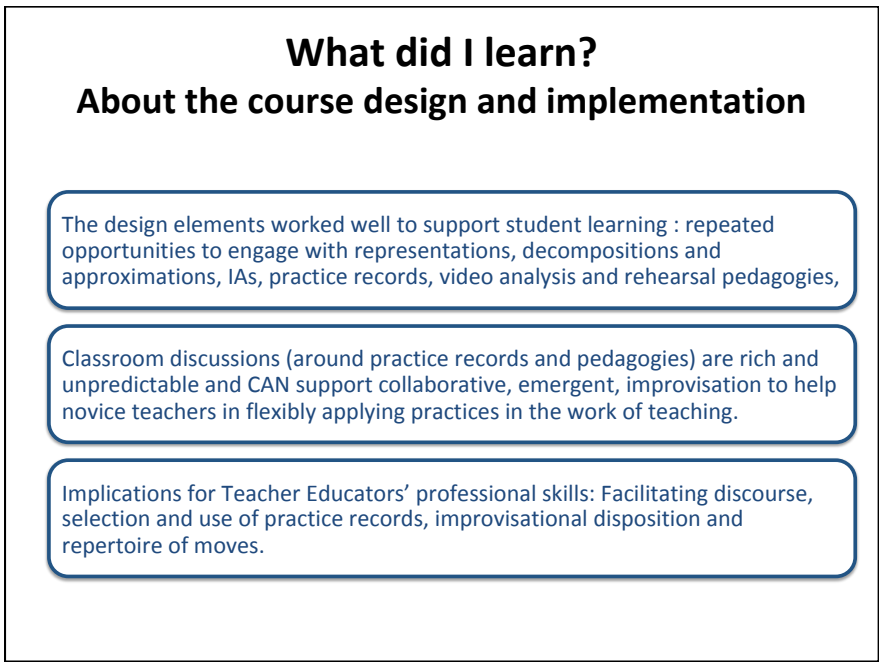
Slides 13 – 14 describe the course that I designed and studied.

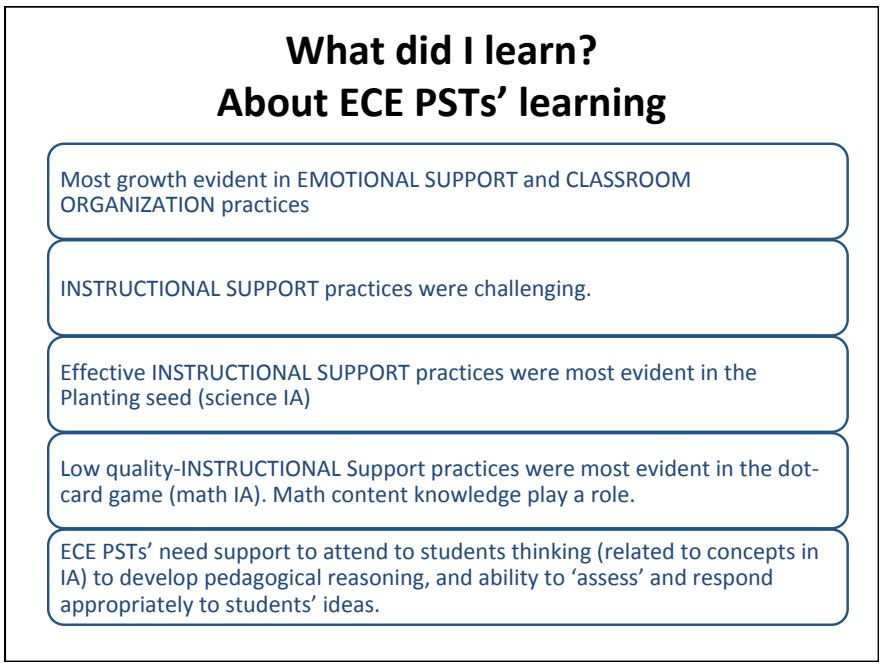




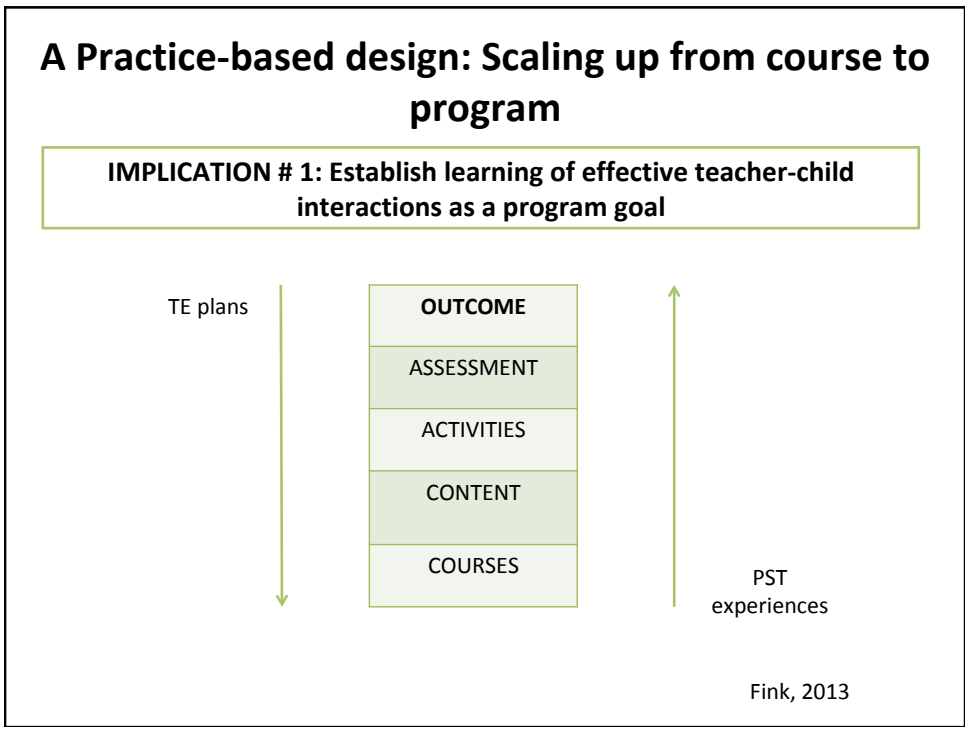
Slides 15 – 16 zoom into the second half of the course featuring four instructional activities.

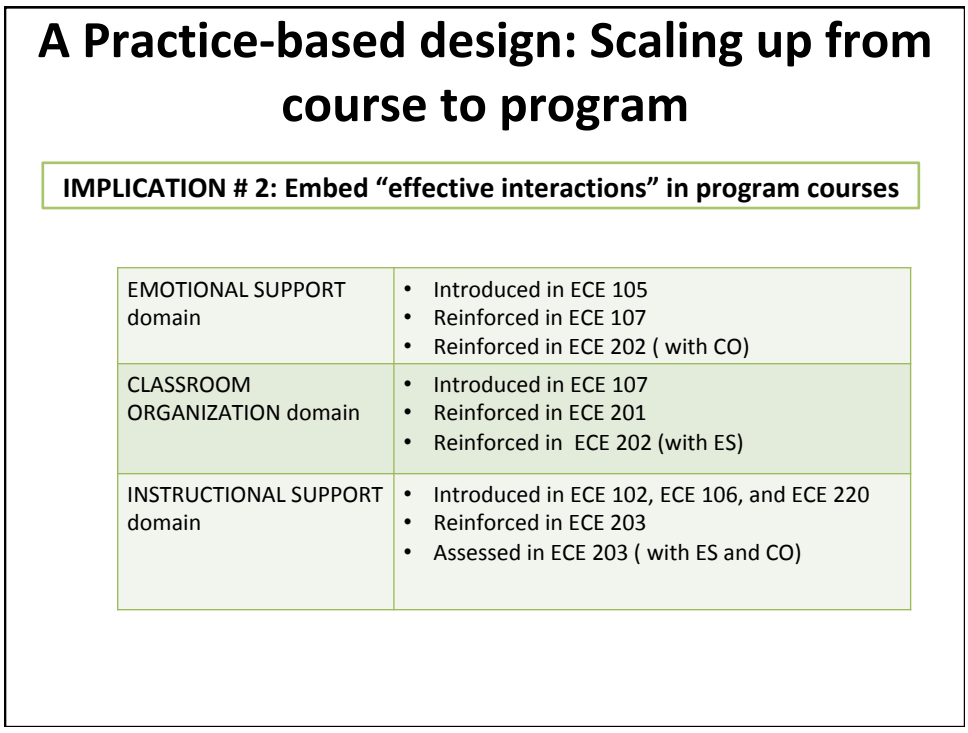
Slide 17 At this midway point, I will pause to take questions about the course design and activities. Possible discussion topics: Experiences with embedding widely accepted tools, frameworks or models of effective teaching.





Slides 18 – 19 focus on my findings from studying the course implementation and outcomes. Brief transcripts of students' reflections may be shared. Questions to prompt discussion: What thoughts, comments & questions do these findings raise: about PST's challenges, etc.? What does this look like in your contexts? What steps have you taken to address these challenges?





Slides 20 – 21: I will discuss the first step in scaling "effective interactions to a program level focus using Fink's Significant Learning framework to map curriculum.

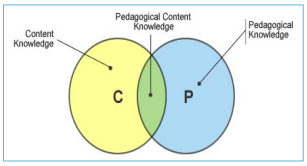
A Practice-based design: Scaling up from course to program

IMPLICATION # 3: Develop and use teaching and learning activities around practice records in program courses

Lesson plans	Curriculum units	Teaching manipulatives
Written and video cases	Students' work samples, observation records	Teacher's dilemma/problems of practice

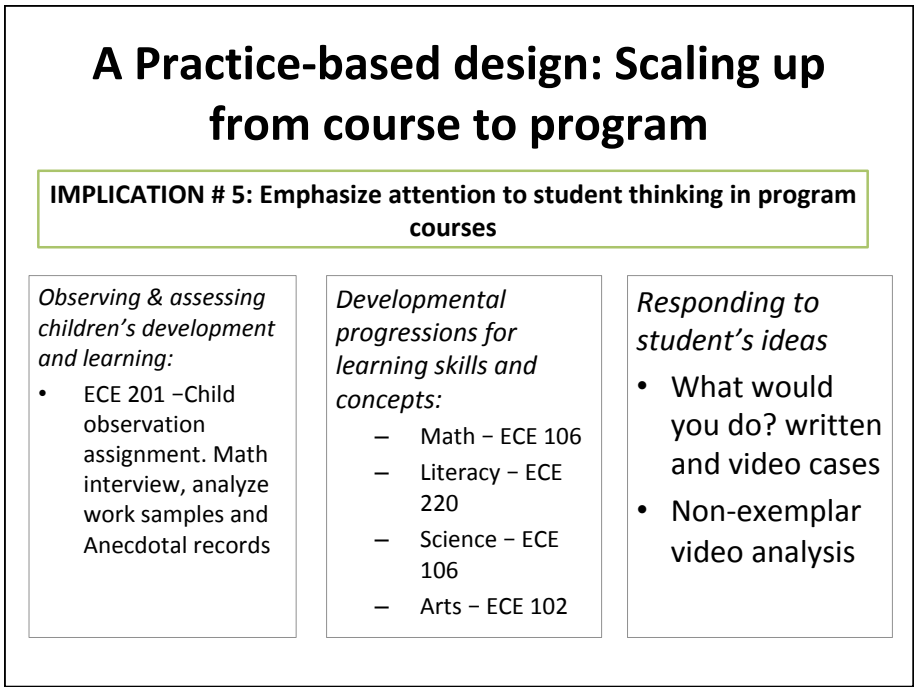
A Practice-based design: Scaling up from course to program

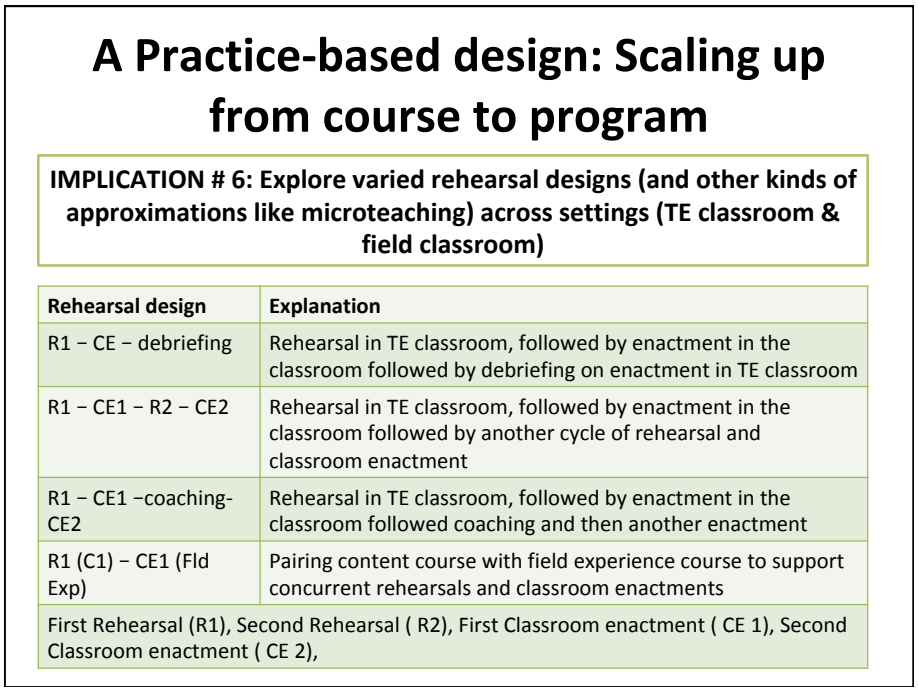
Implication # 4: Emphasize knowledge of content and content-specific pedagogical strategies in content/methods in program courses and examine how they interface with instructional interactions



ECE 102 Creative Expressions: Using Art, Music and drama	Content and methods in visual and performing arts
ECE 106 Practical Math and Science for young children	Content and methods in mathematics and science
ECE 220 Early language and Literacy development	Content and methods in English language arts

Slides 22 discusses the use of 1) practice-based activities to address course goals, and Slide 23 shows a sample plan to add effective interactions to the curriculum of Math, ELA and Arts content courses in my context.





Slides 24 – 25 unpack specific strategies that can be used to address specific study findings related to supporting PSTs in understanding children's thinking, and rehearsal designs. Discussion will focus on ideas tried in participants' contexts.

A Practice-based design: Scaling up from course to program

IMPLICATION # 7: Include one-one coaching on videos of classroom enactments in program's field experience courses

- PSTs video record teaching of IA
- TE/coach and PST choose a focus (domain/dimension)
- TE/coach inserts prompts:
  1. Identify effective interaction − What did you do here to help the child and what did he do in response?
  2. Identify less effective interactions and explore alternative strategies − What do you notice about what you did here and the child's response? What else might you have tried?
  3. Identify interactions that support the content area's learning goals − What did you want the children to learn in the activity? What do you notice about what you did to support the learning goal?

A Practice-based design: Scaling up from course to program

IMPLICATION # 8: Teacher-Educators' professional skill set for teaching to teach

- Explicit and implicit modeling
- Facilitating discourse − structure and moves
- Supporting co-construction of knowledge
- Building an improvisational disposition
- Reflecting through video-recording own practice, and CoP

Slides 26 presents a suggested set of coaching prompts that can be used with PSTs video clips. Suggestions for other prompts, coaching related activities will be elicited. Slide 27 will specifically focus on TE skill set. Discussion will include ideas about skill building resources.

Presenter will ask participants to complete a survey to provide feedback about the presentation and reflect on their learning.

Chapter Five: Conclusion

This dissertation has focused on a problem of practice in my work context; namely how to support pre-service early education teachers (ECE-PSTs) in my institutions' associate degree program in learning to use effective teacher-child interactions, a core practice increasingly regarded in the ECE field as integrally related to positive child outcomes (Mashburn et al, 2008, Howes et al, 2008). While there is clarity about the construct and components of effective teacher-child interactions, thanks to the three-part CLASS™ framework (Pianta, LaParo & Hamre, 2008), a useful knowledge base on how to best support (PSTs) in building this skill set, is still evolving. The findings discussed in this portfolio-style format of dissertation, have implications for my practice and that of early childhood teacher educators in 2 year and 4-year institutions. I believe that the three artifacts help to share distinct aspects of my work, with the ECTE community, where conversations around teaching-learning components and their effects on ECE-PSTs' learning are much needed.

General Implications

This study used a design aligned with K-12 teacher education's practice-based frameworks and pedagogies to supporting ECE-PSTs' in learning to use effective interactions in their work with young children. The underlying assumption was that PSTs could learn to use effective interactions through opportunities to observe and identify them in other teachers' practice, analyze and discuss them using the CLASS™ framework and the language of the CLASS™ dimensions and indicators, and rehearse them within specially designed instructional activities. Since the study had a descriptive research design, and did not include a random assignment of participants to the course intervention or a manipulation of treatment condition among groups for comparison, a causal effect of the course components on PSTs learning cannot

be concluded (Lauer, 2004). However, the use of CLASS™, and a series of practice-based pedagogies, namely video analysis and rehearsals, provided opportunities to actively engage with effective interactions to support knowledge and skill building. Data analysis showed that the PSTs in the study grew in their understanding about effective interactions and showed use of ideas raised in the course activities, while working with diverse children in their field classrooms. This was particularly true for two of the three CLASS™ domains, *Emotional Support* and *Classroom Organization* (Pianta, LaParo & Hamre, 2008)). While it is possible that other teaching approaches may have the same effect or possibly even greater effect, the study participants reported that practice-based approaches (i.e., CLASS™ tool, video analysis and rehearsals within the learning cycle of IAs) in the course enabled them to learn from and with each other by *doing* the work of teaching. Improvements in PSTs' *emotional support* and *classroom organization* interactions are meaningful because studies have shown that moderate to high levels of these interactions are associated with better social competence, and fewer behavior problems among children, particularly for at risk children (Mashburn et al., 2008).

An important finding in this study was ECE-PST's challenges around *Instructional Support*, which relates to how teachers cognitively stimulate children to support thinking and offer feedback about learning in responsive ways. This domain was new content for the ECE-PSTs in the study. Data analysis indicated that the broad spectrum of nuanced and sophisticated practices and terminology added to the complexity of learning this new content. In comparison, the PSTs in the study were well versed with the importance of attending to the emotional climate and building relationships. This is not surprising, since ECE teachers have long regarded emotional support practices like positive relationships, and responsiveness as mainstay practices (Copple & Bredekamp 2009; Lobman, 2006). On the contrary, instructing children about

concepts and academic content area skills and supporting children to think deeply and reason have been problematic and ill defined, and sometimes seen to oppose the field's long-embraced developmentally appropriate teaching values (Brown, 2007). Experts have advocated that the ECE field embrace theories and approaches, in addition to those solely focused on child development, to articulate a clearer and a more dynamic role for the early childhood educators, one that integrates supporting children's development with academic instruction (Ryan & Goffin, 2008; Brown, 2007, 2013).

It is noteworthy that owing to the novelty and lack of clarity about what it means to engage young children in developmentally appropriate academic instruction, the ECE-PSTs in the study fell back on traditional rote –focused and drill-style teaching approaches. It can be argued this occurred because participants used their pre-existing mental-models or schemas constructed from prior educational experiences to interpret and understand I*nstructional Support* interactions (Pianta, LaParo & Hamre, 2008)). This points to the importance of addressing beliefs about children and learning through the courses in a program of study at the pre-service level of teacher preparation. In terms of teaching-learning approaches, using dilemmas and problems of practice to help PSTs access and confront pre-existing ideas (Spillane, Reiser & Reimer, 2002).

Further, a deficit perception of low SES children may influence the belief that didactic and teacher directed approaches are appropriate approaches to instruct content area skills, as a way to "prepare children to be ready for Kindergarten" (study participant 5). Research shows that teachers of low SES children may believe that children can benefit from more intensive and forceful early mathematics instruction, in comparison to teachers of middle-SES children who use more children-centered and individualized teaching methods (Lee & Ginsberg, 2007).

Irrespective of the myriad interpretations, it is clear that ECE-PSTs can benefit from a deeper dive and a more prolonged and meaningful engagement with *Instructional Support* interactions (Pianta, LaParo and Hamre, 2008).

The spotlight on PSTs' challenges with instructional interactions helps to illuminate the problem spaces in ECE-PSTs' learning. The study findings indicated three specific areas to be inherently problematic for the ECE-PSTs in the study. First, as they talked to children during the instructional activities, they were unable to attend to, assess, and build on students' content-related ideas. Secondly, their interactions and responses within instructional activities showed a need for a better-developed knowledge of the content area and specific pedagogical strategies within the content area. Third, and partly in consequence to the two areas mentioned earlier, PSTs showed lack of understanding about certain interactional moves, especially supporting high level thinking. These difficulties are natural and understandable given the sheer expanse of novel learning ground that PSTs have to cover.

It is heartening to note these patterns of problems became visible because of the opportunities to rehearse and enact instructional activities with children, due to the course's core-practice-based focus. Identifying problems that pre-service teachers may face when enacting teaching can help to build the knowledge base of *teaching to teach* at this level of teacher preparation. These can also be brought back into the TE classroom, through non-exemplar videos or problems of practice case studies, for collective analysis and problem solving using inquiry style discussions. Such discourses have great learning merit for pre-service teachers because it sets the tone to develop the skills and dispositions necessary to engage in ongoing learning about teaching, in and from practice, and with peers (Feiman-Nemser, 2001; Zeichner, 2012).

Implications for Practice as a Teacher Educator

The opportunity to design and teach the course in this study has offered many revelations about how to organize learning for pre-service teachers. The traditional structure of teacher education programs front-loads a series of knowledge and theory-based courses following which teacher candidates engage in field experience to apply this knowledge. Practice based approaches, especially focused on *core-practices*, are based on the premise that the best way to learn the work of teaching is to repeatedly and deliberately engage with teaching practices throughout the sequence of courses in the TE program to meaningfully construct and use knowledge entailed in the work of teaching. Critiques of practice-based TE have expressed that the approach can take a minimalistic interpretation of teaching practice and reduce teaching to learning discrete and isolated practices without considering the learners and the context (Kennedy, 2016). There is also a belief that such an approach can push knowledge of teaching to the sidelines. However, this need not be the case at all. In the current study, engaging with practice opened up opportunities to discuss theory and content, and engage in pedagogical reasoning around artifacts to interact with a range of practices. My experiences have shown that practice-based approaches can be used to meaningfully engage with knowledge in and for practice.

The implementation of the course examined in this study, raised several ideas for improving the course. Four major changes were implemented in the next iteration. First and foremost, the content of teacher-child interactions was organized into two field experience courses so that *Emotional Support* and *Classroom Organization* interactions were moved into an earlier field experience course and *Instructional Support* interaction*s* became the sole focus on the culminating field experience course. This was done to provide more time to engage with

practices for supporting children's thinking and language development, in more depth. Second, the CLASS tool was substituted by a simpler framework titled, the *framework for Effective practice*, sourced from the *National Center on Quality Teaching and Learning (NCQTL).* The framework's foundation focuses on *Engaging Interactions* and presents strategies based on CLASS practices. I chose this framework because of its simpler terminology and structure. For a third change, I replaced the dot card Math IA with an activity called *Counting Collections*, in which a teacher presents children with small collections of items to count and represent. I chose this activity because it focused on a specific and smaller set of counting principles, in comparison to the dot card IA, thereby affording more opportunities for teachers to observe children's actions as they organized and counted their collections. The course timeline was restructured to devote three weeks to the *Counting Collections* activity and time was dedicated to focus on counting principles and preschooler's developmental progressions on counting principles. Prior to the rehearsing the IA, all participants experienced the counting collection activity as students and with the TE's support unpacked the counting principles inherent in the activity. Participants also engaged with videos and written cases illustrating common patterns in preschooler's counting and problem-solved collectively using "what would you do" scenarios. The final change was in the feedback built into the IA's learning cycle. Participants videotaped their first enactment and received feedback through a coaching prompt following which they reenacted the IA in their field classroom. This was done to offer specific and corrective feedback to help revise the second enactment.

The changes described above emerged from the analysis of study participants' engagement with course activities, their IA enactments, and their focus group comments. Other ideas for program level changes also surfaced from the analysis, work on which has been

initiated through discussions with other faculty-members in the department. Future studies focusing on teacher-candidates' outcomes can help to understand more about ECE-PSTs' learning and improvements that can result from a systematic inquiry of one's own practice.

The study enabled some interesting insights into the pedagogy of teacher education as well. Loughran (2008) has written that in *teaching to teach*, that PSTs learn as much from how they experience the learning activities as they do from the TE's instructional approaches, theories, or the content of the learning activities. I believe that practice-based approaches and pedagogies meaningfully lend themselves to interactive, interpersonal, and improvisational dimensions of teaching to teach. The study gave me an opportunity to scratch the surface of this dimension. While I realize that there is much learning ground to cover, I have a better appreciation of the fact that PSTs learn not just from the content in our classes, but also their experiences as learners and from observing my teaching behaviors and practices. For example creating a discourse setting around a lesson plan, where PSTs could reason, brainstorm, and explain their thinking about teaching decisions, was a meaningful way to learn by experiencing the feedback and thinking interactions that PSTs were being expected to enact.

At the present time, I am preparing to transition from teaching in a 2-year institution to that in a 4-year IHE. I plan to bring with me the learning and dispositions gleaned from this study, to shape the courses that I will teach in a new setting. In my new position as a faculty in a graduate level initial level P-3 certification program, I hope to be able to apply practice-based design and pedagogies, along with collaborative problem-solving discourse, revised from my experiences in this study.

Implications for future research

Several new questions have emerged from this study that can be systematically researched to gain more in-depth understanding about teaching and learning at the pre-service level. To begin with, I would like to study the course activities across a few semesters and compare findings across sections. It would also be worthwhile to follow the PSTs through their induction phase (Fieman-Nemser, 2002) to examine to what extent they enact the practices they learned in the course. Examining PSTs' characteristics: age, experience, credentials, beliefs about children and their learning, and how these variables influence PSTs' learning about teacher-child interactions is a useful line of inquiry. Equally promising is to study the climate and culture of teachers' work settings to identify both levers and barriers to implementing effective interactions because we know that contexts can influence teacher's enactment of newly learned behaviors (Delaney and Nueman, 2016).

Reflecting on the current study, there are aspects that I could have examined using more precise methods. For instance, I am intrigued to find out how knowledge and practice interact with each other. Some CLASS™ studies have shown that knowledge of effective interactions can change before practice (Hamre et al., 2012). Other models of professional development and teacher change have proposed that change in practice is rarely linear and instead evolves through cycles of enactment and reflection (Guskie, 2002, Clarke & Hollingsworth, 2002). Tying in structured reflection prompts would have helped me gauge how participants were making sense of their practice and how knowledge changed, in response. Secondly, single day observations by a single CLASS™ observer in two time intervals possibly limited the quality of data. Many contextual aspects influence teacher-child interactions, so gathering observations across days and

from different observers would have been better. Moving forward, studying the changes made to the course will help in making ongoing improvements.

A significant learning idea that came from this study, relates to the interactional and improvisational dynamics in the instructional interactions between the PSTs and me as the TE. This is a rich avenue to delve into as I build my expertise in facilitating problem solving and reasoning-oriented discourses around practice artifacts. Audio recording teaching-learning conversations can further illuminate these interactional dynamics. This form of self-study can help to generate new understandings about my own practice and TE pedagogy in general. I believe that exploring the dynamic elements of TE pedagogy has great value because it can help establish the knowledge and skill-set that teacher educators require to prepare PSTs for the intellectual work of teaching children. This knowledge base is needed because most practicing teacher educators report feeling unprepared to *teach to teach* (Lin, Smith, Cheruvu, Sauto-Manning, Tan, Reid & Taveras, 2014).

This scholarship is particularly needed in early childhood teacher education. In the wake of landmark publications that have called to upgrade what ECE teachers must know and do, now more than ever, there is widespread consensus that the knowledge and skills required to work with young children are just as complex, as in K-12 schools. Yet, ECE is different because low wages for work and fragmented programs seem to perpetuate the idea that teaching young children requires no more skill than babysitting. When ECE is designed to enact rich early learning environments and interactions, children are prepared for lifelong success. This places an emphasis on ECE teacher-competencies and how TEs prepare them. Clearly, this means reconstructing how we understand this work and how we can, as ECE teacher-educators prepare and support ECE teachers in doing this high-stakes work.

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