Preparing “Good Little School Citizens”: One Public Prekindergarten Teacher’s Readiness Beliefs and Implementation of Responsive Mathematics Practices

by

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Dedication

For my little girl, Audrey Eunje,
who always reminds me to be bravely playful and live in the moment

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ABSTRACT

Preparing "Good Little School Citizens": One Public Prekindergarten Teacher's Readiness Beliefs and Implementation of Responsive Mathematics Practices

Jiwon Kim

Under the supervision of Professor Mary Elizabeth Graue

The purpose of this study was to gain insights into how a PreK teacher's beliefs on readiness shaped how she adopted/adapted to a new practice that was intended to provide responsive mathematics education. To explore these issues, I constructed one descriptive case study of a teacher's beliefs and practice based on data from a broader research project. Marley, this study's focus, participated in a two-year-professional development (PD), which focused on culturally and developmentally responsive early mathematics pedagogy by connecting funds of knowledge (FoK), early mathematics teaching, and early childhood curriculum. The following questions guided my study: "How were a community-based PreK teacher's readiness beliefs related to her mathematics engagement in a play-based classroom? And how were they related to her use of children's FoK when teaching mathematics?"

I analyzed qualitative data, such as interview transcripts, observational field notes, PD discussion transcripts, and teacher created artifacts, that were gathered as part of the larger research project to examine the role Marley's beliefs played in her practice.

Findings highlighted that dominant within Marley's ideas and practices are understandings based on environmentalist notions of readiness. Marley's goal was to prepare

children to be “good little school citizens” who can act and interact according to typical kindergarten norms. Within the environmentalist frame, “readiness” is emphasized as a mechanism that provides children with the skills, knowledge, and experiences that are considered to be needed to be ready for kindergarten schooling. Consequently, Marley’s strategy for PreK teaching was to use prescriptive teaching methods, which limited pedagogical interactions between the teachers and children.

How Marley took up PD contents including play-based pedagogy and incorporating children’s FoK when teaching mathematics were closely linked with her environmentalist notions of readiness. Furthermore, Marley’s readiness beliefs were related to the types of FoK Marley noticed and chose to incorporate. Marley used FoK as a tool supporting her view of kindergarten readiness rather than a transformative approach in which the child’s present home practices became the site of knowledge production that teachers learned from. Marley’s notions of culture and FoK also played a role in how she incorporated children’s FoK.

Keywords: readiness; prekindergarten; early mathematics; funds of knowledge; play-based pedagogy; responsive practice; professional development; teacher belief; teacher practice; teacher learning; early childhood education.

LIST OF ABBREVIATIONS

1. CK: Content knowledge
2. DAP: Developmentally Appropriate Practices
3. FoK: funds of knowledge
4. NAEYC: National Association for the Education of Young Children
5. PCK: pedagogical content knowledge
6. PD: professional development
7. PreK: public prekindergarten programs
8. PreKPD: the PreK Professional Development
9. SSD: Snowcity School District

Chapter 1: Introduction

Problem Statement

> When we've gone to our [district] training, they've talked about how ‘never, never, never do calendar time, calendar time is wrong.’ But a lot of these people (participating teachers) have been teaching for 20, 30 years and they're gonna do a calendar no matter what. And I used to be the calendar person. [...] When I go to the monthly training for the school district, that's where I heard [presenter] specifically say ‘never, ever, under any circumstance, should you be teaching letters.’ Like really, you should never? Well, if you’re not introducing [the letters] to (the children) then what, they're gonna go to kindergarten and be surprised? I feel the same way about a calendar. They're gonna go to kindergarten, [be] expected the first day to sit at a rug and pay attention to this chart that makes no sense to them. At least if I've introduced it with songs, then I think their ability to sit will be better. So that's kind of what I think about a lot of things. I just want to expose them so that they are good citizens next year. So they're not jumping all over and that they can listen and that they’re interested. So that's my overall goal; just produce good school citizens. (Marley, Interview, June, 2013)

In the quote above, Marley, this study’s focus, highlights how teacher beliefs are resistant to change, even with professional training. It particularly shows her frustration with new practice advice received in district training that is not well aligned with her kindergarten readiness beliefs. When told she should not do calendar time or teach letters of the week, Marley disagreed because she worried it would not prepare them adequately for kindergarten. Marley’s beliefs and practices illustrate how teacher beliefs, particularly on readiness, are deeply ingrained and can

have a profound influence on their pedagogical decisions and how they interact with children. Teachers' histories and teaching context are also shaping their beliefs on readiness as well as the ways in which they accomplish the perceived readiness goals (Puccioni, 2018). Thus, understanding a teacher's beliefs on kindergarten readiness requires a close examination of a teacher's pedagogical actions and understandings as well as their past experiences and teaching context. My goal for this dissertation is to learn how these processes play out for one community-based PreK teacher, particularly when the teaching context changes and when alternative practices are advocated.

In early childhood education internationally, ideas about kindergarten readiness are often related to program purposes (Sriprakash et al, 2020; UNICEF, 2012). This is further strengthened by a great deal of evidence showing that many children, particularly from racially, economically, and linguistically marginalized families, enter school lacking in the academic as well as social-emotional skills needed for success (Monfredo, 2017; Wildy & Styles, 2008). In addition, empirical studies have demonstrated a correlation between being ready upon school entry and later success in school and in life (e.g., Matthews et al., 2010). Consequently, promoting school readiness has been at the center of national policy agendas in the U.S. It has also been the focus of discussions for pedagogical decisions including program focus (e.g., academic skills and/or social aspect of being a student at school), teaching methods (e.g., play-based approach and/or teacher-directed approach), and types of assessment and its usages (e.g., kindergarten entry assessment for identifying possible concerns and/or narrative assessment to support day-to-day learning) (Graue, 2006).

However, readiness is a complex construct for which teachers have varied beliefs that shape their practice (Dockett & Perry, 2002). For example, some believe readiness is an expected

and fixed set of skills and characteristics that are related to successful schooling. They focus on meeting readiness indicator threshold and believe the primary function of early childhood education is to ready children for the experience of schooling. This way of perceiving readiness has been prevalent in early childhood education policy and pedagogical reform efforts toward improving and prioritizing early learning outcomes (Bloch & Kim, 2015). Informed by socio-cultural theory, others problematize this prevailing notion of readiness and believe readiness is a more complex construct than that. They view readiness in terms of providing caring environments that enhance a more holistic development of the child; it is "an ethical responsibility" (Bates, 2019; Graue, 2006, p. 51). Strategies for responding to readiness issues, therefore, depend on how the concept is defined. As Marley's quote above suggested, teachers' notions of readiness are often most salient when they adopt new practices that are potentially conflicting with their prior beliefs. Their beliefs about readiness works as a filter through which they resist, accept, or negotiate elements of new practices. Thus, it is important to understand teachers' implicit and explicit beliefs of readiness through their words and enacted practices to better understand the assumptions behind their practices and to gain insights into ways to further support high quality and ethical teaching.

Understanding teachers' notions of readiness is particularly pertinent in the context of publicly funded settings, like public prekindergarten[1] (PreK) programs, that explicitly aim to promote children's readiness for school. Compared to other forms of early education[2], PreK is especially significant because it situates early childhood education within public schooling.

[1] Public preK (PreK) is defined as "programs funded and administered by the state with a primary goal of educating four-year-olds who are typically developing and who are in classrooms at least 2 days per week" (Barnett, Friedman, Hustedt, & Stevenson-Boyd, 2009, p. 5). See Appendix A. for definitions of key terms and acronyms.
[2] In the U.S., four-year-old children are served in three major kinds of early childhood education center-based settings: Private preschools or community-based child care centers, Head Start programs, and state-funded preschools. In a state or district where they deliver PreK through a mixed delivery system, they use all of three settings as a site for PreK programs.

Moreover, one of the promises of PreK is improving educational equity. It has been argued that PreK could contribute to closing both opportunity (Villanueva, 2015) and achievement gaps (Slaby et al., 2005) by providing access to quality early childhood education for all families.

Mathematics is one of the content areas that is frequently mentioned in the readiness discourse, because of its predictability for later success as well as a significant readiness gap between different groups. Researchers suggest that children of different backgrounds are provided with varying levels of mathematics engagement from earlier years (Sophian, 2012; Levine et al., 2010). In turn, there is a readiness gap in mathematics skills upon entry into formal schooling (Starkey & Klein, 2000). These gaps widen if they do not receive more intensive mathematics teaching (Starkey & Klein, 2000). These are significant results because early mathematics is shown to be significant in predicting successful schooling in later years (Claessens et al., 2009; Claessens & Engel, 2013; Duncan et al., 2007; Lee & Ginsburg, 2009). Thus, high-quality mathematics pedagogy in early childhood education can help ameliorate inequities in educational opportunities among children and address achievement gaps.

In sum, teachers' beliefs are a crucial construct to make sense of their practices. In early childhood education, beliefs about readiness are particularly significant in shaping teachers' pedagogical choices. In this study, I explore how an experienced child care worker with strong beliefs about preparing her children, and with readiness in mind, adapts to becoming a public PreK teacher in a program that mandates play-based teaching.

Purpose of the Study and Research Questions

The purpose of this study is to learn how a PreK teacher's beliefs on readiness shape her practice. To explore these issues, I constructed one in-depth case study of a teacher's beliefs and practice based on data from a broader research project conducted by members of a Midwestern

university in 2010-2015. I entered the project midway through the study and used data collected by other researchers on the project. Here I present a case study of a community-based PreK teacher, Marley[3], during two academic years in 2011-2013. The two-year-professional development, called PreK Professional Development program (PreKPD), aimed to teach educators about culturally and developmentally responsive early mathematics pedagogy by connecting culturally responsive practice, early mathematics teaching, and early childhood curriculum. Using funds of knowledge (FoK), the knowledge and practices of daily household routines that enable individuals or households to function within a given culture (Moll et al, 1992), was the specific practice of focus. I considered how Marley responded to PreKPD content by examining her discussions and assignments from the PD, individual interviews, and observation field notes on her practices. I further observed Marley's reflections on her background growing up. This study will provide insights into how a PreK teacher's conceptions on readiness and teacher roles shape how she adopts/adapts a new practice that is intended to provide culturally responsive and developmentally appropriate mathematics education.

The following questions guided my study:

1. How were a community-based PreK teacher's readiness beliefs related to her mathematics engagement in a play-based classroom?
2. How were a community-based PreK teacher's readiness beliefs related to her use of funds of knowledge when teaching mathematics?

[3] All the names in this dissertation are pseudonyms.

Chapter 2: Literature Review

In this chapter, I present literature on the public prekindergarten movement in the U.S. as the context for this dissertation. Then, I review literature on teacher beliefs in relation to teacher learning, followed by notions of readiness. Finally, I review literature on the use of play-based pedagogy, mathematics in early childhood education and FoK.

Context: The Public Prekindergarten Movement in the U.S.

Over the last few decades there has been a movement to expand PreK programs in the United States. According to the National Institute of Early Education Research (2019), PreK is a program funded and administered by the state whose focus is educating typically developing four-year-old children in classrooms at least twice per week. States, overall, have increased investments in early education (Friedman-Krauss et al., 2019). PreK programs have played a major role in the growth of school enrollment for preschool-aged children since 1965 (Barnett & Yarosz, 2007). According to a recent report, the number of four-year-olds attending PreK programs has expanded by 20 percentage points, increasing from 14% in 2002 to 34% in 2019 (Friedman-Krauss et al., 2020). Now, D.C., Florida, Vermont, and Oklahoma offer or scale toward universal access to publicly funded programs[4] for all preschoolers regardless of family income and serve more than 80% of four-year-olds (Friedman-Krauss et al., 2020). In the 2018-2019 academic year, Wisconsin served 72% of four-year-olds in PreK programs (Friedman-Krauss et al., 2020).

[4] This includes state-funded PreK, state-funded PreK special education, and Head Start. Some or all four-year-old Head Start children may be served in a state-funded PreK program (Friedman-Krauss et al., 2020).

The expansion of PreK comes as policymakers and legislators recognize early education's potential for promoting individuals' as well as society's well-being (Phillips et al., 2017). On the individual level, PreK is hoped to enhance children's academic, social and emotional development (Barnett, 2008), reducing the need for remediation in later years, which results in savings to the public school system (Puma et al., 2005; Rebell et al., 2017). It also improved individual's later health and health behaviors (Karoly, 2017)[5]. On the societal level, it enables parents to work by providing an enriching environment for their four-year-old children (Gormley, 2017). This is especially relevant when the PreK program is offered full-day, which accommodates the needs of working parents. It is also hoped to reduce the long-term costs related to the criminal justice system (Schanzenbach et al., 2016; Rebell et al., 2017) and bring potential positive economic returns (Rebell et al., 2017). Moreover, many advocates suggest that PreK will narrow the achievement gaps between poor and/or marginalized children and their counterparts before children enter kindergarten (Reardon & Portilla, 2016; Gormley et al., 2008; Magnuson et al., 2006). Although PreK systems vary widely both within and across states, they share the same goals of narrowing the readiness gap and preparing all children for kindergarten.

However, PreK expansion does not guarantee meeting expected goals; what is important is the quality of PreK. In recent years, there has been increasing interest in assessing how well these goals have been achieved to seek better ways to shape the future of PreK education. The results, however, vary widely. While some scholars report optimistic results of children who attended PreK, suggesting that expansion of PreK is beneficial and doing its job (Camilli et al., 2010; Pianta & Howes, 2009), others indicate that the results are more complicated (Valentino, 2018). For example, Valentino (2018) found large "quality gaps" in PreK between those serving

[5] Examples include depression, smoking, substance abuse, mortality, and teen pregnancy (Karoly, 2017).

marginalized students and non-marginalized students (p. 80). She found quality gaps both in terms of structural quality[6] (e.g., staff-child ratios, class size, classroom materials, and teacher credentials) and process quality (e.g., teacher-child interactions, teacher's use of strategies that scaffold children's learning, amount of time spent in free play, etc.). Moreover, Valentino also found that the neighborhood one lives in is tied to the PreK quality they receive. Thus, Valentino concluded that equal access to high quality PreK across different groups is the key for narrowing readiness gaps. And with evidence by other researchers (Bierman et al., 2008; Domitrovich et al., 2009; Pianta et al., 2008), she suggested PD for teachers is the most effective way to improve quality.

Additionally, studies that focus on process quality for PreK view aspects of teachers' pedagogies as significant determinants for quality (Farran, 2017). In the PreK world, there are two different pedagogical approaches often colliding. This is because PreK often brings the two worlds—the child care sector and the K-12 system—together in new ways (Graue et al., 2016; Hustedt & Barnett, 2011; McCabe & Sipple, 2011). Many PreK programs are implemented through public school systems, but more often in partnership with other community-based programs such as childcare centers or Head Start. There are structural[7] as well as pedagogical discord based on historically different aims (Graue et al., 2016; McCabe & Sipple, 2011). Whereas the child care community's preferred pedagogical orientation lies in child-directed exploration and play, which focuses on the individual child's development, K-12 schools are characterized by a more scripted and teacher-directed approach to learning (Bloch, 1987; Kagan,

[6] Structural measures of quality are often shown to indirectly predict child's academic as well as socioemotional outcomes through their mediated impact on classroom process (Justice et al., 2008; NICHD Early Child Care Research Network [ECCRN], 2002).

[7] While K-12 is largely public and relatively stable with increasing standardization at the state and national level, child care sector is fragmented, market-driven, typically relies on private funding, and highly varied from community to community (McCabe & Sipple, 2011; Graue et al., 2016; Wilinski, 2017).

2013). K-12 schooling culture is also relatively more influenced by the accountability discourse, focusing on grade level benchmarks (Brown, 2007; Graue et al., 2016).

Research shows high-quality interactions between teachers and children are principal mechanisms that drive children's development (Mashburn et al., 2008; Pianta, 2006), and teachers' pedagogies play an important role in PreK quality and learning outcomes (Valentino, 2018). Thus, to provide improved quality services that will better support children in various settings, it would be crucial to support PreK teachers with their practice and ongoing learning.

Teacher Beliefs and Teacher Practice

Teacher Beliefs

Teacher belief is a concept that is accepted as true by the teacher holding the belief (Green, 1971; Seoane et al., 2020). Teacher beliefs as a construct became the focus of attention as the constructivist revolution emerged in the early 1980s and as the act of teaching began to be understood as an individual's meaning-making process (Skott, 2015). It generally includes teachers' assumptions and perceptions about children, learning, and content to be taught (Seoane et al., 2020; Wright et al., 2019), which may be held consciously or unconsciously (Wilcox-Herzog et al., 2015). Teacher beliefs are more than opinions because teachers are committed to them (Loucks-Horsley et al., 1998). In addition, there are terms including perspectives, perceptions, conceptions, ideas, and notions, and the differentiation between these terms is not evident in much of the teacher education literature. Pajares (1992) suggested that such concepts are really beliefs in disguise. Thus, in this study, the terms—beliefs, perspectives, perceptions, conceptions, ideas, and notions—will be used interchangeably to describe a proposition that is accepted as true by the individual who holds the belief.

Teacher Beliefs and Their Implications for Practice

Teacher beliefs are a foremost consideration in understanding and improving teacher practice (Organisation for Economic Cooperation and Development [OECD], 2009). Teachers bring in their prior notions and experiences to pedagogical spaces to enact teaching practices. Researchers have claimed that teachers' beliefs shape their pedagogical decisions and practices because beliefs act as filters for knowledge and practice (Pajares, 1992; Wallace & Priestley, 2011; Wright et al., 2019). Moreover, teachers' beliefs influence their expectations for students as well as the nature of relationships they build with children (Wright et al., 2019). For example, teachers' beliefs about their own abilities and the strength of available resources can support or hinder their practice in terms of planning complex lessons, addressing children's questions, and dedicating more time focusing on the topic with children (Greenfield et al., 2009). Additionally, teachers' preexisting pedagogical beliefs appear to play an important role in their implementing new pedagogical approaches (Lee & Ginsburg, 2007). Thus, one of the goals of the research on teachers' beliefs has been to understand beliefs as an explanatory mechanism for explaining differences in teachers' practices (Fives & Buehl, 2012).

In empirical studies on early childhood teachers, researchers found a positive relationship between teacher beliefs and observed practices. For example, teachers who hold child-centered perspectives are likely to reflect children's individual needs and interests and to engage in child-directed learning; whereas those who hold teacher-centered beliefs tend to enact didactic, teacher-directed, or structured group activities that are largely directed by teachers' agendas (Hu et al., 2017; Stipek & Byler, 2004). Other studies found that teacher practices do not always match their beliefs (Chan, 2016; Wen et al., 2011). For example, studies demonstrated the incongruence between teachers' beliefs about child-initiated learning (Wen et al., 2011) and

play-based learning (Pyle & DeLuca, 2017) and their according practices. These studies suggested that factors that might have led to the discrepancy between beliefs and practices include the following: 1) teachers might have not internalized the espoused beliefs or do not have the associated skills to enact them, 2) teachers might not have relevant knowledge, and 3) there are external barriers such as different parent expectations or mandated responsibilities. Their interpretations are in line with Buehl and Beck's (2015) argument that some evidence of lack of congruence does not mean we should discount the power of beliefs; rather, it is necessary to understand the possible factors that may support or hinder this connection between beliefs and practice.

Teacher beliefs are deeply rooted in past and present experiences. Scholars identified experiences with personal life, with schooling and instruction, and with formal knowledge as sources for teachers' beliefs that affect their decisions about teaching and learning (Opfer & Pedder, 2011; Richardson, 1996; Tzuo et al., 2013). Another piece worth noting is the importance of understanding teachers' beliefs in their complex ecological contexts (Ashton, 2015). For example, classroom context, like parents' reactions to teachers' practices, may support or inhibit whether teachers act on their beliefs (Fives & Buehl, 2012). Brown and Lan (2015) found that education policies like NCLB changed teachers' pedagogical beliefs and beliefs on teacher responsibilities. Mansour (2008), recognizing teachers as people with a range of beliefs and experiences beyond school settings, has suggested culture and personal religious beliefs also play a pivotal role in shaping teachers' beliefs about teaching and learning. These studies suggest that different experiences and contexts contribute to the formation of enduring teacher beliefs and these beliefs should be surfaced during the teacher education program or PD to make a change in the deep structure of teachers' existing beliefs.

Grounded in their past experiences and the contexts that they are in, teacher beliefs are resistant to change (Hustedt et al., 2018; Kane et al., 2002) and tend to self-perpetuate (Wright et al., 2019). Pajares (1992) has shown that individuals sometimes hold on to beliefs grounded in incorrect or incomplete knowledge and are prone to "use whatever cognitive tricks are necessary" to turn conflicting evidence into support for existing beliefs, even after they are presented with scientifically proven evidence (p. 317). Similarly, in their study of teacher beliefs and knowledge, Buehl and Fives (2009) suggested that teachers do not regularly enact their practice based on warranted research knowledge; instead, teachers find justification for their practices from beliefs shaped throughout their own years of experience.

Implications for Teacher Education and Professional Development

Despite its stable nature, however, it is critical to prompt teachers to reflect, question, and, if desired, transform these existing beliefs. According to researchers, indeed, new knowledge leads to changes in beliefs and practices (Hamre et al., 2012; Heisner & Lederberg, 2011; Wright et al., 2019). Scholars have suggested that teacher education, both for pre-service and in-service teachers, can transform teachers' existing beliefs by supporting, refining, or challenging their prior beliefs (Mansour, 2008; Wright et al., 2019). In their study on homeless children, Wright and colleagues (2019), for example, found that encouraging preservice teachers to reflect on their existing beliefs and stereotypes--through in person observations of a child's life through various contexts—would challenge and change their misconceptions about homelessness. They suggested teachers also benefit from such opportunities by developing meaningful relationship with children, which in turn, greatly increases the likelihood of preventing/overcoming one's prejudice. in a comparative study, Heisner and Lederberg (2011) found that more so than others, preschool teachers who were enrolled in Child Development

Associate training courses significantly decreased the amount they endorsed beliefs and practices that contrast with DAP over time. Likewise, in a randomized study, Hamre, et al. (2012) found that teachers who participated in 14-week PD courses reported higher scores on beliefs about intentional teaching, and were observed to demonstrate more effective teacher-child interaction practices

PD is also an important context to understand the ways teacher beliefs and knowledge manifest in teacher practice and the teacher learning process (McChesney & Aldridge, 2019; Opfer, 2016). Scholars have suggested that teacher beliefs play an important role in how they take up knowledge introduced from PD. For example, Opfer and Pedder (2011) argued that teacher beliefs, along with its interplay with experience, determines what they themselves are willing to learn. De Vries et al. (2014) demonstrated the significant relationship between teachers' pedagogical beliefs and teachers' participation in PD. They specifically examined teachers' beliefs about a subject matter orientation and a student orientation; in a subject matter orientation belief, more traditional forms of teacher-centered approach to teaching are valued, with a focus on the knowledge transmission and learning of content. A student orientation belief, on the other hand, is based on constructivist theories, focusing on the individual students' active construction of knowledge through social interactions. De Vries et al. (2014) found that the higher teachers believed in student orientation, the higher the teacher's participation in the PD: they were more likely to update their knowledge through reading, reflect and reconsider the existing knowledge, beliefs, and practices, and exchange ideas and collaborate with other teachers.

Moreover, studies have been conducted to identify the key aspects of successful PD or barriers that hinder teacher learning (Desimone, 2009; Gersten et al., 2010; Kennedy, 2016;

Richardson, 2003). To address what works for changing teacher beliefs, Riojas-Cortez et al. (2013) conducted a study on early childhood teachers who participated in a 2-year-long PD. The teachers engaged in critical reflections and discussion that bridged DAP theory and practice. The results suggested that throughout the process of reflecting and sharing with other colleagues, teachers discovered incongruencies between their beliefs and practices and began to resolve these "ethical conflicts" (p. 43) and reconstruct their beliefs and practices.

Finally, scholars have suggested that it is important to understand teacher beliefs within an ecological context. For example, in a study that examined the effects of PD on teachers' beliefs and practice, Vu et al. (2015) found teachers' beliefs did not change much because all of them already claimed to endorse beliefs that support play-based learning before PD. To better interpret this finding, they suggest that rather than examining teacher beliefs by simplified models (e.g., the common two scales model to measure teacher beliefs for the whole sample), taking into account different context, history, and other markers of power and privilege could offer a better understanding of teachers' belief systems (Tonyan et al., 2013). This calls for conducting in-depth qualitative research to understand teachers' beliefs through listening to their ideas, observing their everyday practices, and examining their history and contexts.

Notions of Readiness

Evolution of Notions of Readiness in the U.S.

The concept of readiness was understood by educators for a long time, but the term "readiness" began to emerge in writings in the 1920s (May & Campbell, 1981). During this time period, of particular interest was readiness for reading, although readiness for arithmetic learning also gained interest shortly after (May & Campbell, 1981). A high rate of failing first graders

prompted discussion around how to support students in home and in kindergarten to help with reading. Advanced by developmentalists, readiness for learning was thought of as the level of development at which an individual acquired the capacity to undertake the specific learning (May & Campbell, 1981; Moss, 2013). According to an American developmentalist, Arnold Gesell, a child would be more successful in school if he or she started and were promoted on the basis of developmental age, the age at which the child is behaving as a whole—socially, emotionally, physically, and intellectually (May & Welch, 1986).

In the late 1950s, spurred by competition with the Soviet Union, concerns about low achievement of U.S. school children were on the rise (Dahlberg, 2013). There was also a growing number of children living in poverty. To address issues of children living in poverty and to close their educational gap, the Johnson administration declared the "War on Poverty," under which a new federally funded early childhood intervention program "Head Start" was initiated (Rose, 2010). Inspired by emerging research showing the long-term benefit of early education (e.g., Perry Preschool program), the initial primary mission of Head Start was to improve poor children's success in school by promoting physical, pre-academic, and socio-emotional skills (Rose, 2010; Williams, 1999). This particular agenda partly contributed to the re-creation of readiness discourse in the goal of early childhood education.

Even with greater focus on readiness skills, criticism of the U.S. public schools was on the rise again by the 1980s; this time, competition with Japan was the driving force (Rose, 2010). The K-12 school reform movement during the 1980s embraced early childhood education as an important way to improve the system. Reformers turned to research evidence that demonstrated high-quality early childhood programs were effective for Black children from low-income families in terms long-term gains (e.g., lower dropout rates, lower rate to be placed into special

education classes, lower retention rate, and later, higher employment rates than children who had not attended programs). Therefore, promoting "school readiness" became an important component in the school reform agenda (Rose, 2010).

The K-12 reform movement of the 1980s culminated in identifying six national goals for education in 1991, which aimed at increasing America's economic competitiveness by improving student outcomes. The first of the six National Education Goals in the USA states that "By the year 2000, all children in America will start school ready to learn" (National Education Goals Panel, 1991, p. vi). The focus of education across the country quickly turned to early childhood programs and the development of ways to promote readiness skills exhibited by children who were successful in school. However, identifying and measuring the progress towards meeting the readiness goal was challenging because of varying views of how to understand readiness (Ravitch & Vinovskis, 1995).

Different Notions of Readiness

How readiness is defined varies according to different "ideas about how children develop and what we can do to support that process" (Graue, 1998, p.13). Reviewing different notions of readiness is important because it affects many decisions about children (Dockett & Perry, 2002). Graue (1993) addressed four interpretations of the term "readiness" based on different theoretical perspectives.

Maturationist Notion of Readiness. A maturationist notion of readiness claims that children's proficiency in school is a result of a biological process of maturation that is inherent to each child. Their environment can do little to promote this process. This view can be best exemplified by such eminent psychologists as Gesell. Gesell (1925) observed and documented patterns that children developed and demonstrated that all children go through similar and

predictable sequences at their own pace, publishing The Gesell Developmental Schedule as a result. His schedule was designed to be a measure of the developmental status in young children of the four major fields of behaviors (motor characteristics, adaptive behavior, language, and personal-social behavior). In the maturationist view, instructional tasks were presented to children according to their developmental level. “Time for growth is the only mechanism for enhancing readiness” (Graue, 1993, p. 6); when the child is unready, some of the remedies include changing the level of the curriculum, delaying the introduction of activities (i.e., redshirting), or kindergarten retention so that children can repeat the program.

Environmentalist Notion of Readiness. In contrast to the maturationist notion, the environmentalist notion of readiness focuses on external evidence of learning. Specific skills or experiences in relation to the expectations of the schools (e.g., ability to count to 10 and say letters of the alphabet; behaving in a polite and socially expected manner) are considered as precursors of the ready child (Smith & Shepard, 1988). Therefore, schools and teachers become the ultimate responsibility for identifying the core skills-set necessary to prepare students for kindergarten (Dockett & Perry, 2002). Often, instruction derived from this viewpoint is behaviorist in nature. Teachers use teacher-directed methods and modeling with a large amount of practice on specific skills, usually in the form of worksheets (Hatch & Freeman, 1988). The major criticism of this view is that it focuses too much on a set of skills to be mastered without taking into account the developmental characteristics or needs of the child (Ackerman & Barnett, 2005).

Fundamental to this notion is the belief that readiness is an endpoint that teachers and children can strive to meet through teaching and that the barometers for readiness are stable and universal (Meisels, 1999). Also known as the “cultural transmission” (Kohlberg & Mayer, 1972),

the environmentalist perspective perceives the purpose of education as conformity to predetermined performance criteria. In this view, early childhood education is regarded as an intervention that can improve the performance of kindergarten children. When the child is unready, environmentalists attribute children's 'unreadiness' to lack of experience due to what has been considered 'at-risk' situations (Graue, 1993). Skills that students are lacking for school readiness are identified, and in turn, a prescription for instruction is provided to fill in these deficits and to match what is required by the school (Dockett & Perry, 2002).

Many scholarly efforts, particularly from the fields of psychology, human development, and economics, have been made to develop a model that effectively predicts kindergarten readiness (Goldstein et al., 2017; Soydan, 2017; Stormont et al., 2015) or to identify psychometric and academic properties that may be used as readiness screeners (Houri & Miller, 2020; Snow, 2006). Other strands of research describe or explain children's readiness status using these assessment tools (Edyburn et al., 2017; Greene & Sawilowsky, 2018). These studies are based on the environmentalist notion of readiness that assumes readiness is a status determined by whether children possess specific skills and knowledge and can be measured at one point in time.

Joint Notion of Maturation and Environment on Readiness. The third view conceived readiness as the product of maturation and experience. It is considered as "a function of balancing the physical developmental level and the past experience of the learner with the demands of a given task" (Graue, 1993, p. 8).

Constructivist Notion of Readiness: Towards a Reconceptualization of Readiness. The final interpretation of readiness, constructivist, understands readiness as a culturally and historically constructed concept (Graue, 1993). For example, in her study of the cultural meaning

making of readiness in three neighborhoods and schools in one city, Graue (1993) demonstrated how families, communities, and schools enact a sense of what "being ready" means differently for individuals and groups. Her study revealed how such factors as the students' socio-economic status and/or cultural context affected how one conceptualizes readiness. Constructivist perspective focuses both on children's development and the conditions of the social, cultural, and historical context in which children are taught. The readiness threshold that is represented by specified tasks, skills, or behaviors holds no importance in this perspective. Rather, it recognizes the "complex, multidimensional, and process oriented" nature of readiness and focuses on children's active construction of knowledge (Graue, 2006, p. 51). It suggests that successful schooling depends on "the emergence of a reciprocal relationship between school and child" (Meisels, 1999, p. 11).

Constructivists problematize the prevalent notion of readiness that fail to address its complex and dynamic nature and strive to reconceptualize it. For example, Moss (2013) challenges the dominant environmentalist narrative that contends "learning is hierarchical and that the primary function of early childhood education is to ready youngsters for the experience of schooling" (Kagan, 2013, p. 137). He further argues that this notion of readiness strongly contributed to the schoolification, a phenomenon of public school "taking over early childhood institutions in a colonising manner" (OECD, 2006, p. 62), suggesting its implied unequal relationship between early childhood education and public school (ibid.). Indeed, as Kagan (2013) stated, "'ECE-ification' of schools has not taken hold," under which public school would be "aligned with children's developmental trajectories and would honour and respect their rights as both learners and human beings" (p. 138-139).

Moreover, Bloch and Kim (2015) pointed out that the prevailing readiness notion, that is built on the logic of cultural assimilation of the school, is not a socially just approach. They advocated "readiness by schools and teachers" to appreciate the knowledge base of children, families, and communities. Similarly, Brown and Lan (2015) also found that current notions of readiness based on maturationist or environmentalist appear to strengthen the prototype based on a White, middle-class norm. Children are often perceived as "lacking," "deficient," or "at risk" of failure under the current dominant criteria of readiness, which potentially contributes to further disengaging and/or disempowering some children and their families as they progress through school. Thus, Bloch and Kim (2015) emphasize the need to incorporate the rich knowledge base children bring to school with them pedagogically and philosophically. They illustrated culturally relevant pedagogy as an effort to move toward a more equitable conceptualization of readiness.

Teachers' Notions of Readiness

Examining teacher conceptions of readiness is significant because how teachers conceptualize school readiness impacts the relationships they establish and the practices they engage in with their students (Palermo et al., 2007). Previous literature shows that teachers' views have shifted over time. For example, Bassok et al. (2016) demonstrated that kindergarten teachers' perceptions on pedagogical approaches have changed between 1998 and 2010 toward viewing academic skills as the foundation of readiness. Specifically, compared to their counterparts in 1998, kindergarten teachers in 2010 are far more likely to believe that academic instruction should begin prior to kindergarten entry and should significantly reduce time spent on art, make-believe play, sensory play, and science. They are also far less likely to include child-selected activities; are more likely to use teacher-directed instruction as well as worksheets; and

are far more likely to use standardized tests at least once a month and consider children's performance relative to standards as essential. Based on their findings, Bassok et al. (2016) stated that kindergarten classrooms are becoming increasingly similar to typical first-grade classrooms of the late 1990s both in structure and content. This change may be attributed to the emphasis on state standards and test-based accountability, leading early childhood educators to redefine readiness in terms of children's academic knowledge and skills—particularly skills schools assess to qualify for federal funding (Bassok et al., 2016; Bernstein et al., 2019; Kagan & Kauerz, 2007; Wesley & Buysse, 2003).

Similarly, in their review of studies on teachers' beliefs on readiness, Brown and Lan (2015) found that conceptions changed since the implementation of the No Child Left Behind (NCLB) Act. They demonstrated that teachers typically moved from a maturationist understanding of readiness towards an environmentalist one. Prior to NCLB, teachers perceived readiness as a "within-the-child phenomenon" (Meisels, 1999, p.50). They also had maturationist typology about the (un)ready child. After the implementation of NCLB, teachers increasingly positioned themselves and their programs as an intervention that prepared children for school. However, teachers did still somewhat think in maturationist ways. For example, teachers still hold maturationist typology of the ready students. Brown and Lan (2015) suggested that this may be the case because NCLB created new norms for what it means to be a PreK student, kindergartener, or first grader. In other words, such policies have led to the development of a standard or, using Graue's (2005) work, a prototypical image of what it means for kindergarteners in the U.S. to be ready for school. Such norms appear to put responsibility on the poor academic or social performance of a child or a teacher.

Furthermore, Brown and Lan (2015) found that teachers were concerned over the "endless shove down of academic performance expectations from elementary school stakeholders to kindergarten and PreK" (Brown & Lan, 2015, p. 7). Other scholars also addressed the academic push down[8] occurring earlier for young children and their teachers (Brown, 2010; Hatch, 2002). Hatch (2002), for example, called the rapid increase of standards for early childhood education settings as "accountability shovedown" and indicated that it "threatens the integrity of early childhood professionals and the quality of educational experiences for young children" (p. 462).

The changing culture of kindergarten has raised questions about how PreK fits into children's overall schooling paths, with states beginning to create learning standards for PreK-age children (Barnett et al., 2017). In line with this change, Hatcher et al. (2012) found that the primary focus of preschool-age classrooms (in two community-based sites and one Head Start site) has shifted from an experiential, play-based model to a narrower academic model in recent years (Hatcher et al., 2012). Although there are studies that suggest that preschool teachers may be more committed to continue providing children with play-based pedagogy in their classroom as they recognize the academic demands children will face in kindergarten (Hatcher et al., 2012), other studies suggest that preschool teachers feel pressured to teach more academics to children with the changing atmosphere and policies. For example, in his case study on the impact of standards-based reforms on a PreK program, Brown (2010) suggested the potential consequences for children who fail to meet the accelerated academic expectations (e.g., damaging a child's and family's confidence in children's competencies), which drive teachers to keep pace with the increased academic demands placed on PreK children.

[8] Push down refers to the phenomenon that young children are pushed to acquire academic skills and teachers are pushed to teach academic skills.

How PreK practices might be affected by the readiness discourse is still debatable. Some teachers may respond realistically to their knowledge of expectations and rigor. Others may become stronger advocates to maintain the inherent value of early childhood programs centered around play-based learning, particularly considering how the kindergarten movement in the earlier generation changed kindergarten practice to be more academic-focused (Bloch, 1987; Hatcher et al., 2012). Thus, investigating a PreK teacher's notions of readiness and their understanding of their role as a PreK teacher, through their words and practices, has important implications for supporting teachers in providing quality education to children.

Play-based pedagogy

The Evolution of Theoretical Perspectives on Play in Early Childhood Education

Throughout history, the pedagogical potential of play has been shaped by different theoretical understandings. Understanding how play has been interpreted throughout history can help practitioners, scholars, and policy makers better understand the nature of children's play and its use in early childhood programs.

For more than a century, play held a rather romanticized position within the field. Influenced by Rousseau (1712-1778), play was deemed as a natural form of children's healthy activity and development which is innocent and enjoyable and uncontaminated by the adult world (Brooker et al., 2014; Hedges, 2014). The role of education was to let children free play[9] and follow children's naturally healthy instincts without interference (Hedges, 2014). Later scholars began to develop alternative perspectives on play and its potential for learning, which

[9] Free play is frequently used to describe play that is child-initiated, child-directed, voluntary, and free-flowing and often involves make-believe play, although it can refer to other types of play as well (Fisher et el., 2013; Holt et al., 2015).

led to placing children's play firmly in the center of the early childhood curriculum. For example, Froebel (1782-1852) believed that play is an essential process for children's development (Froebel, 1887[10]). Influenced by Rousseau, Froebel honored free play in a naturalist sense, but he also valued the notion of supervised play using well-designed materials, particularly in educational institutions like his kindergartens (Weber, 1984).

In the 1920s, and later in the post-war era, Freud's psychoanalytic ideas based on children's instincts and emotional needs began to influence the curriculum. In Freudian theory, play was regarded as the best context for children's emotional development. Play, specifically make-believe play, served as a space where children communicated and relieved negative feelings caused by traumatic events or inner conflicts (Santer et al., 2007). By reenacting the past with symbolic objects, play invited children to find ways of disengaging from unresolved feelings and relieving them in favor of more manageable and positive feelings (Freud, 1938). The teacher's main role is to provide a safe environment where children can explore freely and make sense of their world on their own. One of the most important ways in which Freudian theory shaped ideas of play in the early childhood education field was the recognition of the educational value of free play, specifically make-believe[11], also known as pretend play, dramatic play, symbolic play, or imaginative play. Furthermore, the discussion around make-believe play became focused on socioemotional development.

From the 1960s until the early 1990s, Piagetian theory had a tremendous influence on early childhood education (Cannella, 1997). While Freud focused on the socioemotional value of play, Piaget studied play primarily from a cognitive viewpoint. Piaget (1962) believed that

[10] This book was originally published in Germany in 1826 and translated into English by W.N. Hailmann in 1887.
[11] Make-believe play is a loosely structured form of play that involves role play, object substitution and nonliteral behavior. In make-believe play, children largely take control of the narrative and content (Fein, 1981).

children construct their knowledge through active engagement with the environment and that play provides a rich context for it. Piaget's (1962) conceptualization of play is stage-based: (1) practice play (sensory-motor), (2) symbolic play (representational), and (3) games with rules (concrete operational). Each sequential stage has qualitatively different cognitive structures, which determine what can be learned during this period. Accordingly, different types of play are manifested in each stage. The Piagetian view regarded play as a process reflective of the level of cognitive development and learning, but contributing little to it (Johnsen & Christie, 1986). Because of this, symbolic play, for example, is understood as a function of an underdeveloped thinking process rather than a source of novel ideas with its own structures (Silin, 1986). Additionally, Piaget's idea of development based on a sequence of stages that was fixed and unchangeable suggested that the curriculum should reflect only what the children's current intellectual status tells about their intellectual capabilities. Thus, he did not believe teachers can teach young children to comprehend a concept (Bodrova & Leong, 2007). Such a view has been attributed to be the basis for a 'laissez-faire' free play curriculum, where children make the choices without adult guidance (Smith, 1993). Instead, the teacher role in play is limited to providing an adequate environment that promotes interactions and experiences with a wealth of materials. For Piaget, environment and materials form the base for children's active construction of thought and thus the teacher should facilitate opportunities for play in the rich environment (Cutter-Mackenzie et al., 2014; Weber, 1984).

The work of early childhood professionals continued to focus on Piagetian constructivism until the early 1990s. Dahlberg et al. (1999) argued that the image of "Piaget's child" that follows biological maturation through stages was preferred by the scientific and psychological disciplines. Consistent with the domination of early childhood by psychological perspectives, the

National Association for the Education of Young Children (NAEYC) published a document entitled Developmentally Appropriate Practice (DAP) guidelines for early childhood education in 1987 (Bredekamp, 1987). Initially, DAP was mainly grounded in Piagetian influence (Canella, 1997; Edwards, 2003), although it was modified later to speak of Vygotskian perspectives as well (Edwards, 2003). Its intention was to respond to pressures on the early childhood curriculum to be overly academic and to provide a theoretical and empirical base for protecting children's opportunity to learn and develop through play-based experiences (Cutter-Mackenzie et al., 2014). Furthermore, one other purpose of DAP was to provide a certain professional cohesiveness under a set of guiding principles. However, some criticized that the very nature of the DAP was constructing professionalism which has further constructed concepts of normality and dislocated educational problems from socio-cultural-historical contexts or political structures (Canella, 1997). Thus, DAP guidelines were modified in 1997 and again in 2009 to include greater focus on the role of social and cultural interactions on children's learning, play and development, influenced by Vygotskian theories (Edwards, 2003). Ever since, a range of contemporary perspectives on early learning, development, and play support early childhood education, including postmodernism, post-structural, socio-cultural, and sociology of childhood viewpoints (Nolan & Kilderry, 2010), which collectively are understood as being 'postdevelopmental' (Blaise, 2009). Among the most significant of the post-developmental perspectives has been the work of the Russian psychologist Lev Vygotsky.

Like Piaget, Vygotsky believed that children take an active part in constructing their own knowledge. What makes his theory distinct from Piaget's in this aspect is that for Vygotsky, cognitive construction is always socially mediated. For Vygotsky, both physical manipulation and social interaction are necessary for learning. In fact, he placed the support of others as

central to developing children's understanding. Furthermore, he believed that the social context in several layers mold not only the content of knowledge but also the very nature of the mental process (Bodrova & Leong, 2007). In Vygotskian theory, the purpose of learning and teaching is more than acquiring and transmitting a body of knowledge. Rather, it involves the acquisition of tools. We teach to arm children with tools, and children appropriate these tools to master their own behavior and perform a higher level of cognitive operations. Vygotsky, who primarily spoke to make-believe play, believed that play served as a tool of the mind, enabling children to master their own behavior (Vygotsky, 1977). In Vygotsky's theory (1978), the basic criterion of play is the imaginary situation, but play also involves implicit rules. Unlike Piaget, who viewed rule governing play as something that comes in a later phase of the development, Vygotsky demonstrated that every type of play contains an imaginary situation and rules in a concealed form. For instance, a child who plays a truck driver will not produce totally spontaneous behavior. Instead, a truck driver is a role that organizes a pattern of behavior and language use that the child needs to act out. Vygotsky outlined the evolution of play as the development from games with an overt imaginary situation and covert rules to games with overt rules and a covert imaginary situation (Vygotsky, 1978). Unlike Freud, Vygotsky did not believe that play arises as a result of unsatisfied desires. On the contrary, he believed children create play for a purpose, which is "really the realization in play form of tendencies that cannot be immediately gratified" (Vygotsky, 1978, p. 94). He regarded play as an activity that liberates children from their immediate situational constraints (Santer et al., 2007). In this way, his idea on play contributed to the field by showing the importance of understanding children's motivations in play and the circumstances of children's activity (Vygotsky, 1978).

Essentially Vygotsky viewed play, specifically make-believe, as a major source of development and thus a leading activity. According to Vygotsky, play influences development by establishing a zone of proximal development for the child. The zone of proximal development (ZPD), one of the most important concepts in Vygotsky's theory, is a way of conceptualizing the relationship between learning and development. Defined as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86), the 'zone' of proximal development suggests development is not as a point on a linear progression, but a continuum of behavior (Bodrova & Leong, 2007). Development takes place on two levels forming the boundaries of the ZPD. The lower level is the child's independent performance, what the child knows and can do alone. The higher level is the maximum performance the child can reach with assistance. Between maximally assisted performance and independent performance lie varying degrees of partially assisted performances. The skills and performance represented in the ZPD are dynamic and constantly changing. What a child currently can do only with some assistance is what the child will do independently tomorrow, and this cycle will be repeated as the child moves forward to attain a higher level of mental tools, skills or behavior. In other words, development involves a sequence of constantly shifting zones. By focusing on the internal course of development, Vygotsky's ZPD shed light on the "buds" of development rather than the "fruits" of development, which had been the traditional focus of developmental psychology (Vygotsky, 1978).

Vygotsky (1978) recognized that the ZPD in play is unique because it involves the creation of imaginary situations. As play creates a rich context that involves various roles, rules,

scenarios, and motivational support, all these elements provide the assistance necessary for the child to perform at a higher level of his or her ZPD. Moreover, Vygotsky argued that by engaging in make-believe, children begin to separate the idea of the object from the actual object itself (Vygotsky, 1978), which is preparation for the development of abstract ideas and thinking (Berk, 1994).

The notion of the ZPD challenged the efficacy of a free-play curriculum and opened up more space for the teacher to engage actively in children's play and be part of the learning process. Specifically, because it requires teachers to understand not only the child's level of independent performance but also how much he or she is moving forward, teachers should constantly and authentically assess a child's development. Throughout this process, teachers have the crucial role of noticing where children are and their current level of understanding, and then facilitating children's development. It would also be important to take the learner's perspective in order to facilitate learning in a way that would work for them. Bodrova and Leong (2007) suggested that teachers rephrase a question, pose it differently, or encourage a child to show what she knows.

Play-Based Pedagogy and Teacher Roles

Early childhood education as a field has long relied on ideology based on play and child-centeredness to guide their teaching practices (Hedges & Cooper, 2018). Yet, the idea of child-centeredness (children direct their own learning) may limit teachers' role in children's learning in and out of the play context (Peterson et al., 2015). Moreover, given the current climate emphasizing accountability in education, teachers may face dilemmas over juggling between supporting children's play to promote their emerging ideas and explicit teaching (Wood, 2013).

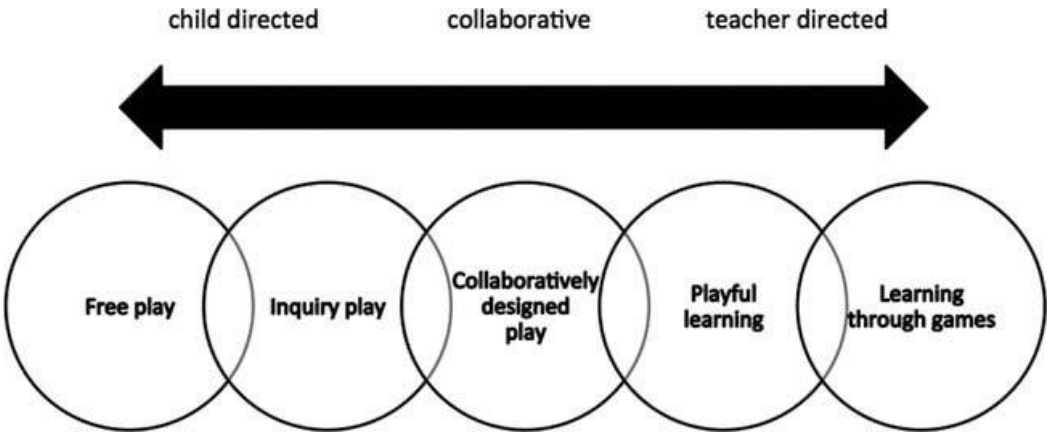
Approaches to early childhood education could often be located at either end of a continuum. At one end, there is free play, where children are able to direct their own narratives as individuals or with peers without teacher input. At the other end is more formal teacher-led didactic teaching, or structured routine group times designed to teach academic contents (Hedges & Cooper, 2018). Tensions arise when these two ends are taken as a false dichotomy between play and learning (Peterson et al., 2015; Pyle & Danniels, 2017). In this dichotomous view, teachers face difficulties in engaging in children's play without "hijacking" it (Goouch, 2008, p. 95; Peterson et al., 2015).

Recently, however, scholars have made efforts to locate the "mediational space" on this continuum, where teachers can guide and mediate learning objectives while still honoring child-directed elements (Hedges & Cooper, 2018, p.370; Weisberg, Hirsh-Pasek, et al., 2013). This approach, also known as play-based pedagogy, allows children to have a large degree of control over their activities, as would free play, but also has learning goals and teachers' roles, as would direct instruction (Fisher et al., 2013).

One of the scholarly efforts addresses the issue of conceptualizing play in play-based pedagogy. For example, in a study examining the use of play-based pedagogy in public kindergarten classrooms, Pyle and Danniels (2017) problematized the narrow understanding of play as child-directed practices only. They identified five different types of play that teachers engaged in, situated along a continuum from child-directed to more teacher-directed (see Figure 1 below).

Figure 1

Continuum of play-based pedagogy (Pyle & Danniels, 2017, p.282)



In free play, children initiated and directed their own play narratives and determined which materials and resources to be used. There was little to no teacher involvement in the structure of the play. In inquiry play, the locus of control still remained largely within the child, but teachers extended the play by integrating the related academic standards. In collaborative play, there is a shared locus of control. Teachers and children collaboratively design the context of the play, including both the theme and resources necessary. Children then direct the play within the created environment and teachers integrate academic skills learning within the play context. In playful learning, a more structured approach was employed to support the learning of targeted academic skills in a playful manner. Teachers played a vital role in creating the structure of play, although children influenced coming up with the narratives. Within the context of play, teachers prepared the prescribed activities that provided practice with math and literacy concepts. Finally, learning through games is the most prescriptive type of play-based pedagogy. By using learning-embedded games, teachers direct the outcomes and prescribe the process as children follow the game rules by using learning-embedded games. Pyle and Danniels's (2017) understanding of play-based pedagogy as a continuum provides a broader and more concrete definition of play-

based pedagogy and thus, their conceptions will be used to understand the case of this dissertation.

Moreover, new conceptualizing in teaching in play-based pedagogy was offered as a way to delicately blend play, learning, and teaching (Hedges & Cooper, 2018). For example, Hedges and Cooper (2018) demonstrated how teachers used their content and pedagogical knowledge to thoughtfully engage conceptual ideas with children in ways relevant and authentic to each child and learning situation. Drawing from Vygotsky's notions of the ZPD, they theorized a mediational space where teachers provide careful guidance for children on their own theorizing and where children enjoy engagement with everyday and scientific concepts. Hedges and Cooper (2018) argued fundamental to this mediational space is a relational pedagogy (Papatheodorou, 2009) which emphasizes reciprocal relationships and interactions with children and families. They further argued that within this relational play-based pedagogy, the phenomenon of 'schoolification' might be avoided.

Finally, evidence shows that play-based pedagogy has a positive impact on both children's academic skills achievement (Chien et al., 2010; Han et al., 2010; Marcon, 2002; Trawick-Smith et al., 2015) and socioemotional development (Berk & Meyers, 2013; Elias and Berk, 2002; Kroll, 2017). For example, in a study examining the effects on math learning of teacher's scaffolding during children's play, Trawick-Smith et al. (2015) found that both types of teacher interactions-those stay close to children's current play narratives to provide just the support they need and those that prompt children's mathematical thinking and communicating enhanced early math performance. Moreover, Ogan and Berk (2009) found that play leads to socioemotional development when mediated by teacher roles (Ogan & Berk, 2009). Even a review (e.g., Lillard et al., 2013) that pointed out the unrigorous methodological approaches

many of these studies take suggested that one of the strong hypothesized causal agents between children's play and socioemotional development is adult interaction. Thus, it appears that play-based pedagogy with teachers' guidance is effective in supporting children's learning and development.

Mathematics in Early Childhood Education

Importance of Mathematics Engagement in Early Years

For the last three decades, researchers have accumulated a wealth of evidence showing that young children develop important forms of mathematical competence (Baroody et al., 2006; Clements & Sarama, 2007; Ginsburg, 2006; Hachey, 2013), which has implications for actively instructing young children in mathematics. Increasing evidence demonstrates that children's early knowledge of mathematics has a significant impact on later learning. For instance, in a meta-analysis study of six longitudinal data sets, Duncan et al. (2007) found that children's mathematical abilities upon entry to kindergarten were a stronger predictor for future educational success than any other predictor, including oral language and verbal abilities, reading skills, attention skills, social skills, or internalizing and externalizing problems. According to this research, reading skills predict only future reading abilities, but mathematics performance predicts not only future mathematics achievement but overall school achievement.

Yet, even before the start of formal schooling, there is evidence that demonstrates inequities between marginalized children and White, middle class children in terms of the mathematical experiences provided and subsequent mathematics achievement (Jordan et al., 2006; Sophian, 2012; Starkey et al., 2004). For instance, Levine et al. (2010) found socioeconomic differences in the amount and type of math discourse that parents employ with

their children. Studies demonstrate that the quality of early child care could be a significant moderator of socioeconomic differences in children's mathematical achievement in future education (Dearing et al., 2009). Thus, providing high-quality mathematics education in early childhood education settings is important.

Different Pedagogical Approaches for Early Mathematics Education

With increased recognition about the importance of early mathematics, educators have strived to decide on the best approaches to support children's mathematics competencies in early childhood programs. On the one hand, there is an adult-led explicit instruction, whereby discrete mathematics concepts are broken down into smaller skills that are designed to be worked through in a given order (Doabler & Fien, 2013). Advocates of direct instruction support it for its effectiveness in enhancing underachieved students' early mathematics performance, which implies deficit-oriented toward students whose mathematical knowledge is not recognized by standardized tests (Doabler & Fein, 2013). More studies suggest that while direct instruction may seem to lead to learning target information, its costs may outweigh the benefits. For example, direct instruction may limit children's self-exploration and discovery when introduced to novel context (Bonawitz et al., 2011). In addition, evidence suggests that children attending programs with direct instruction show more stress behaviors (Hart et al., 1998).

On the other hand, there is a play-based approach whereby mathematical competences are applied to everyday situations and children's play becomes a significant mathematics learning context (Copple & Bredekamp, 2009; Parks & Wager, 2015; Van Oers, 2010). Advocates of a play-based approach argue that play provides valuable opportunities to explore and to undertake activities that can be surprisingly sophisticated from a mathematical point of

view (Ginsburg, 2006), including make-believe play (van Oers, 2010) and board and card games (Vogt et al., 2018).

Scholars have compared these two pedagogies in regard to mathematics learning. To address the issue that a play-based approach can be perceived differently in terms of teacher involvement, numerous studies have included unassisted free play, play-based pedagogy with teacher's assistance, and direct instruction in their comparison. For example, Fisher et al. (2013) conducted an experimental study to determine the impact of pedagogy on children's geometric knowledge. Their findings demonstrated that children's acquisition of geometric knowledge was impacted by instruction, as children who were taught through play-based pedagogy with teacher's assistance performed significantly better than children in both the unassisted free play and direct instruction conditions. This finding supports an earlier study by Alfieri et al. (2011) who conducted meta-analyses that analyzed unassisted discovery learning (similar to free play), assisted discovery learning (similar to play-based pedagogy with teacher's assistance), and direct instruction. They analyzed studies that examined various age groups from young children to adults. In terms of the mathematics domain, they concluded that direct instruction benefitted mathematics learning more than unassisted free play, but play-based pedagogy with teacher's scaffolding led to greater student learning than both unassisted free play and direct instruction.

The finding that shows unassisted free play contributes least to learning certainly does not mean that there is no value of providing free play time to children. On the contrary, in a literature review on teacher roles in scaffolding mathematical learning in preschool, Anthony and Walshaw (2009) found that the most effective practice for young children to learn mathematics is providing balanced teaching context between "teacher-initiated group work and freely chosen, yet potentially instructive, play activities" (p. 117). Parks (2015) also suggested children's free

play, even though it alone may not be sufficient for mathematics learning, and provides ample metaphors to make explicit mathematics connections later on. The literature demonstrates how a play-based approach, particularly with teacher's assistance, matters for young children's mathematical learning (Alfieri et al., 2011; Anthony & Walshaw, 2009; Fisher et al. 2013; Parks, 2015).

Teacher Roles in Engaging Mathematics With Young Children in Play-Based Classrooms

Scholars recommend providing play-based learning experiences for best practices for young children (Copple & Bredekamp, 2009; Parks & Wager, 2015). Parks (2015) demonstrated that children's play not only provides an important context for developing mathematical ways of thinking and knowledge but also serves as "a rich repertoire of connections" that children will draw on during formal lessons later on (p. 39).

As reviewed in the previous section, however, free play alone without adult involvement is shown to be insufficient to foster mathematics learning in many children. Scholars claim that although children's natural mathematical learning is impressive, it is limited (Ginsburg et al., 2008). To develop comprehensive and abstract thinking about mathematics most effectively, children need intentional teaching that supports learning mathematical concepts progressively and developmentally. This leads to the next question which is what, then, is the teacher's role to best assist children's mathematics learning in play-based classrooms?

Noticing Mathematical Content in Children's Play and Everyday Situations. The first step for quality early mathematics education would be recognizing mathematical content in children's play. The importance of recognizing mathematical ideas that children are engaging with in their activities has been addressed in previous literature. Some scholars described this recognizing act as "professional noticing" (Jacobs et al., 2010, p. 171; van Es & Sherin, 2008)

and others described it as “teachers’ sensitivity to mathematics in play-based situations” (Oppermann et al., 2016, p. 175).

Everyday mathematics is a useful concept proposed by Ginsburg (2006) that opens up the pathway for teachers to notice children’s mathematical thinking embedded in their play and daily activities (Presser et al., 2015). Distinct from formal school mathematics, everyday mathematics refers to a child’s informal mathematical ideas found in their lived experiences and environment in a variety of topics (e.g., space, shape, pattern, number, and operations) and features (e.g., interest, concrete and abstract thinking, and understanding and misconceptions) (Ginsburg et al., 2006; Ginsburg et al., 2008). Indeed, children engage in math-driven performances every day. Thus, naturalistic observation can reveal young children’s sophisticated exploration of measurement, shapes, comparing lengths, creating symmetries, and the like (Seo & Ginsburg, 2004).

Scholars have investigated ways to enhance noticing skills. Sherin and Han (2004), for example, in their study of teacher learning in the context of video-based PD (also known as video clubs), found that teachers improved their noticing by changing the focus of what they notice; that is, 1) changing the focus from their pedagogical strategies that they should have used to figuring out what did happen in terms of children’s thinking and 2) changing from mere reporting of the events to synthesizing and generalizing of children’s thinking. Jacobs et al. (2010) suggested the following to be indicators for growth in teachers’ professional noticing: 1) A shift from general strategy descriptions to descriptions that include mathematically important details; 2) A shift from general comments about teaching and learning to comments specifically addressing the children's understandings; 3) A shift from overgeneralizing children's understandings to carefully linking interpretations to specific details of the situation; 4) A shift

from considering children only as a group to considering individual children, both in terms of their understandings and what follow-up problems will extend those understandings; 5) A shift from reasoning about next steps in the abstract (e.g., considering what might come next in the curriculum) to reasoning that includes consideration of children's existing understandings and anticipation of their future strategies; and 6) A shift from providing suggestions for next problems that are general (e.g., practice problems or harder problems) to specific problems with careful attention to number selection (Jacobs et al., 2010, p. 196). Both studies emphasize focusing on interpreting individual children's mathematical thinking processes in detail rather than quickly shifting their focus on teaching strategies or general evaluation of mathematical errors.

Being Equipped with Content Knowledge and Pedagogical Content Knowledge.

Observing children's activities, including play with "mathematical eyes," can allow teachers to notice children's mathematical knowledge and thinking and enrich learning (Parks, 2015, p. 13). To be able to identify mathematics in daily activities, teachers need to be equipped with mathematical content knowledge (Oppermann et al., 2016; Parks, 2015). According to Shulman (1987), content knowledge (CK) is defined as the necessary subject matter knowledge base for teaching. Oppermann et al. (2016) found that teachers' mathematical CK predicted their ability to recognize mathematics during children's play. Parks (2015) provided detailed CK for each mathematical content area. Parks (2015) categorized content areas as following: early number sense, geometry, measurement, and mathematical reasoning. For early number sense, children must learn to count orally, recognize written number symbols, cardinality, and one-to-one correspondence. For geometry, identifying and describing shapes (both 2-D shapes and 3-D shapes), analyzing, comparing, creating, and composing/decomposing shapes, and reasoning

with shapes and their attributes are major content that children should master. For measurement, it is important for children to recognize and name measurable attributes, understand it is a distance to be measured with identical units, and understand any unit of the same size can be used. These concepts are important in understanding how to appropriately use formal measurement tools later on (Van de Walle et al., 2007). Finally, for mathematical reasoning, Parks (2015) focused on making sense of problems, being perseverant in solving them, and attending to precision. This idea that children need to learn how to communicate their reasoning and ideas are supported by other scholars as well (Lee & Ginsburg, 2009; Moseley, 2005).

However, mathematical CK alone does not guarantee high quality teaching (McCray & Chen, 2012). Along with mathematical CK, teachers' math-related pedagogical content knowledge (PCK) is considered particularly important for high quality mathematics education (Cross et al., 2009; Lee, 2010; McCray & Chen, 2012). Drawing on Shulman's (1986, 1987) framework for school teachers' professional knowledge, PCK refers to "a knowledge of subject matter for teaching which consists of an understanding of how to represent specific subject matter topics and issues appropriate to the diverse abilities and interest of learners" (Shulman & Grossman, 1988, p. 9, as cited in McCray & Chen, 2012). PCK is a combined three knowledge bases that are deemed necessary for effective education: 1) knowledge of content ideas (CK), 2) knowledge of appropriate teaching practice for illustrating those concepts, and 3) knowledge of the development of student understanding of the content. Taking into account that early mathematical learning often takes place in children's play, McCray (2008) suggested that early childhood teachers' ability to analyze children's play and notice mathematical content is an important aspect of their PCK. And McCray and Chen (2012) demonstrated that Head Start teachers' ability to recognize mathematics in children's play, as one aspect of their PCK, is

significantly related with process quality (measured by teachers' frequency of math-related language) and children's learning gains.

Scaffolding Through Math Talk and Posing Questions. After noticing mathematical content in children's play using their CK, teachers should scaffold and enrich children's mathematical learning using PCK. As Ginsburg et al. (2008) wrote, teachers should "help children to mathematize—to interpret their experiences in explicitly mathematical form and understand the relations between the two" (p. 7).

One of the important teacher roles to make everyday mathematics concrete and visible to children is engaging in math talk with them (Greenberg, 2012). For example, Klibanoff et al. (2006), in their research on the amount of math talk and children's mathematical knowledge, found that the amount of preschool teachers' math talk was significantly related to the growth of preschoolers' conventional mathematical knowledge over the school year. In terms of types of math talk, Kotsopoulos and Lee (2013) have found that three features are relevant: reinforcing learning (e.g., affirming knowledge that a child might demonstrate), checking for understanding, and advancing learning. Moreover, Cohrssen et al. (2014), using conversation analysis, have found that teachers' incorporation of intentional protracted pauses during math talk raises the quality of both math talk and mathematical interaction with children. It invites children to elaborate their thinking or actively participate in the conversation. Teachers who use intentional pauses also do so right after children's speculational, incorrect answers to reflect the children's thinking and consider how to rephrase the question. They concluded that using intentional pauses transformed the nature of math talk between teacher and children from a question-and-answer type to more participatory and equitable (Cohrssen et al., 2014).

Furthermore, Parks (2015) notes that teachers can support children during free play by asking questions, posing problems, and providing resources that encourage students to make their play more complex. In terms of questions, Parks (2015) suggests asking questions that do not take away opportunities from children to think mathematically for themselves, while motivating children to remain engaged in the problems. Moreover, drawing on curricula like High/Scope, Parks (2015) suggested using a planning time before play and a debriefing time afterward to guide children toward mathematical play. For example, planning time can be used to introduce new materials or activities that children could engage in. Or it could be as simple as putting up a picture of a block structure that may motivate children to build. The goal of planning time is "to engage children's interest in the mathematical materials and also to push children toward more complex play than they may have engaged in previously" (p. 29). Similarly, in debriefing time, children can discuss what they did during the play time, and in doing so, teachers can connect formal mathematical concepts and thinking to the play activities children engaged in that day (Seo, 2003). Parks (2015) also encouraged the use of digital devices to support these conversations. Additionally, Wager and Parks (2016) added supporting children's thinking by "improvisational" acting-in-the-moment (Graue et al., 2014) as one of the core roles of teachers to engage mathematics during play. Teachers need to have sensitive eyes that notice teaching moments and a high degree of PCK to be able to improvise and adeptly respond to children's learning (Sawyer, 2004, from Graue et al., 2014).

Finally, Parks (2015) suggested observing children's mathematical play in their living communities outside of school. She recommended visiting a community playground or other places that students might spend time in after school hours, because oftentimes, the real-life contexts that teachers or curricula attempt to make connections with in mathematical problems

are not familiar to children. Thus, the goal of the suggested community survey is to identify contexts that children can actually relate to so that connections made will be meaningful to them. Play survey or reaching out to families is another strategy to learn about children's play experiences outside of school that can be used as a metaphor for formal learning. Moreover, teachers can identify play contexts/materials that children may not be familiar with, but which are known to foster mathematical development. Conducting a community survey or play survey with mathematical eyes is greatly in line with FoK, because it is one of the attempts to value and learn from children's living experiences outside of school and an effort to incorporate what children do to school learning. Literature on FoK will be reviewed in the following section.

Funds of Knowledge

What is Funds of Knowledge?

This dissertation draws from a larger study of a PD program based on funds of knowledge (FoK), early mathematics, and developmentally appropriate practices. FoK is defined as "historically accumulated bodies of knowledge and skills essential for household functioning and well-being" (Moll et al., 1992, p.133). These skills cover everything from farming, household management, business, and trade (Moll et al., 1992) to cultural practices that households need to survive or thrive. The FoK approach pays special interest to cultural practices because they provide teachers with valuable sources of knowledge that they can draw on to scaffold student learning from what is familiar to students. These types of knowledge are seldom acknowledged by the formal curriculum (Moll, 1992). In terms of how the concept is applied in practice, it involves conducting ethnographic research, sometimes collaborating with researchers (Gonzalez et al., 2005). Teachers play a vital role in the process of data collection by conducting

home visits and undertaking ethnographic research because they already have relationships with students and families. Through interviews and observation, teachers learn about students' household knowledge, which will be used in classroom learning.

FoK was developed as an effort of social justice in making a curriculum that is more engaging for underrepresented marginalized children. Previously, deficit perspectives blamed the underachievement of ethnic marginalized students on perceived deficiencies relating to the marginalized students themselves, their families, and their cultures (Moll et al., 1992). This model sought to explain underachievement of less privileged children as due to their own inadequate qualities or practices such as inadequate home literacy practices, inadequate parental support, and so on. Studies suggest that deficit thinking perpetuates the educational gap and inequality by creating "culturally deprived schools" (Ryan, 1972, p. 61) and schools incapable of mitigating social injustice. As an effort to overcome deficit theorizing about less privileged children and to promote educational equity and social justice, the FoK concept and its research were developed. While gathering information about students' FoK by interviews and home visits, teachers develop deep and "multi-stranded" relationships with their students (Moll et al., 1992, p. 134) which in turn contribute to subverting deficit perspectives of underserved students (Poole, 2016). The FoK concept (Moll et al., 1992) not only further participates in disproving prevalent deficit theorizing, but also offers a new and effective practice for diverse students. Advocates of FoK claim that it is important to validate students' home and/or community knowledge and life values, and actively utilize them for student learning. As described thus far, it invites teachers to conduct and apply their research to learn about children's lives and backgrounds, and suggests the best way to do this is through focusing on children's households'

everyday practices and learning about "what people do and what they say about what they do" (Gonzalez, 2005, p. 40).

Benefits and Challenges of Incorporating Funds of Knowledge

Many research findings highlight the benefits of teachers learning about their students, accessing students' FoK to incorporate in their classroom learning and in research (Andrews & Yee, 2006; Patterson & Baldwin, 2001). Primarily, the FoK approach helped teachers to develop more asset-based perspectives on children's home practices which may be different from school practices. For instance, Reyes and colleagues (Reyes et al., 2016) found that preservice teachers who received teacher training based on the FoK approach more strongly appreciated children's developing their native language competencies. Those who possessed some knowledge of children's native language recognized the value of using it to support children's learning when needed (particularly preschool teachers) and to build additional connections with them (Reyes et al., 2016). Furthermore, studies revealed that utilizing FoK contributed to positioning students as having expert knowledge (McLaughlin & Barton, 2013).

Secondly, using FoK to design teaching strategies helped teachers to build authentic relationships with children and families. Teachers reported how they appreciated the opportunity to interact with the children and families in various non-school-related contexts. At the same time, studies indicate that collaborative and reciprocal partnerships between teachers and families support teachers in better understanding FoK held by families and communities (Hedges et al., 2016). Llopart and Guitart (2018) reported that according to teachers, families become more open and trusting, and participate more often in school activities.

Thirdly, FoK helped teachers to notice more information both about children and themselves and reflected it in teaching moments (Llopart & Guitart, 2018). Studies indicated that

teachers, after gaining more knowledge of the family context, became more aware of children's needs, behavior, and attitudes in class as students (Llopart & Guitart, 2018; Whyte & Karabon, 2016). Moreover, FoK encouraged teachers to understand their own FoK and reflect that in teaching.

However, it is also recognized that there are challenges or dilemmas when teachers seek to utilize FoK for school practices. There are undoubtedly instances when teachers do not find value in learning about childrens' FoK, or in utilizing it as a foundation for teaching because they hold deficit perspectives. As Graue et al. (2015) suggest, teachers' personal cultural resources and experiences shape how they take up the FoK framework. Teachers' own FoK is always present when making pedagogical choices and when learning new practices (Andrews et al., 2005; Hammersley, 2005; Hedges, 2012).

Sometimes, even when teachers are eager to incorporate FoK, they meet challenges. Firstly, integrating FoK into teaching practice is often very difficult, especially because the FoK approach requires teachers to take on a researcher's role when conducting home visits to learn from and about children's home practices and lives outside of schools (Moll et al., 1992; Whyte & Karabon, 2016). According to Whyte and Karabon (2016), taking on a learner's role can be difficult because the traditional role associated with teaching is not easily removed. The power issue between teachers and families plays a role in this as well. Teachers are disposed to have more power than families (Whyte & Karabon, 2016). Thus, there is a certain challenge that is to some degree inherent in the nature of teachers' home visits.

Secondly, it is challenging for teachers to try to incorporate children's FoK when children live in the realities that involve violence or crime, which Zipin (2009) described as 'dark' FoK. In this case, teachers and researchers tend to choose to avoid those types of learning

notwithstanding their recognition of those realities of children's lives. Teachers' justifications for making a pedagogical choice to avoid dark FoK include nuanced deficit perspective that FoK of the students are so bad that schools should be a "safety zone" for them where they can disengage from their lifeworld (Zipin, 2009, p. 322). Zipin (2009) made a valid point that even negative sides of lifeworlds can constitute positive learning assets as well.

Along similar lines, teachers face challenges and dilemmas when they learn a student's FoK has different values from what they want to promote. For instance, Hedges (2015) provided a case of a student who displayed values of gender inequality. Hedges (2015), while confirming the importance of learning and respecting children's FoK, emphasized that children's cultural knowledge should not be accepted uncritically. When facing tension between cultural practices of children's families or communities and wider societal goals, it is essential for teachers to be mindful of "what individual families practice and believe, which cultural principles and activities might be acknowledged, which might be questioned (and on what grounds) and wider societal goals for children and society as societies transform" (Hedges, 2015, p. 92).

Thirdly, teachers who attempt to incorporate children's FoK in their practice tend to focus only on knowledge contents such as artifacts, skills, and knowledge and not as much on interactive ways of knowing and transacting those knowledges. Zipin (2009) named the latter as 'funds of pedagogy.' Prior to Zipin (2009), Velez-Ibanez and Greenberg (2005) also acknowledged and argued for the significance of process modes of the pedagogic transaction of knowledge within the lifeworlds of children from underrepresented communities along with content modalities. Velez-Ibanez and Greenberg (2005) observed that Mexican American children experience a cultural clash between two lifeworlds (community and school lifeworlds). Specifically, Mexican American children are expected to actively organize their own learning in

their cultural worlds. To do this, they are expected to ask questions during the performance of household tasks. Then, based on the answers they received, they may practice the learned behavior through play situations. These process modes of the pedagogic transaction of knowledge in their community lifeworlds are quite different from public schools in which individualized, competitive, and rote pedagogical approaches to learning are emphasized. Zipin (2009) argues that ways of knowing and transacting knowledge, or funds of pedagogy, are valuable learning resources to be used in redesigning school curricula. Zipin even stated that funds of pedagogy may be more powerful than FoK as knowledge contents because ways of knowing and modes of learning interaction are embodied in people and become subconscious dispositions.

Finally, some scholars raised certain limitations in the FoK approach in terms of families being the primary or exclusive sources when documenting a child's FoK (Esteban-Guitart & Moll, 2014a; Rios-Aguilar et al., 2011) and interviews being the single methodological approach with which teachers depend on (Esteban-Guitart & Moll, 2014a, 2014b). Esteban-Guitart and Moll (2014a) further argued that the FoK approach mostly uses adult household practices as a unit of analysis. But children create their own FoK, which may be independent from the adult's social life (Esteban-Guitart & Moll, 2014b). Moreover, different kinds of FoK emerge in response to people's social or living conditions (Moll et al., 2013). Nowadays, for example, there are new social networks and new FoK that are derived from the use of digital media by children, so there are other contexts of life and activity that are a big part of children's lived experiences. Esteban-Guitart and Moll (2014a, 2014b) proposed the concept "funds of identity" to overcome these limitations. Defined as "historically accumulated, culturally developed, and socially distributed resources that are essential for people's self-definition, self-expression, and self-

understanding" (Esteban-Guitart & Moll, 2014a, p. 37), funds of identity uses different visual strategies or techniques such as self-portrait created by children (Esteban-Guitart, 2014b). By incorporating visual methods created by the children in addition to the information gathered by teachers, teachers can enhance the use of the FoK approach.

Conclusion

Teachers bring their beliefs about teaching with them to the classroom and use them in pedagogical decision making. Grounded in teacher's personal and cultural experiences, schooling and instruction experiences, and experiences with formal knowledge, teacher beliefs are an informative source in determining how they take up and apply PD content in their classrooms (Opfer & Pedder, 2011; De Vries, Van de Grift, & Jansen, 2014). In PreK classrooms, beliefs about readiness are particularly pertinent in understanding teacher's practices and learning, because one of the primary goals of PreK programs is kindergarten readiness for children. Scholars have identified different notions of readiness (maturationist, environmentalist, joint notion of maturationist and environmentalist, and constructivist-interactionist notions of readiness) that help to understand teachers' conceptions of readiness (Graue, 1993; Meisels, 1999). Teachers interpret readiness based on their personal and professional experiences, which are also shaped by the discourses available and prevalent in the context that they are in. In this society where accountability is taking over school culture, it is likely that teacher beliefs on readiness are somehow responding to their perceived expectations.

The context for this dissertation is a PD for PreK teachers (PreKPD) which focused on developmentally and culturally responsive mathematics education. The PreKPD offers a great context for examining a case teacher's notions of readiness and how those notions are enacted into practice, because it addresses the contents that include approaches (i.e., a play-based

approach and FoK) that may be considered as counter-narrative to the accountability model. Thus, by examining a teacher's notions of readiness and how they are enacted in the classroom when incorporating play-based pedagogy and FoK to teach mathematics, I hope to gain implications for how to better support PreK teachers in providing more equitable and developmentally appropriate mathematics education to children.

Chapter 3: Methodology

Context of the Study: PreK Professional Development

The data for this study were collected as part of a larger project funded by the National Science Foundation. The PreK professional development program (PreKPD), the larger project that this dissertation is drawn from, was developed to support kindergarten-certified teachers in the new PreK program in the Snowcity School District. It was designed by local university faculty members to promote culturally and developmentally responsive mathematics practices with PreK children. There were three cohorts of teachers who voluntarily participated in the PreKPD. Each cohort of teachers enrolled in four 3-credit graduate level courses through the local university that took place over a two-year period. Participants met weekly for 2.5 hours in the evening.

The content of the courses centered around early childhood pedagogical practices, early mathematics-numbers and counting, and FoK (Moll et al., 1992). The overall goal for PreKPD was stated as "using pre-K mathematics as a prism for understanding four-year-old learning and development, we will create a model for PreK programming in both school & community contexts. We will blend attention to best practices in early childhood education, culturally responsive design and children's number sense" (stated in all four syllabi). The aims of each course were presented as follows:

> First course: examines the theories of development that shape appropriate practice for four-year-olds and the role of PreK in the system of early education. The course also introduces FoK that frames a foundation that builds on the resources that all children bring to school.

Second course: conceptualizes multiple environmental contexts in which children learn that inform each other. The course helps teachers reflect their roles as a teacher, use understanding of environments to design and evaluate, and recognize the resources available for learning within children's homes and communities and use them to enrich the interactive learning.

Third course: explicitly focuses on culturally relevant and developmentally responsive pedagogy for early mathematics. This course examines how to provide young children with opportunities to learn mathematics that are academically rich, connected to culture, and support a social justice agenda.

Fourth course: is designed to support each teacher with conducting a FoK-based action research project "to build a community's capacity to solve self-identified problems and to promote health and social justice" (Hughes, 2003, p. 41). Teachers are scaffolded as they design the research project, gather and analyze data, find supporting literature, and compile your work into a final written product (from each course syllabus).

The participants engaged in a variety of activities and worked with a focal child to apply what they learned in the program in real-life teaching practices.

Researcher's Positionality

In qualitative research, it is important to acknowledge and disclose researchers' selves in their research, seeking to understand their role in informing how and why they research (Holmes, 2020). In this section, I will articulate my role in the larger project, personal background, and epistemological stance, and explain how they may have influenced this research.

Researcher's Role in the Larger Project

This study is about one PreKPD participating teacher from the second cohort. The second cohort began the PreKPD in fall 2011, which coincided with the launch of the PreK program in the district. I joined this larger project on PreKPD as a research team member in spring 2012 and worked with the second cohort. My role in this project was to collect data, assist with administrative matters of the PD courses, participate in a research meeting for planning and reflecting on PD, coded portions of data, and analyzing data to conduct research derived from this project. As a member of the research team, I understand the nature of the data as well as the nature of the PreKPD.

However, I did not gather Marley's data. I saw her in the PD, but I did not have any meaningful relationship with Marley. Moreover, I started working on this dissertation research after Marley completed the PD. Therefore, my positionality did not play a role in shaping the nature of the data, but it did influence how I came to know the case and analyzed. First of all, secondary analysis of the existing data limited the extent to which I could humanize Marley. Because I did not have a relationship with Marley, I had limited knowledge about Marley's ways of knowing and could not respond to them with reciprocity. I was not being able to return to Marley for member checking or conduct further interviews to clarify or validate my findings. On the related matter, Marley did not have a chance to respond to my ways of knowing her with reciprocity. Thus, my representation of Marley may have been objectified more than it needs to be.

Personal Background

Researcher positionality has been addressed in terms of being an insider or an outsider to the case being studied (Weiner-Levy & Queder, 2012). There is also an argument that there

may be no clear boundaries between the two positions (Herod, 1999); the positions can be seen as a continuum with multiple dimensions (Mercer, 2007). As Holmes (2020) argued, a researcher may hold multiple positions simultaneously along that continuum.

As a researcher, I also inhabit multiple positions, which can be either similar to or different from Marley's. Specifically, I am a Korean woman who was born and raised in Korea. I received most of my education in Korea from preschool to graduate school, with two exceptions, including when I went to public middle school in Belmont, MA for a year when I was young. I have two teaching licenses (preschool and secondary education) from Korea, and my teaching experiences were based in Korea and Hong Kong. Given these differences of schooling and teaching experiences, I might have different perspectives from Marley on realities in the U.S.

As a former preschool teacher, I shared a professional familiarity with Marley's trajectories, ideas, and practices. For example, I could relate to the pedagogical tensions between early childhood education and K-12 schools. Moreover, I could easily resonate with her struggles to balance between a play-based approach and content learning. Yet, since my preschool teaching experiences are based in Korea, differences between us emerged as well. For example, the early childhood education and care systems are different in Korea from the U.S. It has developed in two different systems (Kindergarten and childcare) based on different historical backgrounds with different purposes, although Korea has moved to integrate these two systems recently (Park et al., 2017).

My professional involvement in the US context, however, has provided me insight into micro and macro aspects of topics of this dissertation. For example, I taught one undergraduate course about topics in early childhood education that includes US history of early childhood education, play-based pedagogy, and culturally responsive practices. I also worked with

practicum teachers as a supervisor. These experiences have contributed to my understanding of Marley's case with theoretical sensitivity.

Epistemological and Methodological Alignment

I am guided by a social constructionist epistemology in the course of this dissertation. As a subcategory of constructionist viewpoint, social constructionism views "all knowledge [...] is contingent upon human practices, being constructed in and out of interactions between human beings and their world, and developed and transmitted within an essentially social context" (Crotty, 1998, p. 42). People make sense of the reality that they engage with, and "there is no true or valid interpretation" (Crotty, 1998, p. 47). Additionally, as much as constructionism is well removed from objectivism, it also rejects mere subjectivism. Thus, researchers should pay close attention to the objects of research, while approaching it in a radical reinterpretation for unconventional or richer meaning (Crotty, 1998).

Furthermore, social constructionism recognizes the role of culture in shaping our minds. 'Culture' in this sense is the source rather than the outcome of human thought and action, and in this view of the role of culture, human thought and behavior is fundamentally both "social and public" (Crotty, 1998, p. 53). According to Fish (1990), cultural institutions are the source of the interpretative strategies whereby we construct meaning. Institutions "precedes us, and it is only by inhabiting them, or being inhabited by them, that we have access to the public and conventional senses they make" (p. 274). Added to this, Crotty social constructionists recognize that culture is "limiting as well as liberating and warn that while welcome, it must also be called into question" (p. 58). Thus, social constructionist researchers should acknowledge the social origin of our ways of understanding the world and strive to reinterpret beyond the restrictive aspects of our cultural inheritance.

From a social constructionist epistemology, I align this work, methodologically, with qualitative case study with various data sources. Case study is the study that looks for the detail of the phenomenon under study within its social and cultural contexts (Yin, 2014). I strive to understand Marley by closely paying attention to her sense-making processes from multiple sources of data. I also recognize that Marley's interpretation of the world is shaped by both the current context as well as past experiences shaped by culture (Crotty, 1998; Merriam, 2002). The goal is to attempt to understand experiences from Marley's perspective that are grounded in her social and cultural background, while also being mindful of my own process of interpreting these perspectives (Crotty, 1998).

Research Design: A Case Study

Stake (1995) described a case study as a strategy of inquiry that focuses on the particularities of the case, seeking to understand the many details of a case. Scholars have different definitions of case study (Merriam, 1998; Stake, 1995; Wolcott, 1992; Yin, 2014), but many qualitative scholars have concluded that the most defining characteristic of case study research lies in delimiting the unit of study, the case (Marriam, 1998; Stake, 1995). A case is a bounded (Smith, 1978) and integrated system with working parts (Stake, 1995). Stake (1995) believes that cases should be conceived of as specific objects, making people and programs rather than processes or events ideal for cases. Miles and Huberman (1994) think of the case as "a phenomenon of some sort occurring in a bounded context" (p. 25). In this study, I am studying Marley's notions of readiness and how they are related with her play-based pedagogy and with her use of FoK when teaching mathematics. The case is bounded by an individual—a single PreK teacher named Marley.

The purpose of this study is to understand Marley's conceptions on readiness and practices regarding FoK, play-based pedagogy, and mathematics teaching. A qualitative case study examines the case in real-life situations and it is highly contextual (Stake, 2000). This characteristic, with its emphasis on understanding and describing ideas and actions as they occur within a natural context, supports the purpose of this study. It offers a means of rich, contextualized descriptions of Marley's notions of readiness and the ways it shapes her new role as a PreK teacher.

This study is an instrumental case study. An instrumental case study is used when researchers want to gain insight into certain concerns or issues, rather than into the case itself. In an instrumental case study, the case is of secondary interest and "is examined mainly to provide insight into an issue or to redraw a generalization" (p. 437). Although producing "grand generalizations" (Stake, 2000, p. 437) about all PreK teachers with findings from Marley's case is not the primary intention, I am hoping to "expand and generalize theories" (Yin, 2014, p.21). Marley is a case of a teacher with strong beliefs about readiness that are in conflict with PD. Resisting to adopt new practices introduced by the PD is not unique to Marley, nor is it irrational that they do so. Teachers' beliefs are grounded in their knowledge and experiences and are more precise agents of how they take up new PD contents. As Marley's quote in the beginning of this dissertation suggests, many teachers choose to maintain their autonomy and teach based on what they see as advantageous for their students (Smith & Southerland, 2007). Since PD is provided with an ultimate hope to transform teachers' practices for the benefit of the children, I hope this research has implications for teacher educators and PD designers about how to design a curriculum so that it takes into account the process teachers go through when adopting/adapting

new practices that are conflicting with their strong readiness beliefs and guides them into desired change.

Selecting Marley

This study is based on Marley's experience in the second cohort of the PreKPD program. I decided to select a teacher from the second cohort of teachers mainly for two reasons. First, their enrollment in the PreKPD coincided with the year that the Snowcity district first implemented PreK programs. Second, they were the cohort that I worked with as a research assistant for the larger project on PreKPD.

Marley was chosen as a case of a teacher with strong beliefs about readiness that are in conflict with PD. Thus, I was looking for a teacher who struggled with aspects of new practices on the onset of the PD. Since I was involved in another research derived from the larger project, I was familiar with some of Marley's data. She often shared very honest opinions about her experiences and ideas in the interviews, some of which may not be well-received among early childhood communities. For example, she expressed objections against particular practices (e.g., no calendar time) suggested by PD instructors or the district. She shared her struggles of adopting such pedagogies as play-based pedagogy while having to fulfill teacher roles to prepare children for kindergarten. Thus, I purposefully selected an "information-rich (case) from which one can learn a great deal about issues of central importance to the purpose of the research" (Patton, 1990, p. 169).

It is important to note what relevant information were included and excluded in this dissertation due to the limitation of using existing data. First of all, since this dissertation is about Marley's readiness beliefs and their relations to her practices, any data that include Marley's ideas or her practices either through her utterances and reflections or observations of her practice

were analyzed. However, anything that was not explicitly addressed by Marley or observed in Marely's classroom were considered beyond the scope of this study. I made this chose with the understanding that some of the important pieces of Marley's story may be excluded. For example, Marley's readiness beliefs are not without basis in reality but rather a result of a cultural phenomenon. However, Marley did not consciously make connections to the readiness discourse in a bigger system in the data. Although I assume Marley's readiness beliefs are situated in a widespread readiness discourse, not having had a relationship with her limited my ability to claim so without any concrete data. Thus, that piece of information was largely excluded from this dissertation. However, as I addressed the evolution of the readiness discourse in the US in the previous chapter, I suggest that Marley was not unique in her thinking and that her readiness beliefs reflect social and cultural ideology.

Marley's Teaching Context

Marley was a mom of three sons. She worked in a private child care center (community-based site) for 5 years when she became a PreK teacher and participated in the PreKPD. Marley had 17 children (11 boys and 6 girls) in her class[12]. According to Marley, her site mostly served White middle-class families and that her class was also homogenous in those terms (White middle-class). There were two PreK classrooms in Marley's site[13]. In her first year, Marley's classroom was located in a multi-purpose room in a local church. But the building was not one of the stone buildings, but a space in a strip mall that used to be a Dollar Store. The space was a big challenge for Marley. Since it was a shared space, Marley had to set everything up and down

[12] This particular information is based on Marley's second-year classroom. Due to the secondary analysis of data, I do not have further information about children demographics.
[13] Toward the end of the first year, Marley mentioned that she sometimes planned with the other 4K teacher, although no further information is available about the collaboration with the other teacher.

each day. However, this was not what was challenging to Marley[14]. Not only was the converted store not designed for all the needs of young children[15], its use as a religious space also created issues. One of the issues was the presence of strong religious messages that some families had problems with. Another involved an incident related to the church's recovery program in which a man passed out in the sanctuary during school hours and then hid in the adult bathroom when Marley tried to get him to leave. Fortunately, in her second year, Marley moved back to the main building of her child care center. Her new classroom was as twice the size as her first year one and had large open windows overlooking an indoor pool and the outside. Marley said the watching people swim seems to have a calming effect on children.

Data Collection

The data for this study was gathered as part of a larger project on a PD program for PreK teachers in the Snowcity district. All of the data were collected by other researchers for two academic years during Marley's participation of PreKPD. The data included information about Marley's current practice, current PD experiences, past experiences as a preschool teacher, Marley's experience of growing up, and Marley's perspectives about early childhood pedagogies. The types of data include semi-structured individual interviews, classroom observational field notes, and seminar discussions and assignments from the PreKPD. Table 1 provides further information about how the data were collected and when by the data type.

[14] In fact, Marley said she liked the fact that she gets to set everything up neat and tidy in the room (Marley' CLASS observation, September 21, 2012).
[15] The space was small and there were no windows in Marley's first-year classroom.

Table 1

Information About Data Collection by Type

Data type by sources			
Data Type (Number)		**Setting**	**Time Period**
Semi-Structured Individual Interviews (3)		One on One with Marley	September 30, 2011 May 15, 2012 June, 2013
Observational Field Notes (9)		Marley's Classroom	May 15, 2012 Bi-weekly starting mid-December, 2012 and ending May 14, 2013
PreKPD	PD Seminar Discussions (66)	PreKPD Course. Both whole group and small group discussions	September 14, 2011-May 08, 2013
	Teacher Created Artifacts or Assignments (14)	PreKPD assignments	Self-introductory Questionnaire Autobiography Reflections about Marley's focal child Learning Story 1,2,3,4,5 Home Visit Reflection 1, 2, 3; Family Math Night Reflections

Semi-Structured Interviews

In-depth, semi-structured interviews were conducted three times across the two-year data collection period. All three interviews took place in Marley's classroom. As semi-structured interviews, interviewers asked predetermined questions (see Appendix B for interview protocol) and probed as needed to elicit more information by asking for examples or clarification (Rubin & Rubin, 2005).

The initial interview was conducted at the beginning of the first school year (September 30, 2011). It largely focused on Marley's personal and professional history, including teacher education experience and teaching history. The interview also included the perspectives of the

role of PreK, perspectives on children's number sense and play, perspectives on learning from families, and perspectives on how to address differences of children, and hopes for the PD.

At the end of the first school year (May 15, 2012), another interview was conducted to ask Marley's reflection on the first year of the PreK program and how the PreKPD supported the first year. It also covered her perceived progress of children' learning over the year, evolution of teaching practice over the year, how learning about FoK and play-based early mathematics teaching impacted her teaching, her reflection about working with a focal child, and hopes for next year.

Finally, at the end-of-the-second-year interview (June, 2013), teachers were asked to reflect on their experiences across the school year. It particularly addressed FoK and children's mathematics learning through play. The interview asked how Marley conceptualized FoK and mathematically rich play, what would be the value and drawbacks of using those practices in PreK, and examples from her practices. How Marley's beliefs and practice had changed by new practices from the PD and takeaways from the PreKPD were also included in the last interview. Interviews and group discussions were audio-recorded and transcribed.

Field Notes

Nine ethnographic observations were conducted during the study. Each observation took 90 minutes to capture rich descriptions of Marley's practices. Field notes illustrated children's interactions with one another as well as Marley's interaction with children. Depending on the time of the day that each observation occurred, field notes recorded whole group activities, small group activities, free play, or transition. Each set of fieldnotes included more than one picture of what was going on in the classroom and more than one conversation the

children had with each other. All observations occurred bi-weekly starting mid-December 2012 and ending May 14, 2013.

PreKPD-Related Documents

Discussion transcripts, assignments, and course syllabi from the PreKPD programs were used when they were relevant to the case. Determining the relevance to the case was part of the analytic process. To begin the analytic cycle, I selected documents that involved Marley's participation or with regards to Marley's practice. In total I used 66 class discussion transcripts and 14 assignments. When needed, I used PreKPD course syllabi and weekly reading materials to understand the contexts of the discussion or assignment (see Appendix C for reading and assignment list for each course). More detailed information of the PD assignments is described in Table 2.

Table 2

Information About PreKPD Assignment Topics

Semester	Assignment	Topic
2011 Fall	Focal Child Reflection	Describe the process of choosing your focal child. Describe them as an individual, as a member of the class, and as a mathematics learner.
	Focal Child FoK Reflection	Describe what you know about your focal child's FoK for learning mathematics.
	Home Visit Reflection	Describe your home visit with your focal child, details of the neighborhood context, the nature of your interactions with family, and the child's disposition at home.
	Learning Story, A Narrative Assessment tool designed by Carr (2001)	Write a Learning Story about your focal child. (Describe setting, provide evidence of the experience, discuss what you learned about the child's development in mathematics, and decide what to do next. Comment on the culturally relevant pedagogy that may or may not be present in this learning experience.)
2012 Spring	Learning Story 1	Write a Learning Story about your focal child in relation to planning for Family Math Night activity.

Semester	Assignment	Topic
	Home Visit Reflection	Describe your home visit with your focal child, details of the neighborhood context, the nature of your interactions with family, and the child's disposition at home.
	Learning Story 2	Write a Learning Story about your focal child learning math in your classroom.
	Learning Story 3	Write a Learning Story about your focal child learning math in relation to curriculum, standards, and assessment.
2012 Fall	Autobiography	Write an autobiography focusing on mathematics and multicultural experiences.
	Learning Story 1	Describe an observation of your focal child during free play time.
	Learning Story 2	Describe direct assessment of your focal child.
	Home Visit Reflection	Use the FoK approach by visiting, observing, and gathering information about the child's home life experiences.
2013 Spring	FoK-based Action Research Paper	Design the research project with the practice you designed that include focal child's FoK, children's number sense and developmentally appropriate practice.

Data Analysis

All data from the second cohort of teachers were created as text documents and loaded into NVivo, a computer-assisted qualitative data analysis software program. As I uploaded the documents, I categorized them by data types. Then, I used "Marley" as a code to pull out data that were relevant to Marley's case, because that was the boundary of this study. I began with a thorough review of all of Marley's data sources, along with assigning codes. Throughout the analytic process, I wrote analytic memos about both emerging analytical ideas and methods (Cresswell, 2005; Richards, 2009).

I utilized a combination of emergent and deductive coding. Initial deductive codes based on the conceptual framework were developed using the keywords of the research question. I created codes from keywords of the research question as well as emergent codes as I analyzed the data. Stake (1995) stated that "analysis is a matter of giving meaning to first impressions as

well as to final compilations" (p. 71). In this sense, creating emergent codes was an analytical procedure because I constantly made choices as to whether it would be a new theme or connected to already existing codes. After the first round of coding, I examined the thematic relationship among codes and restructured them.

Strauss and Corbin (1990) describe axial coding as the process of relating data together in larger categories by "making connections between a category and its subcategories" (p. 97). After the first round of coding, I categorized codes, mapped out conceptual relationships between them, and structured the codes which became a coding system for my second round of coding. This cycle continued through multiple rounds of coding. Analytic memos that I created along the way helped me create further themes and restructure the codes throughout the process (Creswell, 2007).

When coding, the data was first searched by data type, but chronological order was taken into consideration to explore the evolution of Marley's perspectives and practices throughout the two-year period. For example, I first chose Marley's initial interview to start coding because it occurred at the beginning of the first semester and it has rich data of her background. Then I decided to code through Marley's PD discussion transcripts starting with the first PreKPD session because the data were collected around PreKPD courses. As most of the data has the date of collection, I tried to code the other data sources along the way, considering the chronological order.

Finally, writing has been one of the most critical parts of the analytic process. At the onset of this dissertation work, I imagined starting the writing phase after I finished my analysis, and would report neatly analyzed results. However, a great portion of analysis was done as I was writing. As Wolcott (2001) stated, writing is a great way to discover and articulate what we are

thinking. Sometimes, as Graue (1998) said, through writing, we are "forced into the situation of saying something about what was nothing before" (pp. 207-208). It was the case for me as well. Thus, as I wrote, I frequently revisited rich data to seek reinterpretation. In addition, writing both the findings and literature review chapters pushed me to revisit and reanalyze the data.

Establishing Trustworthiness of Research

Like all researchers, case study researchers have "ethical obligations to minimize misrepresentation and misunderstanding" (Stake, 1995, p. 109). To promote validity of the interpretation of the case, one of the most common strategies used is triangulation. Triangulation is defined as "using multiple investigators, multiple sources of data, or multiple methods to confirm the emerging findings" (Merriam, 2004, p. 204).

In this study, different approaches were taken for triangulation. Firstly, for data source triangulation, I try to include data across time and space (Stake, 1995). Data for this study were gathered throughout a two-year period and across different spaces including PD sites, Marley's classroom, and focal children's homes. Secondly, investigator triangulation is obtained in this study because two different research team members conducted interviews and observed Marley's teaching practices and wrote field notes (Stake, 1995). Moreover, the data for this study includes artifacts that Marley created such as lesson plans and a reflection paper. Finally, methodological triangulation is addressed by using more than one method to gather and analyze data (Stake, 1995). Individual interviews, observational field notes, teacher created artifacts and documents, and discussion transcripts from teacher PD seminars were used for this study. As Stake (1995) stated, triangulation allowed confirmation that "what [I am] observing and reporting carries the same meaning when found under different circumstances" (Stake, 1995, p. 113).

Additionally, the issue of subjectivity is often discussed as a factor that affects the

credibility of qualitative research. Following Stake (1995), I believe subjectivity "is not seen as a failing needing to be eliminated but as an essential element of understanding" (p. 45). Researchers cannot conduct studies without taking into account their own values, theoretical perspectives, and worldviews. Rather, I want to acknowledge that the meanings I derive from Marley's data are my interpretations of her work; all analysis processes were filtered through my selective lens. My purpose as a researcher is to provide possible new ways of seeing common practices. As a qualitative case researcher, I try to "preserve the multiple realities, the different and even contradictory views of what is happening (Stake, 1995, p. 12)."

Case studies are often questioned for their issue of bias (Merriam, 1998). Case study researchers can fall into the trap of "try(ing) to find the pattern or the significance through direct interpretation" (Stake, 1995, p. 78). I kept in mind the importance of "reflecting, triangulating, and being skeptical about first impressions and simple meanings" (Stake, 1995, p. 78).

At the same time, I want to acknowledge the privilege I have of interpretation as a researcher. Although it is my effort to empathetically understand how Marley, the person being studied, interprets realities, ultimately, my interpretations as a researcher are likely to be emphasized more than the interpretations of Marley (Stake, 1995). Thus, I attempted to provide an adequate amount of data to support my argument. In this way, readers can themselves decide how they take my descriptions. This is an example of social constructionism on how meaning is created constructively (a person being studied, researcher, and readers).

Chapter 4: Findings

In the Midwest state for this dissertation, the Department of Education promoted a community partnership model for PreK[16]. In this model, PreK partnerships were established between school districts and community programs to provide half-day PreK programming during the school year. There are multiple reasons for this approach. It provided early childhood education facilities that were economical for parents, early childhood institutions, and the district. Such partnerships could bring many benefits including fewer transitions for children, availability of wrap-around care[17](Wat & Gayl, 2009), care for younger siblings, and knowledge of developmentally appropriate practices and related resources (Taylor, 2019). Additionally, school districts alleviate the burden of creating space within schools to provide PreK. Community-based providers could also benefit from this model by securing consistent funding streams from the state (Wilinski, 2017).

Taking up the well-established state PreK program, Snowcity School District (SSD) implemented a four day a week half-day PreK program in 2011. SSD partnered with the local community so that its classrooms could be found in elementary schools, community-based sites, and Head Start. Partner sites were required to be accredited by the city or the NAEYC and have a kindergarten-certified teacher. Though all PreK programs were required to use the SSD's' PreK progress report, the curriculum was not unified. School-based sites used Creative Curriculum, as did most Head Start sites. Community-based partners were free to choose their own curriculum if it was aligned with the state's early learning standards, culturally responsive, inclusive, and play-based. This decision recognized the expertise of the community-based child care providers in

[16] Public preK (PreK) is defined as "programs funded and administered by the state with a primary goal of educating four-year-olds who are typically developing and who are in classrooms at least two days per week" (Barnett et al., 2009, p. 5).
[17] Wrap-around care complements the instructional program by providing care before and/or after PreK hours.

early education, and provided autonomy to them to use curricula that educators felt were responsive to their students and families.

In this chapter, I present my analysis of the conceptions and pedagogy of one Snowcity School District (SSD) PreK teacher, Marley. First, I present Marley's additional background and context that will help understand her teacher beliefs and practices. As previous research suggested (Tzuo, Tan, & Yang, 2013; Opfer & Pedder, 2011), Marley's personal experiences in her upbringing, schooling experiences as a student, specifically in terms of mathematics, and Marley's instruction experiences as a teacher are examined as relevant context. I also describe how Marley's perception of her teaching context played a part in her conceptions of a teacher role as a PreK teacher. Second, I examine Marley's notions of readiness and how they are related in her play-based practices. Third, I investigate how Marley incorporated FoK into her teaching of mathematics. I connect these threads by examining how Marley's conceptions about her roles as a PreK teacher and notions of readiness influenced how she incorporated FoK into her practices, with a particular focus on mathematics. In this chapter, I describe the data and, in some instances, refer to relevant literature to bring the data into context.

Context

Marley's Upbringing and Educational Background[18]

Marley grew up in a racially homogeneous town where most people were White as herself. She grew up in a two-parent family with siblings and pets, and her extended family all lived in the same town. In her community, "males were seen as the stronger, smarter, better

[18] The information in this subsection is from her autobiography assignment and professional development discussion transcript.

gender" (September 2012, Autobiography). Marley believed her parents were strict in conforming to traditional gender roles at home. Only her mother attended school functions and was involved in educational events. Growing up, she only spoke English at home and she remains monolingual in her current home. She saw herself as being raised in a Christian value system and attended church every Sunday with her family. After she moved out of her parents' house as an adult, she no longer went to church, but Marley noticed that she was raising her children with similar values.

Marley thought her adult household mirrored her childhood household. While her extended family did not live close by, she lived in a similar White, homogenous community. Marley's adult household consisted of parents, children, and pets. They were monolingual, although her oldest son learned Spanish in school. Marley and her husband were similar to her parents in terms of roles mothers and fathers play at home. Complying with traditional gender roles and "mom did the mom-ish thing, dad did the dad things" (October 2011, PD discussion), Marley managed her children's schedules and activities.

Marley's upbringing experiences are in line with the empirical research documents that indicate most White preservice teachers enter teacher education with very little cross-cultural background, knowledge, and experiences (Sleeter, 2008). It is particularly pertinent to the current situation that the racial gap between teachers and students has widened as more young people of color have enrolled each year; in 2016, 80% of public school teachers were White, while fewer than half of the public school students were White (Meckler & Rabinowitz, 2019). For the most part, Marley shared that she was "oblivious to diversity" during her childhood years. Yet, she did "not feel that the lack of diversity [she] experienced in childhood negatively affected [her] in later life because [she] always had a strong sense of fairness and believed everyone deserved the

same fair chances in life" (autobiography, September 2012). From a critical perspective, this remark raises subsequent questions; how she understood the idea of diversity or lack of diversity, what it means that lack of diversity did not negatively affect her in life, how those underrepresented in the population would answer to the way "lack of diversity" impacted their lives, and how the structural elements of prejudice and racism are considered in the idea of "lack of diversity." It is suggested that being White was the assumed norm, an unstated category as she grew up, so her privilege was invisible and race-based privilege did not figure into her assessment of fairness (Causey et al., 2000).

In terms of her own schooling experiences, Marley did not recall any early elementary years' mathematics learning. However, she did remember she had struggled with mathematics and found it frustrating that her younger brother could do mathematics well. Marley also recalled that much of the mathematics education she received did not connect to real life, thus it was not useful. However, she did much better with applied mathematics fields such as accounting. Marley continued to struggle with mathematics throughout and after college. This history built up her anxiety toward and fear of mathematics. She believed it affected her daily life in many ways: balancing her checkbook, calculating her hours of work, and helping her 4th-grade son with his homework. As a teacher, she said she did not engage in mathematics with children prior to PD because of her lack of interest and confidence in mathematics. It was important to her that she hide her attitude toward mathematics to her sons and students. It was thus fortunate, she thought, that she relearned "what it really meant to teach math through the PD classes" and became aware of the mathematics embedded in everyday practices (September 2012, autobiography).

Teaching Experiences as a Private Preschool Teacher

Marley taught in a private community-based preschool that was part of the SSD's PreK program. Before the PreK implementation, Marley worked part-time for five years with three and four-year-olds. Marley indicated that her student population was homogeneous, coming from "elite" families (interview, September 30, 2011).

According to Marley, her teaching experience in a private preschool equipped her with a "service kind of mentality" (interview, May 15, 2012). To Marley, it meant that she strove to satisfy her parent-clients hoping to retain current families and make a good impression on potential future families. Prior to the PreK implementation, she considered early education to be a family's investment because her site was a private community-based site. As an investment, there was an economic cost for families to enter. Her role as a teacher was to provide what the parent-clients wanted:

> In the past when I'm teaching [preschool prior to PreK], I've always been mindful that I am teaching the kids to please their parents. The parents are my clients, they're paying. Now they're not [paying for PreK], but at [my center] they're [still] paying clients. Unless they're happy, they're going to complain about it. (interview, May 15, 2012)

Moreover, Marley noted that parents found preschools based on recommendations from other parents for the best results with their investment. Because Marley saw preschool education as a family investment, it became critical for her to accommodate what parents wanted.

In one of the interviews, Marley addressed how looking at her families as paying clients specifically impacted pedagogical decisions such as the choice of learning activities (e.g., art activities that generate an end-product) and even curricular goals (e.g., learning every single letter of the alphabet):

> I've had some theories about not having a product at the end of an art. But then I had a lot of unhappy parents [because their] children didn't bring home refrigerator art. So to please the parents, I taught those kinds of things. [...] I don't want anybody to be dissatisfied. I wouldn't want someone to call and complain. So, keeping what might please them and therefore what's important to them. If it's really important that they know every single letter of the alphabet, I've got that in the back of my mind. (interview, May 15, 2012)

What the parents were expecting, based on her experiences, were explicit products (e.g., refrigerator art) and gaining higher academic skill sets (e.g., knowing every single letter of the alphabet) rather than the process of learning. This reactive way of teaching driven by her perceptions of parents limited children's learning experiences to the skills and knowledge that were visible.

When PreK was launched, her classroom continued to be part-time with wrap-around care[19]. Implementing PreK did not alleviate the financial burden from the families; despite the legal requirement that PreK needed to be provided for no cost, Marley's site did not provide a reduction in tuition as it provided wrap around care in addition to PreK.[20] For this reason, the population served by the center remained the same, because their costs did not change. This placed her in a dual position where she worked as a PreK teacher part of the day and also as a

[19] Wrap-around care is a service intended to help working parents, in which young children are looked after before and after PreK hours.

[20] Per state regulations, the PreK program had to be provided free of charge to families. If children came to the center only for PreK, this was straightforward and families paid nothing. The calculation became tricky when children stayed more for wraparound care. This was due to the way many childcare centers calculate full time rates. In most sites, a child is considered "full time" if s/he attends the center for more than five hours per day. Many full time students spend eight to ten hours per day in childcare centers. From a childcare center's perspective, this meant that even if PreK time was subtracted from the total time a child was in the center, the child would still be attending the equivalent of full time. Because of this, many centers did not discount tuition for PreK families. Some centers did provide families with a discount.

private preschool teacher for the wrap around care time. In other words, Marley still served paying clients who, according to her perception, were looking for specific skills outcomes from their investment. Thus, her skills-set-based practices remained largely the same.

Marley's Notions of Readiness That Guide Her Play-Based Pedagogy

Marley's Notions of Readiness

As demonstrated in the previous section, Marley's teaching practice was associated with her notions that preschool education was a family investment. Although she did not use the language of school readiness to describe her preschool practices, her practices to fulfill the family expectation derived from the idea that the function of preschool was to prepare children for a better future by providing skills-based and outcome-oriented experiences.

As a public program that involved new visions and requirements, PreK implementation invited her to re-envision her roles as a teacher. Most notably, getting children ready for kindergarten became her frequently expressed responsibility as a PreK teacher. I argue that the conceptual base of her practices did not change; she adopted the language of readiness more explicitly to justify her practices. I present three themes that demonstrate Marley's notions of readiness and how those notions were enacted in her practices or shaped how she took up PD contents.

PreK Prototype. The first theme addresses the PreK prototype to whom Marley tended to teach. Graue (2005) defined the kindergarten prototype as a "generic child who had the social, physical, and academic maturity and did not (need) much pedagogical support" (p. 39). In Marley's case, she had the PreK prototype in mind, with both academic and socioemotional expectations. When talking about examples of DAP, Marley shared the following:

> I usually target the low and hang by him, but [...] it's figuring out a balance. [...] K *(a girl in Marley's class who was academically advanced)* likes to point out at circle time with her hand raised, "you need to come with more challenging activities for me because I am above this." […] So, her problem is social skills, social and emotional skills. So, I've had private talks with her. "Here's what we're working on, that's a challenge, K. We're working on not crying, blah blah blah. We're working zipping our own coat. We're working turning on the water to wash our own hands. Those are four-year-old skills. We are working on them here." And she was like, "Ohh." She would come in the morning and she would stand like this and daddy would take her coat off and hang it up for her and she'd go in the bathroom and just stare at the faucet because she doesn't have to get her own soap and she doesn't have to turn the water on. So, she didn't have to do any of those things. If you saw her report cards, obviously, they're like all fours but there's one section where she's like one's and two's cause she struggles in those areas. (interview, May 15, 2012)

In Marley's mind, prototypical four-year-old PreKers were quite independent with self-help skills and easy to get along with. They also had a balanced development across academic and socioemotional domains. Thus, when K expressed that she wanted to learn something more advanced in a bold manner, Marley focused only on K's socio-emotional "immaturity" and not on her individual academic needs. And Marley ascribed K's "immaturity" to lack of experiences rather than her biological readiness. Guided by a normative notion of the typical four-year-old PreKers, she had age appropriate expectations in mind, against which each child was judged.

Exposing School Practices to Produce Good School Citizens. The second theme addresses exposure as the readiness strategy. Marley's notions of readiness can be seen through

how she perceived the goals of PreK programs. The following example involves her pedagogical choices on voting activities that respond to her goal of readiness. It demonstrates one of Marley's main strategies used to prepare children for kindergarten, exposure and emulation:

> We've been working on voting. It didn't go over very well last week. We did vote for something and I've been trying to show them the tally marks. Usually when we voted on it, I've done [with] a post-it note; you stick a post-it note up with your name. But now I switched to tally marks 'cause if I show them this now, it won't be over their heads next year. That's my goal; to just expose them to as many things as I can so that next year they're not standing on their heads at circle time 'cause they know how to sit still for 15 minutes, or they know how to pay attention to a teacher who has a whiteboard up, or something. That's my goal: exposure. Just so that they're good little school citizens. (Interview, May 15, 2012)

Voting is a good activity to engage the meaning and processes of measurement. Children develop an ability to organize, represent, and interpret data. It is recommended to represent the data in a way that makes sense to the children (Platas, 2018). In this example, the voting activity was not chosen to advance children's mathematical understanding. The goal was more about preparing children for becoming "a good school citizen" with appropriate group-oriented behavior and classroom conduct. Preparing them to be "a good school citizen" was a frequently expressed term Marley used when she talked about PreK goals. One of her strategies to ensure this was to expose her students in PreK to concepts they would encounter in kindergarten. She believed that even though the concepts may not be comprehensible at the moment in PreK, students benefited by the time they entered kindergarten by being exposed to and thus growing familiarity with them. From Marley's vantage point, PreK time can be best used to emulate

kindergarten practices, both content-wise and behavior-wise to better prepare children for kindergarten.

Marley's commitment to expose kindergarten practices in the PreK classroom for readiness' sake influenced how she took up PD content. One of the strong examples is related to the value she placed on calendar time. A calendar time is one of the popular early childhood practices that serve as a focal point of their morning meeting: teachers ask children the date, day, or month; today, yesterday, or tomorrow. It is a popular activity because teachers believed that it is a successful way to introduce time concepts, numeracy, vocabulary, and other concepts (Beneke et al., 2008). There is, however, little evidence that it is a meaningful activity for PreK children because they have a limited understanding of time. In fact, according to Friedman (2000), it is not until ages 7-10 that children typically gain the ability to judge the relative time from a past event or until a future event based on extended periods of calendar time (a month, a week). SSD PreK teachers were asked not to teach the calendar, and instead find alternative activities that are more effective and fitting in communicating time for young children such as picture schedules. The facilitators of PreKPD reinforced this view as well but Marley continued to teach calendar because they were key to kindergarten readiness. Elaborated upon further in the following section, Marley also mentioned her similar perspective about teaching letters, saying:

> When I go to the monthly training for the school district, [The presenter] specifically says "never, ever, under any circumstance should you be teaching letters." [I thought,] 'if you're not introducing letters, then what? [The children] are gonna go to kindergarten and be surprised?' I feel the same way about a calendar, they're gonna go to the kindergarten the first day expected to sit at a rug and pay attention to this chart (calendar) that makes no sense to them. At least if I've introduced it with songs and then I think their ability to

> sit will be better. I just want to expose them so that they are good citizens next year; so they're not jumping all over, and that they can listen and that they're interested. So that's my overall goal: just produce good school citizens. (Interview, June, 2013)

Marley structured her lessons to be stepping stones for the following year so that children learned to follow behavioral school norms. Marley's PreK practices were dependent on and informed by her ideas of kindergarten practices; any kindergarten activity must be first introduced in PreK to increase familiarity. PreK was about readiness and exposure. Marley's vision saw getting children ready for kindergarten as the goal of the PreK program. All of these are examples of schoolification (OECD, 2006).

Emphasizing Skills-Set as Precursors for Readiness. Marley's notions on readiness are shown in her practice of teaching academic content. She focused on what she thought children needed to be ready for kindergarten rather than on their interests, daily lives, or even their current skills. As a result, she tended to set up skills-based activities that were designed to produce better performance on readiness indicators, such as "know all their numbers and to be able to count" (interview, June, 2013).

One of the typical examples of skills-based activities was a whole-group worksheet activity in which the children completed a book that asked them to trace numerals, then to write on their own (shown in Figures 2, 3, 4). Each page was assigned for one numeral, and children were asked to trace numerals. There were also coloring pages, which children could choose to color if they wanted to.

Figure 2, 3, 4

Numeral Recognition and Writing Worksheet

Marley organized this activity to be done at the rug before free play time. The field note excerpt presented below captured the conversation Marley had with Jillian, Darrel, Bailey, Charlotte, and John during this activity:

Marley: I made you guys a number book. On the first page it has the number?

Jillian: One.

Darrel: Are we going to go to the second one?

Marley: No.

Darrel: Why won't we do the number two?

Marley begins to pass the markers around as she explains what they're going to do.

Marley: First thing you're going to do is put your name on the front.

Marley then tells them to open their books and put a one on the page that has ones on it.

Bailey: So why do we have to do one a day?

Charlotte: Do we cut it then?

Marley: Nope, it's just a coloring and drawing book.

John: Do we draw on the line?

Marley: Yep. Show me your ones before you go. (To Jillian) Let me see your book.

Jillian: I colored 3 butterflies.

Marley: Good.

As the kids finish the sheet, they show Marley their ones and head off to play.

(Observation field note, March 05, 2013)

In this example, Marley managed the group, providing the books and checking their completion. The focus was on tracing and producing the numeral one as well as writing their name on the book, which the children will be expected to do in kindergarten. Interactions between Marley and her students were limited; when Darrel and Bailey questioned why they were not doing two, Marley did not respond to their questions; missing opportunities to make connections between those two numbers. This example illustrates that the primary focus of the learning activity was to gain a readiness skill (e.g., ability to write numerals) by repeatedly practicing rather than to enrich the mathematical understanding by self-directed exploring and communicating ideas. Moreover, this activity was presented as a task that they had to finish before they could be released to play.

Marley's notions of readiness can be better understood through the reasoning she used for making particular pedagogical choices. In an end-of-year interview, for example, she shared why she taught letters in ways that are disapproved by PD:

> How I teach letters [...] is a pencil and paper task that I think no one would approve of. But I want them to go into school knowing how to write their letters. We went to a PD this year and they pretty much said “under no circumstances should you be teaching them letters or how to write letters.” And I was like, "Okay, well we're on M right now. I'm not stopping halfway through." For some kids, Shawn is a prime example, if I hadn't shown him a worksheet with those letters he never would have written a letter and he would be going into kindergarten. He still can't write his name; he would be going into kindergarten never being exposed to a letter G (interview, May 15, 2012).

Marley’s typical practice included introducing a letter of the week (interview, May 15, 2012) and practicing letter writing with worksheets, examples of formal methods of teaching letters that involve extensive whole-group instruction and practice on isolated skills. Her approaches were based on the views that early literacy is a skills-set and can be learned through repeated exposure and practice. This did not take into account the social and cultural aspects of literacy learning (Rohde, 2015), which can be addressed by providing rich interactive experiences with oral language, print, and other symbolic activities and opportunities to discover meaning through these experiences (NAEYC, 2009; Nitecki & Chung, 2013). Her approach is rather reflecting the science of reading, a view that advocates an explicit focus on foundational skill-building atop phonics[21] (Language and Reading Research Consortium & Chiu, 2018; Nation, 2019; Petscher et al., 2020; Shanahan, 2020)[22]. Critics of science of reading disapproved of its narrow plotline for it disregards the impact of culture, play, and family to individualize instruction (Suskind, 2020).

[21] Although phonics has been widely used in the classroom, science of reading emphasizes systemically implemented phonics, not an occasionally used phonics activity (Peek, 2019).

[22] There are epistemological debates regarding best literacy practices (between constructivist and positivists on the basic mechanisms associated with reading development, which is beyond the scope of this dissertation.) See Calkins (2020) and Petscher (2020) to read further on this debate.

Marley was well aware of the unfavorable opinions within the professional community about the formal instruction on reading and writing (Fisher, 1996; Katz & Chard, 1989). Nonetheless, she was determined to proceed with her methods because she believed that obtaining specific skills as precursors of the ready child.

Navigating Her Roles of Engaging Mathematics in a Play-Based Classroom

Marley's notions of readiness did not sit well with SSD's proposed approach of PreK curriculum. Reflecting that children learn best through play, SSD recommended all PreK programs to implement one hour of uninterrupted free play time. Marley found this one hour of free play time to be the biggest change that PreK brought to her practice.

At first, Marley thought implementing one hour of free play was a challenge. She did not see herself as a play-based teacher. In the beginning of the first year of PreK, she complained that an hour of free playtime was "sixty minutes of torture" (PD discussion, May 09, 2012) and made her impatient (interview, September 30, 2011) because free play involved "free flowing" and "free choice [of children]" and "[she doesn't] really like that kind of thing […] as a more structured person" (interview, June 2013). She also shared her boredom and the noise level of the room were other issues she was having with children's free play time.

To add to that, mathematics teaching was also new to Marley. As mentioned earlier, Marley described that her relationship with mathematics had always been negative. She had anxiety, a lack of confidence, fears, and dislikes towards mathematics. As she shared in one interview, "I probably was thinking too deep about what math, and I was probably also trying to avoid it, as far as making it a (teaching) objective during the week, just because I don't like math I probably just pushed that to the side" (interview, June, 2013), prior to participating PreKPD which focused on mathematics, she had not engaged children with mathematics much.

Marley's above-mentioned initial attitudes toward play and mathematics together with her notions of readiness were associated with how she navigated her roles of engaging mathematics with children using a play-based approach. Three themes came up in analyzing her data.

Strategy 1: Creating a Teacher-Directed Mathematics Center. Marley's perceived challenge with the free-flowing nature of the play-based approach suggested that Marley was more accustomed to and preferred more structured teaching environments. Indeed, Marley was a planner. Having a planned structure was a big part of her teaching practice. Before she taught PreK, Marley had used theme- and center-based pedagogy. She organized activities in centers, or activity areas, through which children rotated throughout the day; all activities for two weeks focused on a certain topic. Though her site did not have a specific curriculum for the PreK program, Marley created her own structure. Each day Marley tied activities in her classroom around a letter of the week; the whole group read a book about the letter before individually doing a project activity that involves words that start with the letter of the week. Marley liked to plan ahead and she "like to have structure or have specific goals and lesson plans" (interview, June, 2013). The structure using a letter of the week met her need to have things all lined up, as Marley shared the following: "I like my things to match. I like my theme to match my books every day and my books to match my projects every day and stuff" (interview, May 15, 2012). This plan-ahead approach did not sit well with a child-directed, play-based model in Marley's mind (interview, June, 2013). Thus, it was not a surprise that among 12 mathematical engagements between Marley and children across nine observation field notes[23], none was during child-directed free play (see Table 3).

[23] Across 9 observational field notes, a total of 82 interactive episodes were observed (regardless of Marley's participation).

Table 3

Times Documented Mathematical Interactions Between Marley and Children by Settings

	Documented Mathematical Interaction between Marley and Children					
Settings[24]	Whole group	Project activity	Math-embedded Play (Games)	Child-directed Free Play	Transition	Total
Times documented	5	2	2	0	3	12

In Table 3, I counted the frequency of mathematical interactions[25] Marley had with children that were documented in the field notes. The interactions among children or between children and other adults in the classroom were not counted. The types of play that were documented during free play time were children's free play without Marley's engagement and teacher-directed learning through games, which will be explained in the following paragraphs. Child-directed free play, which involves children's participation in creating play narratives, were not documented in the field notes (Pyle & Danniels, 2017). Although I am not arguing that Marley never interacted during child-directed free play based on what was documented in the field notes, it is a telling trend that her engagement was more frequently captured during teacher-directed activities than during child-directed free play.

Therefore, Marley found a way around her challenge of implementing free play time so that she was able to meet readiness goals during the free play time as well as maintain a good structure. One of the strategies she used often was creating a center with learning through games

[24] I categorized settings based on class routines (whole group, project activity, transition, and play) and Pyle and Danniels (2017)'s categorization for play (free play teacher intervention, inquiry play, collaborative play, and playful learning, games)[24]. Two categories of play were created: math-embedded play (games) and child-directed free play. I merged free play without teacher intervention, inquiry play, collaborative play, and playful learning into 'child-directed free play.'

[25] I define mathematical interactions as Marley's act of talking or doing things with children in areas of early numbers and counting, operations, measurement, shapes, patterning, and mathematical reasoning.

(Pyle & Danniels, 2017) and called out a group of children to engage in the prepared activity while others enjoyed free play time. Marley remained in the center to direct the activity. Having this game center set up afforded her to engage children with a play-based approach in a way that she was most comfortable.

Below is an example of Marley directing a math-embedded game at the game center. It was a one-to-one guessing game. There were a whole bunch of pennies and each person took turns to hide however many pennies they took. If the other person guessed the number of pennies hidden correctly, he or she got to keep the pennies. If he or she guessed wrong, then the person who hid them got to keep the pennies. There was a snake picture associated with this game and whoever filled up the snake first with the pennies they earned won (see Figure 5 below):

Figure 5

A Math-Embedded Penny Snake Game

Marley has a game set up at the tables that the teachers will play with the kids one at a time. Marley puts out a whiteboard and writes down the names of the kids who are

> waiting for a turn. The game is a one-to-one game, but a few children hang out and watch while they are waiting for their turns. Each child who plays seems excited about and engaged with the game. Before starting the game, Marley asked each child if they wanted to hide the pennies in their hands or wanted to guess. John arrives and easily picks up on the pattern of the game.
>
> [...]
>
> John and Marley keep taking turns. John is all the way up by the snake's neck.
>
> John: (pointing to Marley's) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, (pointing to his) 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13. Now I have one more than you do!"
>
> Marley: You only have 2 spots left!
>
> John, Charlotte, Nevaeh, Bailey, Michael, all count John's together.
>
> Michael: You skipped one.
>
> Marley guesses wrong.
>
> Marley: Oh now that's enough to make you be the winner.
>
> (Observation field note, March 5, 2013)

This episode illustrates an example of how Marley operated a center for learning through a game (Pyle & Danniels, 2017). Marley set out a math-embedded game in this center along with other play centers. Children made their choices whether or not they want to participate in this game during free play time. The Penny Snake Game engaged children in mathematics related to making a mathematically reasonable guess, counting one-to-one correspondence, and comparing. In this example, the game provided opportunities for John to practice meaningful counting in a game context and encouraged him to figure out who had more pennies and how many more. One might argue that there could have been more joint conversation that mathematizes the moments

or validates John's mathematical sense-making. However, Marley did support john in seeing how many more spots he needed to fill with pennies to win. Moreover, it created a natural setting where other children joined in to count together and support each other's precision in counting.

On another day at the game center, Marley played a pizza parlor game with children. There were four slices of pizza and toppings for the pizza. Each slice had six spaces for toppings and had a different color dot on the pan—red, yellow, purple, green. Each person took a pizza slice and all of the topping discs were placed upside down on the table. At each turn, the person picked up one topping disc. If it matched the color of their pizza, they put the topping on their slice of pizza. If it did not, they placed the topping back where they got it, face down. Whoever successfully filled their entire slice of pizza with the same topping won (shown in Figure 6).

Figure 6

Pizza Parlor Game

Marley's math talk was limited and her role was mostly to make sure everyone followed the rules:

> Roman picks up a mushroom, and puts it back.
>
> Hailey: I'll remember where that is. (Hailey won last time)
>
> Connor: (On his next turn picking up a mushroom) I knew where that is, I remember.
>
> Marley: Remember where that is.
>
> Shane is one away from being filled up.
>
> Shane: (In a sing-song voice) I get one more, I get one more. I have 1, 2, 3, 4, 5. I get one more. (To Hailey) The mushroom is in the middle.
>
> Hailey picks up the middle one, it's a mushroom.
>
> (Observation field note, April 2, 2013)

The pizza parlor game is a kind of memory game and children do not need to be able to recognize written numerals in order to play, but it is also a mathematics-embedded game. The format of the game supports children to use one-to-one correspondence by placing one topping disc on a space for topping. It also encourages children to figure out how many more they need to win and whether they have more or less than their friends. In this episode, Shane demonstrated precise counting as well as mathematical understanding that one space left on the pizza slice meant that he needed one more disc to win; Marley did not respond to it. Although the example shows that children are encouraged to think mathematically through participating in a math-embedded game, highlighting the mathematics learning explicitly would be beneficial to support all children in making mathematical connections.

Strategy 2: Increasing Mathematics Engagement in Everyday Moments. As presented earlier, Marley's relationship with mathematics had always been negative, which hindered her from engaging children with mathematics. However, with newly learned principles of counting, Marley realized that early mathematics is so much more than just rote counting (KWL chart, May 9, 2012). It helped her become aware that "everything we do is math by nature. [...] everybody has some base of math, of counting and of numbers, as opposed to alphabet knowledge when they're four. They all know how old they are. So there's always a positive place to start with" (interview, September 30, 2011). In the initial interview, Marley shared the everyday mathematics she encountered:

> When the kids are leaving, they're picked up by their parents, and just because I'm trying to make conversations, I'll say, "Oh, we have five kids left!" And then no doubt someone will say, "Four boys and one girl!" And I'm like, "Brilliant!" Then the next person leaves, "well, now we have four people left!" And they'll say, "Only four girls, zero boys." That's

> one of my favorite things and I didn't set out to do that; I just was making conversation and it worked out. (Interview, September 30, 2011)

In the very beginning of the PreKPD, the math talk in her classroom was an unplanned fortunate discovery. However, with increasing awareness of everyday mathematics going on among children, Marley began to proactively initiate math talk and increased its amount:

> We always go around and count how many kids there are, and today (children) liked to chime in about teachers. So I said, “well let's count how many teachers,” so we did six children plus two teachers equals how many people? And their eyes lit up. Then we could basically do 6+2=8 and they were thinking it was so cool. And then a few minutes later, another girl showed up, so we had to erase the six and start over and count it. And Liam was the leader and he was getting ready to do it and he goes, this is gonna be awesome. (Interview, June, 2013)

In this illustrated moment, Marley and children jointly contributed to forming equations using mathematical symbols out of math talk. She had been introducing children to math symbols, because one of the children who she described as advanced was interested in them. This example demonstrates Marley’s improvisation of math talk to facilitate children’s mathematical learning (Graue et al., 2014).

Moreover, Marley used transition times to create more mathematical moments. When waiting in the hallway, Marley engaged children with counting, patterning, and sorting:

> Someone asked me, "Can we try to make a pattern today?" And I'll say, "Sure, let's try. What should we start with?" I'll let them pick, and it'll end up [with] boy, boy, boy at the end and they'll be like, "Aww, we lose." And today they asked (to make a pattern) and I

> picked that it would start with a boy 'cause I knew that it would work out that way. So, that was successful patterning! (Interview, May 15, 2012)

In this example, Marley shared her strategy to think ahead how many boys and girls there are before creating a girl-boy pattern so that she could provide children the joy of making a successful pattern. Overall, Marley increased the quantity of mathematical engagement with children in everyday moments.

Strategy 3: Providing Skills-Based Activity to Complement the "Less Rigorous" Play-Based Approach. Participating in PreKPD changed Marley's perception of mathematics. Prior to PreKPD, Marley was less likely to engaging in either play or mathematics with children. However, she "found out how much math (she) was actually doing with the kids without even trying and (that) all play is mathematically rich" (interview, June, 2013). This realization enhanced her confidence level around mathematics and, in turn, encouraged her to engage mathematics more in a play-based approach.

Despite her attitudinal change, however, Marley still perceived a play-based approach to be academically less rigorous. She distinguished the play-based approach in PreK with what she did as a preschool teacher prior to PreK; her practice prior to PreK was less play-based and more structured. In the final interview, she compared the two approaches and shared her perspective that the children are not appropriately challenged when implementing a play-based pedagogy:

> When it wasn't PreK, I think my students were leaving with higher [achievement]. Because there was no curriculum, no standards, we did whatever we wanted and I was probably disciplined by my stuff as a mom. And my sons were pretty high functioning so that (high level of functioning) is what I expected [to my student]. That's what I spread to everybody else in my [class]room. (Interview, June, 2013)

Marley had developed her own set of standards as a preschool teacher which resulted in skills-based practices that produced what she saw as high achievement. In PreK, however, Marley suggested that they were using lower standards which actually limited how much she expected from students. Marley associated play-based pedagogy with the state's early learning standards and believed that these standards did children a disservice by failing to hold them to higher expectations. In fact, when the interviewer asked if play-based pedagogy led to higher achievement in any area, Marley said, "No, I think everything surprised me that [children's achievement in PreK] was lower than I thought it would be. So in my opinion as a teacher, [a play-based approach] definitely is less pressure and it's easier" (interview, June 2013). In this sense, play-based pedagogy meant lowering standards and she was worried that parents would think negatively about this change.

Marley's perception of a play-based approach as "less rigorous" reflects her dichotomous understanding between play and learning (Pyle & Danniels, 2017). Marley regarded play as a child-directed activity that is free from adult interference and thereby perceived teacher's roles to be passive. When asked which way of teaching she preferred, she answered the following:

> I feel like, [with a play-based approach,] it's easier now because you don't have to plan a whole bunch of stuff, it just happens how it happens. And then because the goals or the standards are lower, I just don't feel like a pressure. [The district] don't want us doing things like a letter of the week and stuff which are things that I did, and I still continue to do it. I offer it because that way they'll be familiar with it next year. (Interview, June 2013)

Teachers take many roles in play-based pedagogy (McDonald, 2018). They observe children to decide how to extend their learning both in the moment and by planning new play environments.

Careful planning plays a critical role because teachers must figure out how to strategically expand play and intervene less intrusively in ways that challenge children's thinking and help them to draw an understanding between their observations, ideas, and judgments (Blake 2009). Marley's ideas about play-based pedagogy as requiring less planning ahead or involving less teacher roles also coincide with her perception that it was less rigorous because it did not include more academically oriented prescriptive activities like letters of the week that paid off by producing more ready kindergartners.

Thus, to complement the "less rigorous" play-based approach, Marley continued to provide skills-based activities during project activity time, a designated time she created for prescribed task-oriented activity, typically between a whole group meeting and free play time. For one thing, along with the letter of the week, she began to incorporate number books into her regular practice, which is essentially a workbook where children practice writing numerals. She recalled noticing children not knowing how to write "9" as the origin of this activity (interview, May 12, 2012). I provide two examples of such complementary skills-based activities from Marley's practice.

The first example is one of the typical project activities. After they did a whole group activity around a letter of the day, they transitioned to a project, in which this stamping activity took place. The letter of the day was 's.' Marley set up a stamping activity to teach recognition of the categories of letter and number. She handed each child eight stamps of letters or numbers and a corresponding worksheet (see Figure 7).

Figure 7

Stamping Activity Worksheet

The worksheet had two columns for letters and numbers and children were to stamp the symbol in the column it belonged to. Marley called Nevaeh, Bailey, Tate, and Manny, to come and complete the activity while others had free play time. She read out their last names, which she had written out on bee-shaped name cards and hung up where their first names used to be:

Marley: First we're going to put our names on the paper.

Nevaeh: Tate I got red, you got green

Marley: We're not ready yet we're waiting.

Marley: My stamp is the number ten. Should it go on the letter side or the number side?

Kids and Marley: Number!

Marley: What letter is this?

Kids: E.

Marley: Where should it go? The letter side or number side?

Kids: Letter!

Manny: You should have had upper cases.

Marley: We have lower cases. Bailey is waiting so patiently. Figure out if they're letters or numbers.

Bailey: I got the letter o.

Marley: Where's it going to go?

Bailey: Letters!

Marley: Good job. Tate, Let's look at yours. What's this? *(This goes on for a while)*

Nevaeh: What is it for?

Marley: Letters are for the letter side.

Nevaeh: No! Why are we doing this?

Marley: For fun. So you can practice your 's'-tamping.

Nevaeh: finished.

Bailey: I used all of them.

Manny: I'm done.

Tate: I'm done. *(They left the area for free play after Marley checked their worksheet.)*

(Observation field note, February 19, 2013)

Marley chose this stamping activity because she was trying to make the day's activities align with the letter of that day, 's.' It was efficiently designed to categorize each letter and numeral in a table. Children were practicing number and letter recognition skills. The interaction she had around it with children was limited because her main goal was to prepare for kindergarten schooling. The focus, then, was more on logistics: putting names on top, completing a worksheet, waiting for others before starting, and focusing on the task. Moreover, as Nevaeh repetitively raised a question, "why are we doing this?", the connection with children's lived

experiences was not made. Rather, it was decontextualized and skills-based, with the intention of preparing children for a particular vision of kindergarten schooling. Additionally, just as the numeral writing activity illustrated on page 78, this stamping activity was presented as a task that they had to finish before they could be released to play. Marley, with her commitment to get children ready for kindergarten, provided children with academic skill-sets in more scripted ways.

Next example is from the whole group activity. Prior to PreK, Marley's typical go-to practice during the morning time was a calendar activity. As mentioned on page 76-77, Marley highly valued calendar time because she believed it teaches children the behavioral norms (e.g., sitting well and paying attention) expected in schools. When PD instructors did not approve of using traditional calendars due to their developmentally inappropriateness, Marley compromised by incorporating "apple tree" counting instead. Similar to the 'Counting to 100' activity, Marley had a poster with 100 spaces for apples. Each apple space had a number written on it and the apples were placed next to each other consecutively. The goal was to add 100 apples to the poster. Below is the example of how Marley engaged with children during the apple tree activity:

> Marley: Adam, your body needs to be on top of the rug, not under the rug. *(to class)* Let's put 5 apples on our tree today.
>
> John: When we get to 100, we'll have a birthday party.
>
> Marley: Let's try counting.
>
> Everybody: 60, 61, 62,
>
> Marley: What's next?
>
> About 1/3 of the kids: 63!
>
> Nevaeh: We need 2 more.

Everybody: 61, 62, 63, 64.

Nevaeh: *(as Marley put 64)* We are going to hang one more apple on.

(Marley moved on to the next activity.)

(Observation field note, March 05, 2013)

The apple tree activity had more potential to invite children to reason and think mathematically. For example, when Nevaeh said "we need two more" or "we are going to hang one more apple on," she was connecting mathematical ideas. However, Marley had two goals in mind during this apple tree activity: to promote appropriate school conduct and to develop skills of counting higher numbers. As Marley reflected on this activity in one interview, "I really feel that (apple tree activity) is what brought their counting skills so high. Because I never would have taken a risk and counted things, like I wouldn't have counted in the 20s and 29, 30, whatever" (interview, May 15, 2012). The apple tree activity provided an opportunity to count higher numbers. Thus, the focus of her interaction with children stayed within counting sequentially.

Working in Progress: Responsive Teaching That Encourages Children's Directedness. Providing a high responsivity to child-directed play was a challenge for Marley, but by the second year since the PreK implementation, she began to find ways to improvise during children's play moments (interview, June, 2013). When asked what things she had not practiced before, she replied with the following:

> Lots of things. One interesting thing this [second] year [in PreK] is, we're not supposed to do like worksheets or coloring sheets. In the past, [I taught theme-based. So] whatever the theme is, [for instance, if it were] bugs, I would print up a bunch of bug pictures and then they colored them. But this year, [I try different things]. Even yesterday we did a project that normally I wouldn't have done. I would have done some routine like had the

> parts pre-cut out and had the children assemble the pieces to make a book. Yesterday we used our fingers in ink pads and made a fingerprint. And we drew the details on ourselves to make bugs, but then [children went on saying,] "we took a hole punch to make caterpillars," "oh, I'm gonna draw it like this with stripes for a bee," so that had been open again. I was not open before [this year] but now I don't need to have a printed sheet out because they will find something to do with a white piece of paper. It makes it easier, but it's funny cause I love that kind of stuff (pre-printed ones). I like to be in the lines as opposed to these guys [who are] just randomly drawing stuff. I'm more in the lines so I'm more comfortable [with] those kinds of projects. But I love watching them and the things they've done and I think it's really impressive the skills that they've picked up from drawing this year. (Interview, June, 2013)

Marley grew accustomed to the openness of play-based pedagogy. Previously, using a theme-based pedagogy, Marley planned the learning materials and directed the learning activities so that learning goals, content, and materials were neatly "in the lines." She frequently used worksheets in ways that were task-oriented and did not allow divergent thinking or learning in different ways. In the second year of PreK, she tried more open ways of teaching. For instance, a simple fingerprint activity produced bugs when they drew the details. It encouraged children to use their imagination to create a caterpillar and a bee. Children used different materials and tools to make the insects they had in mind and Marley noticed they learned and developed different skills during this process. Although she still felt more comfortable with predetermined ways of teaching, by the second year of PreK, she gradually began to see the possibility of play-based, child-directed learning rather than using worksheets.

Marley's Use of Funds of Knowledge When Teaching Mathematics

FoK is an approach for understanding how the knowledge of minoritized families and communities allows them to accomplish their goals (Gonzalez, Moll, & Amanti, 2005). This asset-based view challenges the pervasive deficit perspectives that attempt to link marginalized students' low achievement to alleged deficiencies regarding their culture, families, and themselves. During the two years of participating in PD, Marley worked with two focal children to learn about their FoK and incorporate them into her practices, particularly when teaching mathematics. Marley tended to select school-like FoK. I define school-like FoK as home practices that replicate school practices with the main intention to be successful in schooling. There are diverse bodies of knowledge involved in school-like FoK other than school knowledge; family values, ways of communicating, and ways of bonding.

To grasp how Marley utilized FoK and why, understanding her conceptions of FoK would be the first step, as they function as a filter through which she made decisions about what type of FoK to notice and use in the classroom. Thus, I will first examine how Marley conceptualized FoK. Then, I will assess how her perceptions of her role as a PreK teacher in terms of readiness are related to how she incorporated her two focal children's FoK into classroom practices. I focus on how she selected specific FoK and how she translated selected home practices into school practices.

Grappling With Marley's Understanding of Funds of Knowledge

In the PreKPD, much of the first semester was dedicated to introducing teachers to FoK. The FoK concept challenges the individualist view of children's learning by recognizing the role culture plays in learning. It moves beyond static notions of culture that focus on formal practices and national traditions towards relational approaches that illuminate everyday lived practices,

particularly for underrepresented families (González et al., 2005). The FoK approach is an effort to get personal by not assuming cultural patterns based on predetermined groups. By providing a thick description of how individuals experience the world around them, the FoK approach tries to learn about those specificities of differences and similarities and individuality and diversity. To take account of these issues, the notion of FoK has been introduced as follows:

> Although the term 'funds of knowledge' is not meant to replace the anthropological concept of culture, it is more precise for our purposes because of its emphasis on strategic knowledge and related activities essential to households' functioning, development, and well-being. It is specific FoK pertaining to the social, economic and productive activities of people in a local region, not 'culture' in its broadest anthropological sense, that we seek to incorporate strategically into classrooms. (Moll et al., 2009, p. 85)

As Moll and his colleagues stated, households are developed and maintained through the productive activities of their members using FoK to exist and function in life. It is the concrete manifestations of cultural activities or practices within specific conditions of life, not culture in the abstract. Rather, one's specific cultural practices and lifestyle are of immediate relevance for a FoK approach. Focusing on concrete household practices helps to divert from cultural essentialism—"the assumption that all members of a category of people share one or several identifiable, defining cultural features" (Alvaré, 2017, p. 34)—to instead recognize more authentic practices that are current and relevant in a personal context. In that aspect, the FoK approach benefits both racially and socioeconomically diverse and homogeneous classrooms.

To learn and incorporate children's culture as everyday practices, beliefs, and values, the participating teachers of the PreKPD were encouraged to observe through the anthropologist's lens. What it does is to bring implicit culture to recognition. This can be done by viewing in new

ways and through new cultural lenses about aspects of their own culture and practice and others and noting one's perceptions and interpretations. This process, especially when guided by an experienced cultural interpreter, can reveal how our cultural lenses are allowing us to see certain things and not others (Henze & Hauser, 1999):

> Instructor: So one of the things you need to do is to take on a new role, to think of yourself as an anthropologist to know children, families, and communities. So one of the things that anthropologists try to do is to make the familiar strange and the strange familiar. [...] So what you need to do in this role is to try to make yourself question things that you've never questioned before as much about yourself as about the people around who you're looking at. You assume that families are experts on their own lives and that they have something to teach you that you can learn from through patient attending and relationship building. [...] What's interesting is that you can't go up to people and say, "What's your culture?" Because culture isn't something that we voice very often. It's all based on tacit knowledge. (PD discussion, September 28, 2011)

Home visits were given as an assignment where teachers can take on anthropologist's or ethnographer's roles and learn a focal child's household practices. Teachers were asked not to teach, but to observe and learn. They were reminded that the ethnographer's roles were not to observe to judge, but to try to get to understand a family's perspective on practice and to see what sources are there (PD discussion, September 28, 2011).

The PD instructors acknowledged challenges this process may involve, and emphasized the power of collaboration among colleagues who can support each other throughout the journey. Incorporating FoK can be hard work because it requires building relationships with families, reflecting their own practice, trying to understand others' practice, and negotiating vulnerabilities

they have. Thus, throughout the PD, teachers worked in small groups to share their process with and to give feedback to each other, while each teacher worked on their own FoK project.

Marley's Essentialized Concept of Culture. How a teacher conceptualizes FoK is critical in understanding how they apply them to classroom practices. For Marley, FoK was a teaching approach that allowed a teacher to understand students on a deeper level and build stronger connections with families. In an interview, Marley acknowledged that the home visit to a focal child's home was a beneficial method to extensively learn about the child's FoK. However, she also suggested that FoK was beneficial but unnecessary; she already felt like she knew what she needed to know from her daily interactions with parents before and after school and from "All About Me" posters, a family survey she used to learn about each child's basic family life. Marley believed that she was in an advantageous position working in a community-based site (interview, May 15, 2012). In the same interview, as a further explanation of why she did not feel the need to know more FoK of other families, Marley suggested that the motivation for wanting to know more about the children's home practices was coming from certain judgment:

> [During my home visit to] my focal child, [I noticed] they had two games, one of which is CandyLand, and he's the CandyLand ringleader, too. He had very minimal stuff at home which I don't think is typical. I think probably most of the [children] have tons and tons of stuff at home. So that was interesting to me and just the whole CandyLand obsession and I'm surprised that that's like the only game at home. But as far as other people, I haven't encountered [a reason to know more]. I mean, I guess a reason to dig into other people is just [based on] judgment from what I get from talking to [the parents] or from what I see when I see them for drop-off and pick-up time. I mean we've had

> family nights and things like that, so I guess I pick up things there, too. But there isn't anybody that I've felt like I've had to dig deeper to get to know stuff. I guess I wouldn't have done it [with my focal child, either], if it weren't for a project. (Interview, May 15, 2012)

Marley shared that she had not encountered the moment for other families where she noticed things that were "judged" to be different from the norm and thereby felt the need to "dig into" more. Her motivation to learn and incorporate children's FoK would be based on having a norm for family practice and judging practices from that norm; she did not presume the same degree of benefit or necessity of incorporating FoK of children whose families were perceived to be within the norm. Marley's conception of FoK, in this sense, implied that ultimately there was a norm to be followed and the FoK approach would be the tool to achieve that norm rather than deter from the norm.

Marley's conception of FoK, presuming that there was a norm to follow, is relevant to her understanding of diversity and culture. In the PD, teachers read *Ethnographic Eyes: A Teacher's Guide to Classroom Observation* by Carolyn Frank (1999), which describes tools for developing "ethnographic eyes" that can help student-teachers become more equitable teachers. One of the chapters described an ethnographic assignment to write observational field notes of their students' lives outside of the classroom, which involved finding each students' address and using a neighborhood map to walk or drive to see where each student lived. Then, the student-teachers summarized these experiences and articulated what it told them about their students and their neighborhood. The book presented student teacher assignments that were undertaken in a predominantly Latinx neighborhood, and the student-teachers were diverse in terms of races, ages, and socioeconomic status. Through the activities, they all gained a broader perspective and

awareness of their students' lives. Marley reflected on the student teachers' ethnographic assignment by contrasting their site with her PreK site. Marley's reflection on this reading presented below suggested how her particular understanding of diversity and culture hindered her from learning about children's FoK at a deeper level. She discussed her experience of reading the book:

> When I was reading it, I kept thinking, this is the perfect situation to base the story on. Because I was trying to look at it from my point of view from where I work and what I [myself] am like the opposite of diverse. That's what I am. I'm so not [diverse]. I don't have a good story to tell. I don't have anything. There's nothing interesting. [*One fellow teacher from the background said "European White, surrounded by White. In a ranch house."*] In a ranch house nonetheless. Yeah. (PD discussion, October 05 2011)

Marley perceived being diverse and White as separate entities. Being White was not part of diversity for Marley; it was the opposite of diversity. Being diverse meant something unusual and different from White; being White meant being the usual, a norm, and an ever-present part of everyone's reality. Culture or "a good story," as she called it, only belonged to the people of color who had the "perfect situation" of being different. Moreover, Marley thought her PreK site, serving a homogeneous White middle-class population, was less ideal context for her to make use of FoK. In fact, she described it as "the worst example ever [for FoK approach]" (PD discussion, October 05, 2011). Her belief about the homogeneity of her classroom assumes that as a White middle-class woman, she naturally shared a package of stable and uniform cultural patterns with other White middle-class people, aligning with her previous views about the norm (Smith, 2004). As a result of this belief, she did not think she had to make an effort to learn about her children's FoK, whom she saw as from a similar cultural group as hers. When families' home

practices seemed to follow her idea of the norm, she did not strive to learn more about their home practices. Thus, she perceived that the "ethnographic eyes" were only for teachers who had non-White student(s) and was thus it was an irrelevant approach for her classroom.

Funds of Knowledge as a 'Thing.' Marley conceptions of culture shaped how she interpreted what FoK is and how to incorporate them; as a teacher in a racially and economically homogeneous classroom, her conceptions of FoK did not pay close attention to cultural aspect of practice. Instead, as a practical strategy, she reconceptualized FoK as children's interests at the individual level. In the final interview, as Marley explained the benefits of the FoK approach, she described FoK as a useful tool to implement theme-based teaching. And she illustrated FoK to be similar to children's interests:

> I think that [FoK] is very valuable cause it goes along the lines with planning themes. So you are bringing something that they are interested in, or something that they believe in or value. Obviously if you bring that into the classroom that's gonna inspire that particular student and hopefully it spreads to others. In the beginning of the year we had one child that was really obsessed with penguins, and so we did a whole thing on penguins and everybody got into penguins, and everybody knew everything about penguins just because we did that study for her. (June 2013, Interview)

As shown in earlier section, Marley preferred having a pre-planned structure based on learning themes. In this interview excerpt, Marley identified FoK based on children's interests that would help produce learning themes. She shared penguins as an example of one of her students' FoK. Marley's ways of describing penguins as FoK did not reflect on the child's lived experiences in terms of how penguins were meaningful to the family or how they were part of the family's cultural practices and functions. In this way, her understanding of FoK appeared to stay at the

individual level rather than encompassing the cultural level that recognizes the communal function of bodies of knowledge.

It is noteworthy that some scholars acknowledge that nowadays, families and neighboring communities are not the only main source of FoK (Esteban-Guitart & Moll, 2014a). As new social networks and other contexts of life and activity emerge in children's lives, some scholars propose alternative ways to broaden the scope of FoK. For example, Esteban-Guitart and Moll (2014a; 2014b) proposed a concept "funds of identity," which focuses on bodies of knowledge people use to define who they are in sociocultural contexts. Hedges (2009, 2011) argued that children's interests in popular culture knowledge can serve as FoK for children. However disputed the view 'interests as FoK' can be, however, Hedges (2011) also reflected that interests per se cannot be FoK. She argued that the cultural and relational piece, such as the ways in which interests influence children's language and social behavior, should be captured. In the same interview, Marley continued describing how using one child's FoK benefitted other students as well. And Marley equated FoK with children's interest and did not connect to the cultural or relational aspects:

> This year, [...] someone had a thing about squids, so we did ocean at the beginning of the year. They just really got into it and in the spring we did something with bugs, and they just latched onto bug information. Even now we're kind of revisiting and talking about the body parts they know, [...] all the things they classify to make it an insect. There's just something they glob on to and really like, but then other topics they're [not very interested]. So if you go with that student interest, maybe they have better ideas of what to do. I couldn't have set out to intentionally teach those things; it's something that somebody brought in and everybody else caught on to (interview, June, 2013).

Here, not only FoK was depicted as children's interests, but also it was described as a discrete topic, rather than ways of living or ways of interacting. Without connecting to children's lived experiences, discrete topics such as squids and bugs are mere subject-matters. Thus, her illustration is suited for theme-based pedagogy using children's interests and not specifically for a FoK approach.

Funds of Knowledge as One of the Strategic Teaching Tools Rather Than a Shift in Perspective. Finally, it appeared that Marley accepted the FoK approach as one of the strategic teaching tools to engage children more effectively rather than a shift in perspective from deficit to asset-based and from learning as acquiring individual skills to connecting cultural knowledge. Therefore, she could afford to disregard FoK when not working out. There were times when incorporating FoK seemed conflicting with Marley's teaching tendency of having a pre-scripted structure. When asked how she responded to moments when incorporating one child's FoK did not successfully engage other children, for example, Marley shared that she adhered to her pre-scripted plan. Marley's answer revealed that she did not fully embrace the paradigm shift of the FoK approach:

> We tried to do some on seeds [because one child was interested in them], [but it turned out that others were] not interested. [...] If I were feeling more energetic, I would have done another topic but we just pressed on because I had planned like the last two months way in advance, so I wasn't interested in going back. (Interview, June, 2013)

Incorporating FoK requires pedagogic responsivity or improvisational teaching to activate children's FoK (Graue et al., 2015). In this example that Marley provided, FoK was described as children's interest and she hoped that one child's 'FoK' would be connected to other children as well. When it was not successful, however, Marley did not change anything but chose to "just

press on" the unsuccessful moments because she had a pre-scripted plan. Her teaching tendency of adhering to a pre-scripted plan overruled the use of the FoK approach; FoK was used as an assistance for her pre-scripted plan rather than as a purpose in itself.

Sam: Worksheet as a Funds of Knowledge

About Sam. PD participants worked with a focal child each year of the project. There was one stipulation for the choice: the child must be different from themselves in at least two ways. As part of the assignment, teachers conducted two home visits, learned about the child's FoK, and incorporated them into their classroom practices.

Because Marley saw her class as homogeneous, she found choosing a focal child challenging, so she used a process of elimination. From her 12 students, she excluded the girls first. The remaining boys all lived with both parents in middle-class homes. The one difference she could find was that Sam's mother spoke Spanish as her first language. At the time she chose him, Marley did not know whether Sam spoke Spanish. She later found out on her home visit that he could. Marley said that he was an "obvious choice" and she "picked the only one that could possibly be different [from her]" (PD discussion, October, 2011).

Marley described Sam as a well-mannered child who was respectful to adults. For instance, he would always raise his hand or say "excuse me" before speaking, which was not a skill most of her other students demonstrated. He also called her by her name before speaking. Sam was very sociable; he interacted well both with teachers and peers, and he enjoyed playing with other children, one-to-one and in groups. He was independent and able to make his own choices in the classroom. Sam was also very eager to learn. In mathematics, Marley described

Sam as having more advanced knowledge than his classroom peers, most of whom were already advanced for their age.

Moreover, Sam's parents were very involved in his education. Both parents came to drop him off at and pick him up from school, and they were always concerned about how he was doing. Even though his parents never said any concerns aloud, and even though Marley thought Sam's English was perfect, Marley said that she was certain that it was his language skills that they were concerned about (PD discussion, October, 2011).

Overall, Marley chose Sam because Sam was a boy and his mother spoke Spanish as her first language. His family was also very involved in his education. Marley described Sam as academically advanced, socially mature, and independent; Sam was a "ready" child.

Noticing Sam's Rich Funds of Knowledge During Home Visits. Marley visited Sam's home twice, first in December and again at the end of February. Sam was living with his parents and a dog in a second-floor apartment building that was located less than five minutes from Marley's PreK center and her house, but she was not familiar with the neighborhood. When Marley rang the doorbell on the first home visit, Sam's mom, Brenda, opened the door and Sam was excited to see Marley.

During the home visit, Brenda shared their family history. Brenda was originally from Nicaragua. She met her husband there in 2000 and they moved to a city about 30 minutes away from Snowcity in 2003. Both of their extended families were from Nicaragua; her husband, Jorge's family still lived there, but her family lived in Miami. They moved to Florida last year, but Jorge was unable to find work. Brenda had a customer service job, but their income was not enough. When Jorge's former employer asked him to come back to the state, they accepted. They chose to live in Snowcity where neighborhood amenities were located nearby. With no extended

family in the area and very few friends, Brenda said that it gets very lonely. Brenda further shared that there is no one in the building that Sam could play with, but they do have friends from Brazil that they occasionally see.

Marley also learned that Sam's family was "seriously into technology" (PD Discussion, January 11, 2012). For example, as Sam gave Marley a tour of the apartment, Sam pointed out many of the items in his room including a large screen TV and a Wii game system. Sam then showed [Marley] his toys and the second game system in the living room. According to Brenda, Sam liked to watch cartoons and played games on the Wii and on the computer. They also had a large TV and a computer in their living room. Apart from playing games or watching cartoons, Sam used technology to communicate with his cousin in Florida.

> They moved to Florida [before coming to Snowcity] and her family lives in Florida. Sam's cousin also [lives in Florida]. I had everybody make an "All about Me" poster [...] at the beginning of the year, so I already knew that his cousin was really important in his life [through that poster]. And I assumed that they lived in the same town. [During the home visit] I found out that they live in Florida. They Skype. So they get in touch with each other all the time. (PD discussion, January 11, 2012)

When a family is scattered around the world, technology can be a useful tool to stay connected to each other. Thus, being skillful with technology would be a significant FoK of Sam's family.

Marley further learned that Brenda let Sam play more computer games and Wii after she was pregnant with his little brother. Their baby was due in six months from the time of the first home visit. Marley also noticed that Sam played with a variety of toys including several small action figures and a group of small stuffed animals that he wrapped up in a blanket and called his "babies." In her home visit reflection, Marley suggested Sam's "babies" play was his way of

processing his mom's pregnancy. She shared Sam's play further to her peers in the PD discussion:

> He has every little Mario figure and stuffed thing. And Mom said, "He calls it his babies. He rocks them in the blankets." But that would not be anything he would publicly admit at school 'cause he's way too cool for that. So I think it's so sweet. And then he even said to me today, "My babies are in my backpack." It's like confidential. We would not be sharing that with anyone else. It's just super cute. (PD discussion, January 11, 2012)

The first home visit created a special bond between Marley and Sam. It allowed Marley to see Sam's life outside of school, and thus what he did not share at school. By visiting Sam's home, Marley was allowed to have more access to his other lifeworlds and thus learn FoK.

One of the things Marley learned about Sam's FoK was language. Initially, Marley did not know if Sam was fluent in Spanish because Sam never spoke in Spanish in the classroom. According to Marley, she did not expect that Sam would communicate in Spanish with his mom because Brenda's English was proficient and because Sam never spoke in Spanish in the classroom. During the home visit, however, she found out that he could communicate in Spanish fluently:

> From prior conversations with Brenda, I knew that English was not her first language. I was shocked to hear how [...] Sam spoke perfect Spanish to his mother during my visit. She said that he knows some Portuguese as well. (First home visit reflection, December, 2011)

Marley did not ask how Sam learned Portuguese. But she noted that Sam's Spanish was so fluent that he freely alternated between English and Spanish depending on whom he talked to. Later, Marley reflected further on this in the PD discussion.

> I was shocked to find out that [...] he would speak to her in this beautiful Spanish and then turn to me and say something in English. And he went back and forth. [...] So I was completely shocked with that and really amazed because he's super smart already in English. But now he knew everything in Spanish. And he had no problems just using the two languages with the two of us sitting right next to each other. It was amazing. I never saw anything like that before. (PD discussion, January, 2012)

To Sam, the language boundary between home and school was clear and he never really crossed the boundary. When Marley the school teacher entered Sam's house, the boundary became blurred and Sam exhibited his competency to switch his language code and speak fluently in both languages used by each other person.

All in all, Sam's home visit was a success; Marley learned much of Sam's family history and home practices from his mother, Brenda. Moreover, she built a good relationship with Sam's mother and a special bond with Sam.

Worksheets as a Funds of Knowledge: How Marley Incorporated Sam's Funds of Knowledge When Teaching Mathematics. Teachers worked on an event called Family Math Night as part of the PD assignment. Each teacher designed a math activity that used the FoK of the focal child. Throughout the process, teachers worked in small groups to develop ideas for activities and plans for the Family Math Night. Additionally, teachers also worked on the Learning Stories assignment (Carr, 2001) about focal child's mathematics. Thus, in this section, I analyze first Family Math Night project as an example of how Marley used Sam's FoK in her practice. Then, I analyze Marley's Learning Stories assignment on Sam as an example of how Marley noticed and responded to Sam's mathematics knowledge.

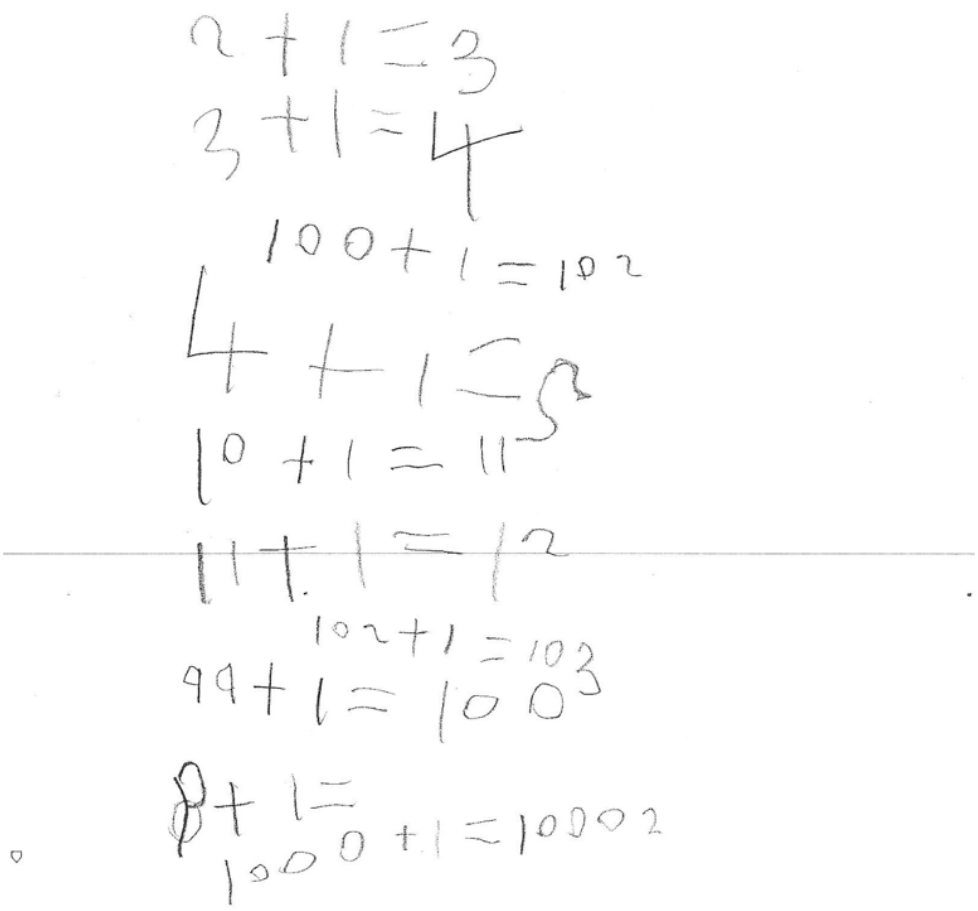
Marley began planning for Family Math Night after the first home visit to Sam's house. Since then, she had more opportunities to observe Sam's mathematical skills in her classroom before the second home visit. Marley learned that Sam had advanced counting and addition problem-solving skills, both orally and in writing. She recounted his skills in this manner:

> Alright, my boy genius today. Today he had a dry erase board, and I was just cruising by behind him, and I see a billion numbers on this dry erase board. I go, "hey, I like your numbers." He said, "yeah I'm writing all the numbers up to 100." So I stop and I look and sure enough, it starts at 1, and he's in about the third row. He's writing the numbers in the 40s. Now I'm like, 'what am I gonna do with this?' [...] And then he has this passion for wanting to know how to add, because he writes numbers like 4 plus 3 plus 7 plus 9 plus 12. And then he says, "how much does this equal?" (PD discussion, January 25, 2012)

Sam's completion of math problems displayed his advanced number sense including counting to higher numbers sequentially, simple addition, writing numerals, and using mathematical symbols such as pluses and equals (see Figure 8). Marley also noticed Sam's learning dispositions toward math problems. His advanced skills clearly impressed Marley as she called him "my boy genius" and indicated a growing, more personal connection to him.

Figure 8

Sam's Math Problem



Note. Marley showed this to Sam's mother later.

Marley mentioned these writing math problem skills to his mother Brenda during the second home visit and Brenda showed her that Sam's dad had been teaching math problems to Sam. There were several columns of addition problems ranging from 1+2 to 100+4. According to Brenda, both parents enjoyed math and numbers when growing up, but it was Sam's dad, Jorge, that primarily worked with Sam on math and counting (second home visit reflection,

February, 2012). Marley further explained Sam's home experience with math that she relayed in two separate PD meetings:

> Before I went to their house, one day at school, Sam wrote this down (see Figure 8) on a paper for me. Some of the math isn't correct, but just the idea that he's doing 100+1 and 1000 plus whatever. So I was thinking, 'Well that's really odd. Where'd he get that from?' When I went to his house and I started asking his mom, saying like, 'Isn't it weird that he came and he showed me this?' (PD discussion, March 21, 2012).
>
> And then she pulls out this notebook and opens it up; it's full of math problems like one hundred plus four equals. [Sam's] dad was writing this plus this equals blank and then Sam would fill in the answers. He had crazy ones in there one thousand plus whatever and stuff, all this crazy math in there. So that's how he got it and then he brought it to school and shared it with me. (PD discussion, March 07, 2012)

Mathematics was common in Sam's family. Both parents had strong mathematical skills and Sam worked on mathematics problems with his dad as a regular activity. Sam's paper math skills came from what dad had been doing with Sam at home and Marley learned that through the combination of classroom observation, home visit, and sharing information with his mother Brenda. Marley selected this problem-solving activity with dad as an example of Sam's FoK for her Family Math Night project.

Creating a Family Math Night project with Sam's FoK was tricky because without deepening the understanding of the cultural aspect of the activity with dad, the math problem-solving activity per se was a math worksheet. Without learning the specificities of the relational practices around the activity, math problem-solving activities with dad would not be so different from Marley's typical practices for promoting children's kindergarten readiness, as examined in

section 4.2. In the initial planning stage, Marley debated whether or not to use worksheets as a Family Math Night project. When brainstorming ideas for Family Math Night activity with other teachers in the PD, Marley shared that she leaned towards using a worksheet as a way to incorporate Sam's FoK:

> I just can't stop thinking about [worksheets]. I think 'oh, that's bad,' but if you gave him a worksheet, I think he'd be super-duper thrilled with that idea. I'm sure I could entice him to do other things, but [...] he's probably more of a coloring kind of a guy than a creating kind. [...] That's bad. (laughter) (PD discussion, January 18, 2012)

In this discussion, Marley admitted that the worksheet would not be an ideal method for learning or teaching. She might have been reflecting common professional knowledge that worksheets would not allow for creativity or encourage different ways of learning. Nonetheless, she was still inclined to use a worksheet for Family Math Night due to her belief that he would be happy with math worksheets.

While Marley recognized the negative implications of using worksheets for children's learning, she also believed it would make sense for Sam to use worksheets. She shared her definition of DAP to justify her pedagogical choice:

> I think it's knowing your children [that determines] what's developmentally appropriate. Because not all children are going to be able to do [worksheet], or even want to do that. But if there's kids that are really into [worksheets, that's appropriate for them]. (PD discussion, January 18, 2012)

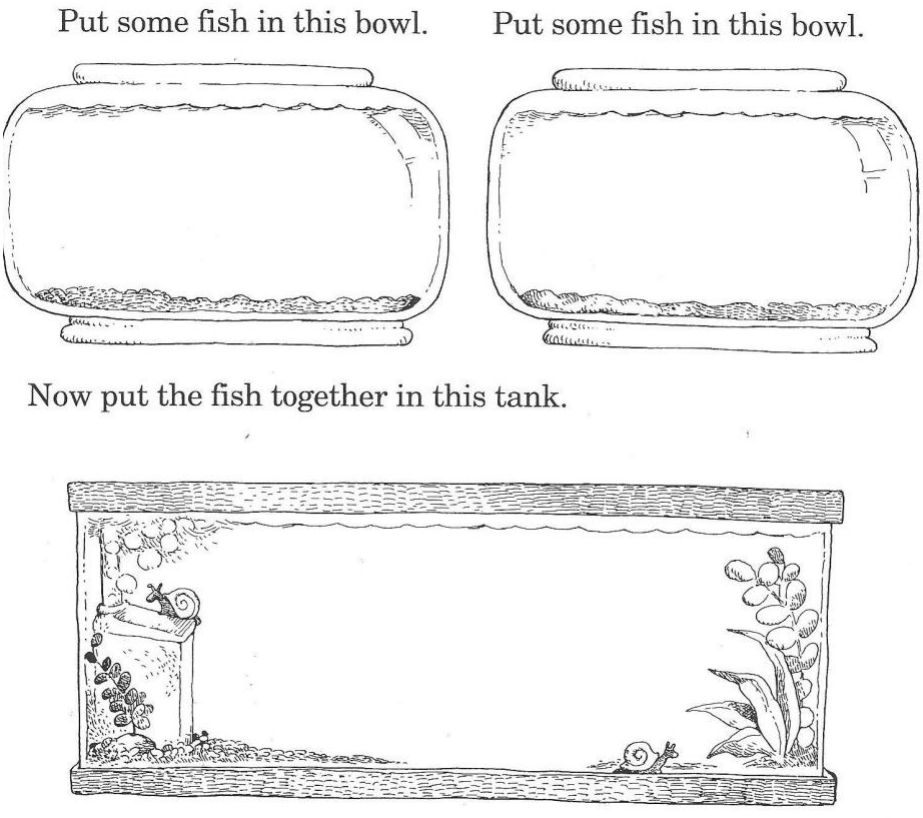
Marley believed that children's capability and interests determine DAP. This was her rationale for using worksheets as a way to incorporate Sam's FoK; Sam was capable of completing

worksheets, which called for several skills such as holding a pen appropriately and writing numerals or letters. He was also enthusiastic about worksheet activities.

Later, Marley finalized her Family Math Night activity plan for Sam's FoK as she found a commercial math game kit. It involved putting fish counters in two separate aquariums. Each person got to bring however many fish they want in each aquarium and count the fish altogether and do the math problem. There was a worksheet associated with it so that children can write a whole math sentence (Figure 9). Marley thought it was "the perfect little worksheet [because] it is totally what he would want to do and what he is doing" (PD discussion, February 01, 2012).

Figure 9

Fish Math Worksheet



In the end, Marley decided to use the ready-made activity for Family Math Night with limited changes including substituting fish counters with fish crackers because she believed there was "no reason to reinvent the wheel" (Family Math Night reflection, March 20, 2012,). The brief description of the activity is the following:

> My activity is called Fish Math. By using fish crackers and a copy of the "fish addition" worksheet, students will be able to add the number of fish together and write a number sentence! First, the student will put some fish in one of the fish bowls on the worksheet, count them and write the number at the bottom of the paper, followed by a plus (+) sign. Second, the student will put some fish in the other bowl on the worksheet, count them and write that number at the bottom of the paper, followed by an equal (=) sign. Third, the student will put both groups of fish from the bowls into the aquarium on the worksheet, count all of them together and write that number (March 20 2012, Family Math Night reflection).

The main purpose of the Family Math Night project was to design a math activity that personalizes learning for the focal child by using their FoK. However, what she chose as a FoK-incorporated activity was designed to fit all children at a certain stage of mathematics development. Marley believed this still would be a relevant FoK activity because it included an addition problem worksheet that was similar to what Sam did with his dad. In other words, she perceived the worksheet method itself to be Sam's FoK, rather than the relationship and interactions with his dad around working on math problems.

When asked why she chose to have this activity, Marley gave the rationale that focused on the typical developmental patterns for mathematics knowledge and fine motor skills:

> I wanted to come up with a challenging way to help my focal child further develop his addition skills, while still being developmentally appropriate (NOT counting in the hundreds!), allow him to develop his fine motor skills by using manipulatives and let him continue to develop his love of writing and doing worksheets. (Family Math Night reflection, March 20 2012)

This rationale reflected that Marley was focusing on a prototypical image of a ready kindergartener who should achieve fine motor skills and addition skills rather than focusing on her particular focal child and connecting his home practices. In fact, "developing his addition skills" and "developing fine motor skills by using manipulatives" would not be the appropriate aims of this activity for Sam, because he may have achieved them already. After Family Math Night, Marley reflected on the activity in the PD. She shared that it was too easy for Sam:

> So Sam is beyond doing this [level]. We're past addition with him, but [did this activity] just for last night. Sam puts seven fish in this bowl and six fish in this bowl and I said, "Well now how many do you have all together?" Without really batting an eye, he's like, 'thirteen.' We really had to go into taking away fish for bowls for him 'cause he moved onto that. (PD discussion, March 21, 2012)

As Marley shared in this discussion, the activity was so easy for Sam that he did not have to use manipulatives to solve the addition problems. The level of activity was lowered based on her vision of what a child should be doing at a PreK-age.

Although the Family Math Night project turned out to be a prototype activity for general PreK rather than for Sam, there were times that Marley tailored a mathematics activity specifically for Sam. One of the examples was documented in Marley's Learning Story

assignment on Sam (Figure 10). This assignment shows Marley's visual and written observations of Sam.

Figure 10

Marley's Learning Story Assignment on Sam

Developed by Margaret Carr, Learning Stories are an assessment technique that uses storytelling to describe a child's learning process (Carr, 2001). One of the basic premises of the Learning Stories is that recognizing the knowledge a child exerts in the moment is a foundational step to build upon so that new bodies of knowledge can be connected and expanded. It would also support constructing children's learner identities. With these in mind, the guideline of this particular assignment asked teachers to write what the focal child learned in the moment in ways that affirm learning as a growth process.

In this assignment, teachers were asked to describe math learning in their classroom context including the following elements:

> DESCRIBING: A structured written narrative describing what you observed including the context, the activity, and any interaction with others/materials if appropriate.
>
> DOCUMENTING: Evidence of the activity such as photographs or videotape of the activity.
>
> DISCUSSING: What does the story demonstrate; be sure to consider which aspects of child development and counting apply.
>
> DECIDING: What is your plan of action to build on what you have observed. (PD Assignment Guideline, Spring, 2012)

Teachers were asked 1) to address how the classroom space and/or interactions with teachers/classmates prompted the focal child's learning in counting or numbers, and 2) to incorporate ideas from the readings and class discussions that connect to teacher child development or classroom space (PD Assignment Guideline, Spring, 2012).

In the first section (see top right corner of Figure 10) and the third section (see bottom right corner of Figure 10) of the Learning Story assignment, Marley described Sam's interest in

solving mathematics problems and writing as well as his competencies in counting. Marley's illustration of him shows Sam's learning disposition such as taking an interest in and communicating with others (Carr, 2001).

In the second section (middle left corner of Figure 10), Marley shared an example of linking a daily activity to Sam's interests and skills. Counting how many kids they have is a daily whole group activity in Marley's class. To connect Sam's interest in solving math problems as well as to meet his desire for learning, Marley slightly modified the activity that children were already familiar with. Marley was able to notice Sam's activated prior knowledge. Sam had the knowledge of one-to-one correspondence and how to use mathematical symbols (+) with numbers to create a mathematics problem. Marley supported Sam to decompose the whole group into two gender groups and count correspondingly before counting the children altogether to produce a mathematics equation. Marley's plan for future engagement involved an addition game with an accompanying worksheet.

In sum, Marley built a good relationship with Sam's mother as well as Sam through home visits, which helped her learn the Sam's rich FoK. When it came to translating these FoK to school practices, however, Marley's ways of incorporating them were limited. Sam's FoK that Marley selected to incorporate were school-like FoK. There are diverse bodies of knowledge involved in school-like FoK other than school knowledge; family values, ways of communicating, and ways of bonding. Thus, tapping into school-like FoK can be a significant entry point to reach other FoK of the family. Nonetheless, what Marley focused on was a stand-alone math problem practice without connecting cultural aspects of the family practice. If the practice that was brought into the classroom is essentially the same as what was already happening in the classroom, then it may not be achieving what the FoK approach initially

attempted to do: bring in previously unrecognized bodies of knowledge from home, make it visible in the curriculum, and thus bridge the gap between home and school. In this sense, Sam's mathematics problems with his dad was a practice that emulated school practices that aim for academic competence and kindergarten readiness. Moreover, the way Marley incorporated Sam's FoK kept the same format (worksheets) with lowering levels. It was because Marley had expectations of a prototypical PreKer in mind and was teaching her general PreK prototype. Thus, Marley's use of Sam's mathematics problem-solving practice was not tapping into Sam's particular FoK on a deeper and transformative level. For the most part, Marley's ways of incorporating Sam's FoK when teaching mathematics focused mainly on school-like learning, and the FoK was either a decoration on top or just too similar to school practices. In turn, there was not much to incorporate.

Vicki: "I Could not Find Anything From the Home Visit"

About Vicki. Marley described Vicki as a sweet, affectionate, and caring little girl. Vicki was a young White girl who had two moms and several pets in her family. Marley explained why she chose Vicki as a focal child:

> When I first met them [Vicki and her moms] at our open house, if all the families were over here, they were over there. They were so uncomfortable with this situation. So I thought me going to their house would help them in, which is why I thought of them as someone in the first place [for the focal child]. (PD discussion, October 17, 2012)

Vicki was in Marley's classroom only for the PreK program; as a result, Marley felt that she did not have the same connection with her compared with other students in her classroom.

In addition to the disconnected feeling she had with Vicki's two mothers, Marley had further concern about Vicki's educational and behavioral development. When asked to describe Vicki in the PD discussion, Marley's description focused on her low achievement:

> I am shocked to find out how low Vicki's skills are. Shocked. And for math, it was just a fluke that happened. [...] I'm just so surprised that she's lacking these skills. (Not knowing) her name starts with the letter V and stuff like that. Just all missing. [...] [Vicki is verbal] but her speech is very hard to understand. Now I'm dying to get into their house to find out what's going on there. She also hangs on me constantly. Always attached to me. Hanging on me, petting me. I can't imagine that she's not stuck on [her parents] as much as she's stuck on me at home, so what's going on [at home] and why doesn't she have that experience. And when they're checking in in the morning, [other children] can find their names, but she is always clueless about it. And it's always a surprise every day. "Oh, my name starts with a V!" But if that (Vicki) were my child and that were me as the mom, I'd be panicking at home, making sure the child must know the name. So I'm just wondering, are they being alerted about this kind of stuff or? I don't know. (PD discussion, October 17, 2012)

Marley was concerned about Vicki's lack of academic skills and socio-emotional immaturity. Even the mathematics Vicki engaged in was labeled as an unexpected happening of luck rather than as Vicki's capability. Marley's description of Vicki's developmental level is based on the notion of what a prototypical four-year-old PreKer should be doing and not doing. In other words, Vicki was judged against Marley's PreK prototype and only seen as an unready child. Furthermore, Marley implied that all the learning and development that was "missing" was due to home factors, which limits Marley from considering other factors and environments that may

have impacted Vicki's development. This perspective contributed to the way Marley (un)noticed or (un)connected Vicki's FoK in school learning.

(Not) Noticing Vicki's Funds of Knowledge. Marley conducted one home visit to Vicki's home before Vicki dropped out of the PreK program in the middle of the academic year. Vicki lived with two moms, Mom (only referred to in this way) and the other mom, Joy, who was not present during the home visit. They also had two friendly dogs and a hamster at home. Vicki, Mom, and their two dogs greeted Marley when she arrived. Walter the hamster lived in Vicki's bedroom.

Marley did not feel that the home visit went well; she thought Mom did not elaborate on her answers to Marley's questions or offer any additional information. As a result, Marley felt that the conversation was "more of a Q&A session" than an engaged conversation (home visit reflection, December 05, 2012). Below is an example from Marley's reflection where she wrote about their family life and history:

> I started off by asking how long she has lived in Snowcity. She said she had lived here for seven years. Mom did not provide any further information as to where she lived before. I asked how long Joy (Vicki's other mother) had lived in Snowcity. Mom thought for a bit after initially answering 10 – 12 years. She said that Joy attended the university in Snowcity for seven years. I asked how long they had lived in their house. Mom said five years. I asked if they had chosen that neighborhood for any specific reason. She said it was the first house they had seen. When asked if she liked living in Snowcity, Mom replied yes because it's like a "little big city." Mom stated that she was from the country. (Home visit reflection, December 05, 2012)

Joy worked regular full-time hours and Mom worked odd hours and weekends part-time in retail. Twice a week, when Mom went to work, Vicki went to a home daycare after the PreK program. When she asked Mom how Vicki spent her time outside of the PreK hour, Mom stated that before school is just like a “rat race” and after school, they eat lunch, and Vicki takes a nap. As a family, they enjoyed visiting the park and the mall play area or they like to stay home and clean; Mom said she spent a lot of time on her days off cleaning and that Vicki also liked to clean and was a good helper around the house. What exactly Vicki's roles were in their cleaning routine was not learned.

During the home visit, Marley asked about Vicki’s social life with peers:

> I asked if Vicki has shared anything about school. Mom said, “no, she does not give any information” and when I asked how her day was, Vicki says that she likes everything at school. I asked if Vicki has mentioned any school friends. Mom said at the beginning of the school year, Vicki often spoke of Cameron. Mom said they do not have any neighborhood friends to play with. I asked if they had family in the area; she listed six cousins and stated that two live out of state and only one of the other cousins is younger like Vicki (home visit reflection, December 05, 2012).

In addition, Marley learned from Mom that Vicki liked to play with both “boy stuff” and “girl stuff”; according to Mom, Vicki loved playing with balls, playdough, and games and started to enjoy playing with dolls. A pretend kitchen and grocery cart were in their living room, but Mom said Vicki never plays with them.

More than just social characteristics, Marley also noticed objects in the home environment, which may have taught Marley more about the family’s practices and values:

> During this time [when Mom shared information to me], Vicki pointed different things in the room out to me; they had a nativity set of four bears. Vicki brought over a small megaphone that Mom said she uses at football games. Vicki shouted into the megaphone and Mom took it away (home visit reflection, December 05, 2012).

Marley did not ask any follow up questions about these items. She listed potential elements of Vicki's FoK, but her reflection about how they were connected to Vicki's life was limited.

According to Marley, one thing that stood out to her during the home visit was Mom's perception that Vicki was "very smart for her age" (home visit reflection, December 05, 2012). Since Marley was in a position where she was worried about Vicki's "missing skills" and was "dying to get into their house to find out what's going on there," Vicki's Mom's perception that Vicki was advanced was surprising to Marley. In fact, Marley shared that was "the biggest thing that stuck in my mind from the home visit" (PD discussion, February 06, 2013). In other words, limited information about Vicki's home practice and resources did little to trouble her assessment that Vicki was way behind her peers.

Marley's limitation in noticing Vicki's FoK during the home visit may be partly because Marley was looking for schoolified FoK in Vicki's family's behavior and activities. When referring to "schoolified FoK," I refer to home practices that emulate or would be characterized as school activities, such as Sam's math problem sheets with his dad. In one PD session, Marley shared her challenges noticing and thus incorporating Vicki's FoK. It is suggested that Marley was looking for particular FoK, ones that were already specifically math-imbedded:

> Marley: [Vicki's other mom] is more talkative and she could provide different information. [...] I was actually looking at the material from last year when we did our

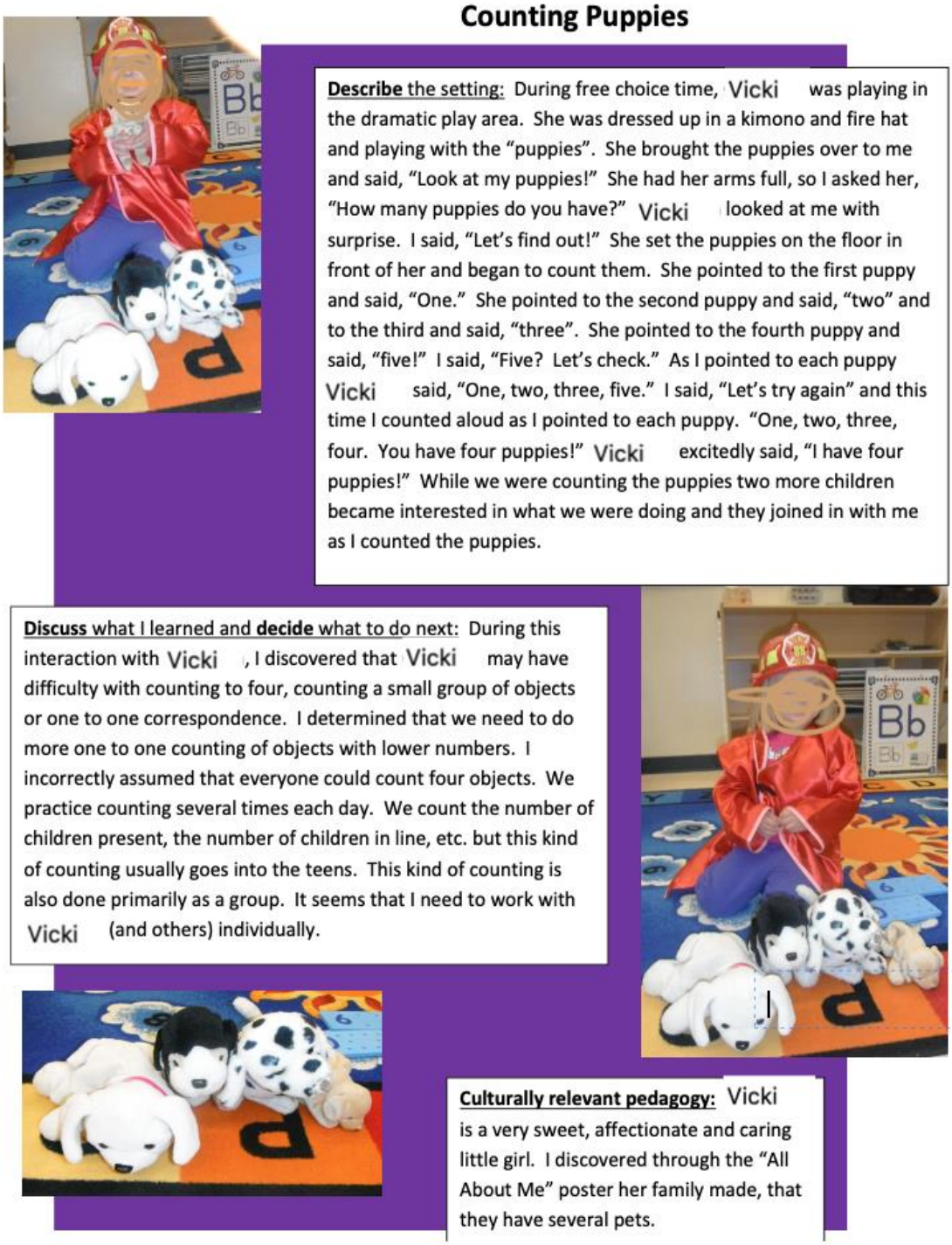
> second home visit [that] was a math interview. I can specifically ask [Vicki's other mom] math interview kinds of questions.
>
> Instructor: Maybe. But even just looking at what the child does at home. What is something that they tend to like or do. (PD discussion, February 06, 2013)

Here, Marley implied she did not learn more about Vicki's FoK because the participating mother did not share much. Considering the rich knowledge she gained about Sam's family history and home practices during his home visit, it suggests that Marley's learning of FoK was heavily dependent on the fit between herself and the family of how one gets to know each other. Furthermore, Marley also said in this conversation that asking mathematics-specific questions to the mother would be helpful for her to learn FoK she can incorporate. This suggested that the difficulty Marley faced when noticing Vicki's FoK may be a partial result of Marley's particular notion of translatable FoK. Presumably, the path from noticing non-mathematics-specific FoK at home to mathematics activities at school was a big leap for Marley. Even though the PD instructor guided her to think beyond math-specific activities, it did not really change her perception of ways to translate FoK.

Focusing on Missing Mathematics Knowledge: How Marley Incorporated Vicki's Funds of knowledge. Vicki dropped out of the PreK program in the middle of the academic year, and thus Marley could not finish working on the main project to incorporate Vicki's FoK. However, Marley did work on the Learning Stories assignment (Carr, 2001), which shows her visual and written observations of Vicki's mathematics during play time. In this assignment, Marley was asked to reflect on the child's FoK (see Figure 11). Thus, in this section, I analyze Marley's Learning Stories assignment as an example of how Marley used Vicki's FoK in her practice.

Figure 11

Marley's Learning Story Assignment on Vicki



In this specific assignment, teachers were asked to describe: 1) how the classroom space and/or interactions with teachers/classmates prompted the focal child's learning in counting or number sense, and 2) FoK that may or may not be present in this learning experience and answer 'why or why not?' (PD Syllabus, fall 2012). The educational purposes of this assignment, which was discussed in the PD, include: to introduce an assessment tool and a provide training opportunity of using it that focuses more on affirmation of children's learning than an evaluation and allows for relationship with the child.

Below I present Marley's re-illustration of this teaching moment described in her Learning Story assignment. I am presenting this data in addition to Figure 11, because these data contain an additional detail of Marley's attitude and perception of the learning moment and what she expected of Vicki.

> She was dressed up in a kimono robe and put on a fireman hat, and she had four puppies. And she came over and said, "look at my puppies!" I said, "how many puppies do you have?" And the look on her face was like, 'I cannot believe you just asked me that!' And she's like, "let's find out." So she puts them down on the floor and she counts them and she's like, "1, 2, 3, 5." And I'm like, "Oh, let's check again." So she does it "1, 2, 3, 5." Now we've got other people's attention, and they come over here and they can clearly see four puppies; so I'm trying to show her, but the 'four' is completely missing. And she [was] like 'no light bulb turned on' even though we showed her how to count and the other kids were like, "four puppies." She was clueless. Four puppies there, we told you that. Interesting, and now I'm seeing there are holes [in] all kinds of other places. (PD discussion, October 17, 2012)

In this description, Marley primarily focused on the absence of visible counting skills (i.e., skipping four when counting to four) based on her beliefs on what a prototypical PreKer should be doing. Thus, she focused on the need to fill this learning gap so that further learning can happen. As an intervention, Marley used demonstration strategy to model accurate verbal counting, but she did not invite her to count with her to practice correct counting words, walking Vicki through the counting. Marley believed that Vicki could learn what she needed to through listening and watching the demonstration.

In the second section of the Learning Story assignment, Marley shared her interpretation of Vicki's learning in the moment and the curricular plan to further Vicki's learning. Marley focused on Vicki's missing skills and made plans based on the repeated-practice strategy:

> During this interaction with Vicki, I discovered that Vicki may have difficulty with counting to four, counting a small group of objects or one to one correspondence. I determined that we need to do more one-to-one counting of objects with lower numbers. I incorrectly assumed that everyone could count four objects. We practice counting several times each day. We count the number of children present, the number of children in line, etc., but this kind of counting usually goes into the teens. This kind of counting is also done primarily as a group. It seems that I need to work with Vicki individually. (Learning Story Assignment, December 10, 2012)

Although the assignment asked to focus more on understanding what conceptual connections children made and how, Marley described what mathematical concepts were not achieved. She broadly stated that Vicki could not count to four nor do one-to-one correspondence. However, according to the illustration of the Learning Stories in Figure 11, Vicki actually exhibited one-to-one correspondence. She pointed each puppy and assigned one number at a time. She also

showed the cardinality principle; after counting the collection of puppies, she said the last number assigned in counting indicates the total quantity of puppies in the collection. The problem that hindered Vicki from counting objects accurately was with verbal counting in stable number order (Clements & Sarama, 2014). Marley's pedagogical priority to teach Vicki was filling the readiness gap based on her idea of what four-year-old should be doing, which led Marley to focus on missing skills. Without recognizing the specific mathematical concepts that Vicki was making, however, Marley's interpretation of the learning moment was gap-based, focusing only on whether or not Vicki could count objects without error. Consequently, Marley's plan for the next step (i.e., practicing repetitively with adjusted levels) was unspecific. Understanding what mathematical concepts children are constructing is important for effective teaching because it will provide information about the children's prior knowledge to base the new knowledge on.

Finally, the last section of the assignment asked teachers to write about what FoK were relevant to the described learning moment. In response, Marley wrote, "Vicki is a very sweet, affectionate, and caring little girl. I discovered through the 'All About Me' poster [that] Vicki's family made that they have several pets" (Learning Stories, October 12, 2012 as presented in Figure 11). This chosen information was not, however, elaborated to include relational and cultural aspects of FoK, such as the role of having a pet in Vicki's and her family's life and well-being. Rather, it was described as a mere 'thing': having pets at home. The chosen information was not applied in Marley's curricular plans to further contextualize and deepen Vicki's learning, either. Instead, Marley's plan for future engagement was informed by the general idea of repeated-practice strategy only. Marley's motivation to fill the learning gaps overtook the effort to incorporate Vicki's FoK.

In sum, Marley's description about Vicki and her home visit was a stark contrast to that about Sam's. Marley focused on the skills that Vicki lacked relative to her expectations of PreK prototypes and perceived Vicki as an unready child, which she attributed to Vicki's home environment. Moreover, since Marley's background and ways of getting to know people differed from Vicki's Mom's, Marley faced challenges in building a good relationship with her during the home visit and in learning Vicki's FoK. It also seems that Marley's focus was on explicit math-specific or math-imbedded practices, which may have limited her perspective during the home visit. Then, it follows logically, that she would recognize these home math practices as FoK and translate them into math-specific school activities. Marley's strategy is valuable here because she did attempt to connect a child's home practices to their school learning. However, this strategy was not truly following the FoK framework because it still validates the traditional view that home practices should follow school practices. Similar to how Marley engaged Sam's FoK in a limited manner, Marley's conception of FoK was a tool supporting kindergarten readiness rather than a transformative approach in which home became the knowledge producer and teachers learned from it. Additionally, Marley's commitment to fill the perceived readiness gap of Vicki interrupted her from recognizing the specific mathematical concepts that Vicki was constructing and Vicki's joy of counting. Focusing on what was missing based on her idea of what should be obtained before kindergarten disallowed her to carefully assess mathematics knowledge that Vicki already had and thus Marley could not come up with more specific and personalized teaching strategies for the next step.

Chapter 5: Discussion and Conclusion

In this dissertation, I strived to understand how a teacher made sense of notions of readiness and its relationship with the ways in which she enacted such new practices as play-based pedagogy, incorporating children's funds of knowledge, and mathematics education. The research questions I asked were:

1. How were a community-based PreK teacher's readiness beliefs related to her mathematics engagement in a play-based classroom?
2. How were a community-based PreK teacher's readiness beliefs related to her use of funds of knowledge when teaching mathematics?

I examined this matter by looking closely at ideas and practices of one community-based PreK teacher, Marley. In this chapter, I first provide key findings of this study and then discuss implications for theory and practice. Next, limitations of the study are presented. Finally, I conclude with suggestions for future research.

Key Findings

Environmentalist Notions of Readiness and Its Implications for Teaching

Scholars have highlighted the complexity of characterizing readiness, identifying different notions of readiness. In this dissertation, I demonstrated that dominant within Marley's ideas and practices are understandings based on environmentalist notions of readiness. Within the environmentalist frame, "readiness" is emphasized as an apparatus that provides children with the skills, knowledge, and experiences that are considered to be needed to be ready for kindergarten schooling (Brown, 2010). This is evident in Marley's idea of the goal of PreK programs. Several times, Marley expressed that her goal as a PreK teacher was to prepare

children to be “good little school citizens” who can act and interact according to typical kindergarten norms. PreK children were seen as future kindergarteners and thus Marley was more keen on providing children with skills and experiences for future schooling than making meaningful connections to their present lives and being.

Marley had a prototypical PreKer in mind, which was based on her notion of kindergartener prototype (Graue, 2005; Graue, et al., 2003), and Marley used that imagined PreKer and kindergartener to design her teaching. Graue (2005) has argued that both prekindergarten and kindergarten teachers have a prototype of the “successful” kindergartener and use that to pass judgment on children. She further argued that the kindergarten prototype “sets the parameters of normal and feeds a system where children outside this prototype are seen as unready” (p. 49). Similarly, based on the kindergarten prototype that Marley called “good little school citizens,” Marley had an image of a typical four-year-old PreKer to assess each child’s level of readiness. Furthermore, she frequently taught to an imagined PreKer, the presumed norm, rather than to the specific child present. For example, Sam was deemed as an advanced and ready child and Vicki was regarded as an immature and unready child. On the one hand, highly advanced was more well-received than immaturity; Marley noticed what mathematical concepts Sam was constructing more easily than she noticed about Vicki. On the other hand, however, she often designed and provided activities with a generic child in mind, someone typically developing, not too advanced and not too unready; resulting in not addressing the academic needs of either child.

Moreover, kindergarten practices were guiding principles for Marley’s PreK practices. One of the strategies Marley used to prepare children for kindergarten was to expose children to kindergarten activities and experiences as a warm-up to kindergarten. Marley’s notions of

readiness for school presumes that the school has determined standards that children need to be able to achieve before entry; the role of PreK program is to make sure children are able to meet those standards (Moss, 2008). In this pedagogical idea, upper educational levels determine the practices of lower educational levels (Moss, 2008, 2013). According to an Organisation for Economic Cooperation and Development (OECD) report, this perspective involves "exposing children who are still in early childhood education and care to the culture of primary school" (OECD, 2017, p. 254). Also known as schoolification, the downward pressure of elementary school on PreK can drive PreK teachers to adopt practices more related to elementary education, such as more teacher-directed pedagogies, greater attention to academic content, "imposing children to sit still at their desk and be quiet," to phrase it curtly (OECD, 2017, p. 254). Ultimately, it may escalate the demands placed on the PreK curriculum. For example, Marley used kindergarten standards designed for children a year older than her students. Her approach to teaching placed more academic and behavioral demands on PreK children. Marley shared her perspective on a curricular relationship between PreK and kindergarten in which kindergarten assumed dominance over PreK: "I'm training them so well, won't the teacher next year in kindergarten be so happy to have someone who probably without being told to do anything automatically keeps their hands behind their back and is quiet" (interview, September 30, 2011).

Finally, Marley's pedagogical conception and choices also reflected her environmentalist notions of readiness. The desired end of the environmentalist notions is the acquisition of specific and observable skills, knowledge, and experiences that are explicitly taught to children (Evans, 2013). Likewise, Marley's pedagogical priority became making sure that children acquire specific skills such as knowing all the letters, writing letters and numerals, and experiences such as sitting on a rug for an extended time and paying attention to a teacher. This

outcome-based practice that focuses on acquiring a readiness skills set is a more "finite" approach compared to the developmentally driven approach that focuses on the process of learning (Kagan, 2007). Consequently, Marley's strategy for PreK teaching was to use prescriptive teaching methods for skills and knowledge, which limited pedagogical interactions between the teachers and children.

Responsive Teaching and Pedagogical Content Knowledge for Rigorous Play-Based Mathematics Education

Based on environmentalist notions of readiness, Marley is a strong example of how prescriptive teaching and skills-based practice align together. Her typical teaching style involved a neatly aligned theme-based approach, and thus, she struggled initially to implement free play time in her classroom. Additionally, Marley perceived play-based pedagogy to be less rigorous academically. Scholars including Pyle and Danniels (2017) have argued that these beliefs are rooted in the dichotomous perspectives between play and learning. Teachers who held beliefs that play and learning are dichotomous constructs did not find their places in children's play; in these classrooms, the setting for children's play and learning was separate. In contrast, teachers who held holistic beliefs that play provides opportunities to learn and grow embraced more diverse types of play with varying teacher roles (Pyle & Danniels, 2017).

Consistent with Pyle and Danniels's results (2017), Marley's beliefs and established practices shaped how she implemented the district-mandated free play time; she divided the setting for play and learning. As shown in the examples in earlier section that starts with page 80, Marley structured times and spaces for learning that were separated from children's free play time. Most of the learning occurred during whole group time at the rug or project activity time at the center where she introduced and directed a task-based activity with inherent goals for skills

learning. After children completed the task, they were allowed to have free play. Sometimes she opened the center for mathematics-embedded games as one of the choices for children to come and play during free play time. While this was a great strategy to engage mathematics with children in a playful way, her interaction with children to make mathematics explicit was lean; she assumed the play would do the teaching on its own. Besides, none of the play moments was documented where Marley used play types in which children contributed in creating narratives and that had a higher level of directedness (Pyle & Danniels, 2017). As a teacher who often used prescriptive teaching methods and skills-based approaches, and as a teacher who held dichotomous beliefs around play and learning, Marley engaged mathematics in more structured settings.

Although she limitedly used children's play to engage mathematics with children, Marley was able to create more teachable moments. PreKPD content about children's number sense helped her learn how to recognize young children's mathematics knowledge and skills expressed in informal contexts, also known as everyday mathematics (Ginsburg, 2006). Everyday mathematics can be observed in children's play and routine times. Teachers can support children's math learning by providing mathematical vocabulary (e.g., "bigger," "less") and teach how to employ this language to explain their mathematical thinking (Rudd et al,, 2008). Using such language, teachers can communicate with children about their lives represented in their play both to learn about each child more holistically as well as to extend their mathematical learning. Marley, who rarely engaged in mathematics with children because of math anxiety prior to PreKPD, began to see that 'mathematics is everywhere.' Marley noticed more mathematics in everyday practices and became more confident in teaching mathematics. Consequently, she

found more teaching opportunities for counting in informal settings, for instance, transition times. Marley also made efforts to engage more math talk with children.

Despite her efforts to create more teaching opportunities in quantity, however, Marley's interactions with children to encourage their mathematical meaning making was limited. Noticing mathematics knowledge and skills was particularly challenging for Marley when it came to moments when children expressed misconceptions. Marley interpreted errors as missing skills and tended to focus on filling the learning gaps rather than trying to understand the roots of the misconception and scaffolding based on children's prior knowledge and experiences (Hansen, 2017). For example, Marley's practices of working with Vicki revealed how Marley's dedication to fill the learning gaps to promote readiness hindered her from noticing specific mathematical concepts that Vicki was actively making. This gap-based approach framed Vicki's learning moments either as a success or a failure, which narrowed Marley's entry points for teaching. In turn, Marley's plan for further engagement remained unspecified and unconnected to Vicki's prior knowledge. This is in line with Parks and Bridges-Rhoad's (2012) finding that the prescriptive teaching practice promotes teacher-student interactions based on recitations and production of correct answers, directly working against open-ended questioning and exploration that promote process knowledge (Parks & Bridges-Rhoads, 2012; Seo & Ginsburg, 2004). It is also in consonance with Hansen's (2017) work whose standpoint emphasizes the importance of addressing children's misconception through open dialogue in which children discuss their own misconceptions and teachers listen carefully. Thus, more remains to be done in order to improve the mathematical interaction with children in ways to notice children's mathematical reasoning and advance their mathematical thinking based on their prior knowledge and experiences.

Through careful reading of Marley's data, I argue that teachers' PCK (Shulman, 1986, 1987) and high level of responsivity to the children's different sources of knowledge are the key components that enable teachers to notice and focus on children's active meaning making and to build upon that information to stretch children's understanding. Many of Marley's struggles were relevant with teacher responsivity. It is noteworthy to mention that noticing mathematical content in play context should be included as one of the important PCKs for early childhood teachers (McCray, 2008). For example, one of Marley's struggles included implementing play-based pedagogy in ways that children participate and direct the narratives, which required her responding in the moment and improvising. Additionally, as shown in the example where Marley misinterpreted Vicki's mathematics knowledge, being equipped with mathematical CK is necessary to connect mathematical concepts and rigorously enrich children's learning. Marley's capacity to respond to Vicki's resources in authentic ways was limited because of her focus on meeting readiness indicator thresholds (Graue et al., 2014). As a more structured teacher with strong readiness goals, Marley struggled to implement improvisational practice in academically rigorous ways.

Other scholars have also argued for the importance of responsivity in teaching. Graue et al. (2014), for example, stated that a fundamental characteristic of responsive teaching is improvisation. They explained responsive teaching as following:

> Responsive teaching requires content knowledge and teacher recognition of children's resources, interests, experiences, and skills. But equally important, it requires action contingent on that knowledge (Hamre et al., 2012). Because of the multidimensional nature of this knowledge/action, responsive teaching cannot be scripted. It is improvisational. (Graue et al., 2014, p. 299)

As a final note, however, it is important to mention that by the end of the second year of PreK teaching, Marley saw herself as more open to the spontaneity of children's play. For example, when she observed children spontaneously engaged in process art play during the fingerprint activity, she waited until it evolved and showed various learning possibilities (e.g., making different insects with fingerprints). As she experimented with breaking structure, she encountered moments that she could use as teaching opportunities to further children's learning. Having witnessed this play experience inspired her. Marley's realization also suggests that it may take many moments of witnessing and reflecting inspiring possibilities to accept a new perspective and eventually change her scripted practice.

Funds of Knowledge as a Teaching Tool for Readiness

The concept of FoK orients our view of children through an appreciation of children's lives at home and in the community outside of school. FoK offers a powerful way to describe children's and families' resources and is a useful method to tap into practices children bring to the classroom (Moll et al., 1992).

FoK also focuses on the "historically accumulated and culturally developed" bodies of knowledge (Moll et al., 1992, p. 133) and recognizes the value of what they engage with in their everyday practices at home. In this way, it strives to shift educators' beliefs and attitudes and supports children's learning with a more personal and richer context with which children can relate. Further, the FoK approach has importantly been used to disrupt the discourses of deficit perspectives on marginalized students or any community positioned as "deficient" (Moll et al., 1992), which remains pervasive and persistent (Luke & Goldstein, 2006). Through FoK, teachers can learn about children's present lives as a whole; not only particular practices but also why and how those practices have worked and continued in their households.

Honoring children's present ways of being and living requires reverse perspective taking; educators must really see the child and their home for learning practices, then find ways to use those resources for classroom learning experiences. Incorporating FoK in the classroom requires teachers to shift from focusing on perceived child and family deficits to their value as assets. To do so, FoK scholars have recommended teachers take on the role of a researcher, to dig deep and learn from children and their families (Moll et al., 1992; Whyte & Karabon, 2016). However, teachers' prior-held perspectives may limit their perspectives as a researcher.

When Marley worked with Vicki, for example, it was challenging for her to see Vicki from an asset-based lens and notice any of Vicki's FoK during a home visit; this is because Marley measured Vicki against the kindergarten standard and viewed her as unready. This led Marley to look for a schoolified FoK that could be easily translated into school learning activities. In other words, without reverse perspective taking, she was reinforced to use existing practices that are based on goals for kindergarten instead of Vicki in the here and now. Moreover, as demonstrated in subchapter 4.3., the amount of FoK Marley noticed for each focal child, Sam and Vicki, was different: She noticed rich FoK from Sam's home visits as opposed to Vicki's where she "could not find anything." Even with these differences, however, the way Marley used FoK for Sam and Vicki was similarly limited. For each, she tried to find schoolified FoK, a practice that is mathematics-embedded and recognized as contributing to academic learning. With Sam, Marley focused on the math problems Sam did with his dad because they mirrored school practices and that matched her commitment to preparing children for kindergarten. Focusing on schoolified FoK hindered her from noticing any FoK for Vicki. In this way, Marley used FoK as a tool supporting her view of kindergarten readiness rather than a

transformative approach in which the child's present home practices became the site of knowledge production that teachers learned from.

Moreover, Marley's reliance on an essentialist concept of culture seemed to play a role in how she conceptualized and incorporated the FoK approach. Marley believed that her classroom was not suitable to use the FoK approach because every member of her classroom, including herself, was from White middle-class families. Not only did she believe that FoK was a pedagogical approach for someone who was outside of the norm of any kind, but also that as a White middle-class woman, she naturally shared identifiable and defining cultural features with other White middle-class children (Alvaré, 2017). As a result of this belief, when families' home practices seemed to follow her idea of the norm, she did not strive to learn more about their home practices. Alvaré (2017) indicated that cultural essentialism perceives culture as a 'thing' that is essential to a bounded cultural community. "Discrete sets of cultural beliefs and practices make up the 'stuff' of culture" (p. 35).

Indeed, Marley's ways of incorporating children's FoK suggested that she perceived FoK as simply a 'thing' that children are interested in as a topic or activity without connecting to their cultural or historical contexts. For example, Marley's use of Sam's FoK also reflected that she perceived Sam's FoK as a simple math worksheet rather than a cultural practice involving interaction and family value around math. Her ways of incorporating children's FoK did not involve her asking questions about why those practices were cultivated and embodied in the household. In these examples, children's interests or activities were abstracted from context and did not provide enough detail to understand the child as a proactive learner. This is in line with Zipin's (2009) argument that highlights the importance of focusing on the ways of knowing and transacting knowledge rather than the knowledge or practice contents per se. Without connecting

to the cultural process of the home practices and its pedagogic transaction, the FoK approach cannot tap into rich bodies of knowledge that are embodied in children and have become subconscious dispositions.

Lastly, the striking differences in the amount of FoK noticed between Sam's and Vicki's home visits suggest that learning children's FoK heavily depends on the quality of interviews teachers conduct with the person who shares the family information. In the case of Sam's home visit, Marely built a successful relationship with Brenda, Sam's mother, which led to learning of the rich FoK. This established relationship led to a virtuous cycle leading to a continuous learning of Sam's FoK. On the contrary, Marley could not build a rapport with Vicki's Mom and the interview did not generate much information about Vicki's home practices or history. Thus, Marley's deficit perspective on Vicki and her family persisted even after the home visit. Previous literature also pointed out that the FoK approach tends to rely on the interviews to learn children's FoK (Esteban-Guitart & Moll, 2014a, 2014b). For example, Esteban-Guitart and Moll (2014a, 2014b) proposed the concept "funds of identity" to overcome this limitation of FoK. Defined as "historically accumulated, culturally developed, and socially distributed resources that are essential for people's self-definition, self-expression, and self-understanding" (Esteban-Guitart & Moll, 2014a, p. 37), funds of identity uses visual methods created by children (Esteban-Guitart, 2014b) to learn children's funds of identity. As such, by incorporating other methods to collect FoK that are most relevant and present to children in addition to the information gathered by home visits, teachers can enhance the use of the FoK approach.

Teacher Beliefs and Their Role in Shaping How A Teacher Takes Up Professional Development Content

In chapter 4, I began by exploring Marley's personal and professional experiences as a context. For teaching experiences, I examined how Marley's perception of what it means to be working in a private preschool program had shaped her beliefs about teacher roles. Marley had been working toward achieving higher academic results as she thought early education was an investment for the families; she perceived that one of her key responsibilities as a teacher was to increase the academic skills of children for later success. This belief was reinforced after the PreK program was launched; Marley was keen on making sure her practices aligned well with kindergarten practices, relying on a new language of logic, kindergarten readiness. In other words, Marley's beliefs about readiness remained largely unchanged.

The PreKPD was designed to support new PreK teachers as they took on new roles. The content of the PreKPD program consisted of early childhood practices, early mathematics content, and FoK (Gonzalez et al., 2005), to promote culturally relevant and developmentally responsive early mathematics teaching. How Marley took up PD content, including practiced play-based pedagogy, and incorporated children's FoK when teaching mathematics were linked with her environmentalist notions of readiness. Sometimes, Marley resisted accepting the new practices or suggestions. For example, aligning with the district's and other early childhood communities, the PreKPD instructors encouraged teachers to move away from developmentally inappropriate practices such as calendar time or letters of the week. Despite professional advice coming from multiple sources, Marley was determined to continue with those practices because of her strongly held beliefs about readiness. Additionally, there were times that Marley had access to knowledge and resources to enact culturally and developmentally responsive early

mathematics teaching but made other pedagogical choices because of the limited "capacity to improvise in her teaching" (Graue et al., 2014, p. 311). This result aligns with previous research that addresses the importance of teacher beliefs in teacher learning (Opfer & Pedder, 2011) and practice (Fives & Buehl, 2012; Hoy et al., 2006).

Implications

Theoretical Implications

The aim of this study was to understand how Marley's beliefs of readiness were related to her mathematics engagement in a play-based classroom and to her use of FoK when teaching mathematics. As demonstrated in Chapter 4, Marley's beliefs of readiness were connected to the ways in which she enacted such practices as a play-based approach, mathematics education, and use of FoK. Many of the previous research has addressed the relationship between teachers' beliefs of certain pedagogy (e.g., beliefs about play-based approaches and DAP) and the enactment of those pedagogy in question (e.g., enactment of play-based approaches and DAP). However, Marley's case suggests that sometimes teachers' beliefs on specific pedagogy may not be the most relevant to understand their practice. Rather, a teacher's notions of readiness are a significant construct that serves as an avenue for understanding teacher practices and learning. For example, Marley's beliefs about mathematics education changed but her notions of readiness often led her to continue providing skills-based practices. Moreover, when her notions of readiness were seemingly conflicting with new practices, Marley compromised what she was asked to do for the new practices (e.g., calendar time). Thus, this study highlights the importance of understanding teacher's notions of readiness, particularly when new practices are implemented.

Practical Implications

The findings of this dissertation have implications for PreK teacher education. Readiness beliefs continue to have strong impact on practitioners' practice and how they take up PD content. This is in congruence with other literature that argued a teacher's beliefs and assumptions are related to his/her practice and contribute in retaining or transforming the existing practice (Fives & Gill, 2015; Wood et al.,1991). Particularly, Wood and colleagues (1991) claimed that perceptions and practice are interdependent in nature; teachers' beliefs and assumptions are expressed in practice and problems encountered in practice give rise to opportunities to make adjustments to their prior beliefs.

Thus, it would be first important for policy makers in teacher education to critically consider the messages about readiness that are embedded in policies. They must ask questions about their own assumptions of children and pedagogy and the types of knowledge they are privileging before they can successfully design and implement policies.

Then, PD designers who recognize and understand the strong influence of what teachers bring to PD has on teacher practices can mindfully set goals, plan content and create activities to help teachers unpack their readiness beliefs. Included within that content should be ongoing opportunities and support for participants to reflect their own readiness beliefs and to learn about the policies that led to the widespread environmentalist readiness discourse (Brown & Lan, 2015). It may also require understanding different notions of readiness and help them understand how each notion would look in practice. By providing resources that articulate implicit assumptions or beliefs about their enacted practice, teachers can reflect on their own practices in connection to their implied beliefs that they may not be aware of, which will facilitate teacher learning.

In addition, it is important to provide concrete examples of responsive mathematics education. Although Marley was resistant to change in her readiness beliefs and thereby in types of knowledge she valued, she did change in terms of where she found mathematics and how to utilize them in her teaching. What contributed to these changes was her growing awareness of broader perception of mathematics by looking at the practice examples provided by PD instructors. Marley suggested that these practice examples were supportive in building confidence and capacity to respond in the moment, which is critically related to how Marley enacted what she learned from the PD. The power of improvising for responsive teaching has been well recognized in the early childhood education field (Graue et al.. 2014, 2015; Pramling et al., 2019). It is particularly relevant in play-based pedagogy, because children's play is often spontaneous in nature. While this study did not address how to cultivate the improvisational skills, Marley's practices over two years suggest that it involved having various sources of pedagogical content knowledge and using them responsively in the moment. Central to this responsivity are asset-based perspectives. Previous literature suggested incorporating FoK impact positively on cultivating teachers' asset-based views on children (McLaughlin & Barton, 2013; Reyes et al., 2016). Findings of this study, however, suggests that asset-based views and using FoK is bidirectional; having asset-based perspectives support teachers to notice and use FoK in transformative ways. Thus, it would be critical for PD instructors to provide teachers with more opportunities to practice noticing children's knowledge, particularly in the situations that involve making errors or perceived lacking skills.

Furthermore, the ways Marley used children's FoK were limited not only by her notions of readiness but also by her beliefs about culture and conceptions of FoK. For example, Marley was not proactive in learning about and from her children's home practices, because she assumed

that there was nothing much to learn, as both she and her class were White middle-class families. Although the concept of FoK has been developed in the context of Mexican immigrant communities as an effort to achieve educational equity, I argue that its effort to move away from cultural essentialism and towards understanding the complex and diverse nature of any communities and households has implications in every classroom. Learning and incorporating children's FoK are a way to understand cultural and relational aspects of children's home practices, which deepens teachers' knowledge about and strengthens relationships with children. By doing so, it provides teachers with tools to personalize and improvise teaching to connect with children's experiences. Given FoK's relevance to every classroom, it would be important for every teacher education and PD programs to introduce how to tap into children's FoK. Teacher educators can provide opportunities for teachers to reflect not only their own FoK, but also their beliefs and assumptions about diversity and culture. Moreover, it is important for teacher educators to provide support in translating various home practices that may not have academic elements into classroom practices. One of the helpful ways to do this is providing teachers with successful concrete classroom examples of incorporating various types of FoK. Supporting teachers with content knowledge also helps in connecting noticed FoK that is not specifically academic-oriented to classroom practices. In the area of mathematics, for example, teachers' knowledge about early mathematics principles (e.g., one-to-one correspondence) provides entry points to notice informal mathematical concepts within nonacademic activities.

Finally, teachers should be encouraged to gather information about children's FoK beyond home visits. Home visits are undoubtedly a powerful tool, but, as Marley's experiences suggested, exclusive reliance on a family interview (which would most likely to be with an adult member of the family) during a home visit would be limiting in terms of access to information

and types of FoK for several reasons. First of all, building relationship is a cultural activity that tend to favor certain ways of communicating or traits over others that facilitate making connections with teachers. Second, there are meaningful children's FoK that are not necessarily family practice (Esteban-Guitart & Moll, 2014a, 2014b). Third, teachers may not be able to conduct home visits to every child. Thus, it would be important for teachers to be always proactive about finding various ways and contexts to learn children's FoK to access to even richer knowledge base. PD designers can support teachers by encouraging them to learn children's FoK through children or in classroom settings. For example, supporting teachers to learn about children's FoK through various representation children create and a dialogue around it would be helpful to access children's FoK that are meaningful to them (Esteban-Guitart & Moll, 2014a, 2014b).

Limitations of the Study

The present study is limited in several ways, which further research can address. First, the methodological choices of this study were constrained by uses of data that were initially designed for another project. In this study, a data set from a larger project was used to examine concepts which were not central to the original research through retrospective analysis (Heaton, 1998). Thus, some data that might have been helpful in better understanding Marley's case were not generated. For instance, what contributed to Marely's notions of kindergarten readiness was not found. A teacher's beliefs are rarely formed internally, but rather shaped through social interactions with both personal and professional communities (Woods, 2003). Unfortunately, how Marley came to such beliefs was beyond the scope of the data collected. Further research could include more detailed descriptions of a teacher's history and educational backgrounds

(both as a K-12 student and as a teacher candidate) and shed more light onto the context in which teachers reside that shapes their beliefs.

Another limitation of this study is that it focused mostly on the individual process of teacher learning, although the context of the study was a PD that used formats like group discussions. Indeed, each teacher worked with their assigned small group to develop their own Family Math Night activities. Learning is a social activity by nature (Lave & Wenger, 1991) and more scholars recognize that through theory building, research design, or data analysis (Lave & Wenger, 1991). If social aspects of a learning community are taken into consideration, we could gain a more profound understanding of teacher learning. Thus, future research should use analytic strategies that take into account the social dimension of teacher learning (Bandura, 1977).

Recommendations for Future Research

Based on the findings from this study regarding the ideas and practices of a PreK teacher, I recommend several directions for future research. First, a comparative study with teachers from different teaching sites (e.g., community-based, school sites, Head Start) or different personal histories would be one approach to explore how the teachers' history and sociocultural contexts are associated with teachers' notions of readiness. Second, a longitudinal study could be conducted to examine the potential change in teachers' notions of readiness or practices. In such studies, the PD can be specifically designed to provide teachers space to reflect on their notions of readiness. Finally, following that, a study could be conducted to investigate ways to support teachers to better engage in improvisational teaching and/or FoK approaches when teaching mathematics.

Conclusion

Through this dissertation, I endeavored to understand Marley's notions on kindergarten readiness and her roles as a PreK teacher, and how those were related with the ways she implemented the FoK approach and early mathematics in a play-based classroom. From Marley's ideas and practices, I learned lessons about how we think about readiness in ways that are deeply embedded in our pedagogic decisions. My hope is that thoughtful considerations of Marley's practice can lead to the desire for deeper thinking that helps reimagine possibilities for high quality PreK practices that both appreciate children's cultural ways of living and advance their learning.

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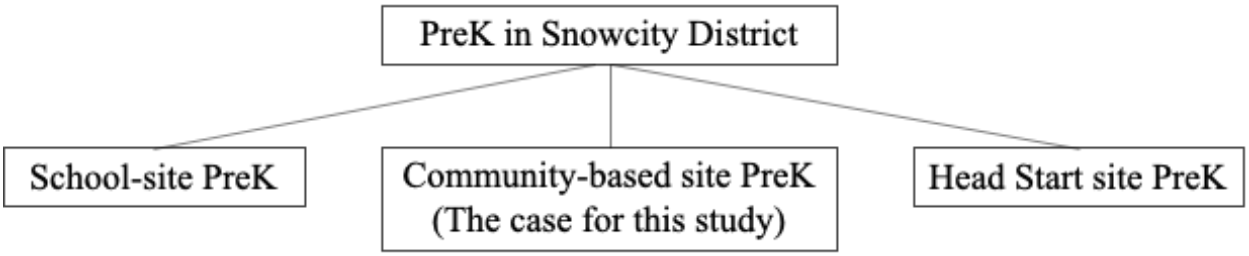
APPENDICES

Appendix A. Definition of Key Terms

1. Public prekindergarten programs (PreK): PreK is defined as "programs funded and administered by the state with a primary goal of educating four-year-olds who are typically developing and who are in classrooms at least two days per week" (Barnett et al., 2009, p. 5).
2. Readiness: In this dissertation, readiness refers to kindergarten readiness. Kindergarten readiness is foundational across early childhood programs. I loosely define readiness as the state stakeholders strive to achieve, and the culmination of the competencies that contribute to children's learning and schooling at kindergarten (Dockett & Perry, 2002). I purposefully define it loosely because the meaning of readiness is locally constructed (Graue, 1993) and thereby want to leave space to fully understand Marley's ways of defining it.
3. Mixed-delivery system (PreK Community Approach): The mixed-delivery system is a PreK delivery system that is based on collaborative partnerships between public schools and community-based early childhood programs. It is a strategy that leverages the existing capacity, expertise, and public investments that support early learning and healthy development. Such a system has the potential to more rapidly expand the availability of high-quality early education and also offers families a choice of preschool settings (Stephens, 2014). The Snowcity district adopted this mixed-delivery system and calls it the PreK Community Approach (see Figure 12).

Figure 12

The Structure of the PreK Delivery System in the Snowcity School District (SSD)



4. Community-based site: I use this term interchangeably with child care center, community-based preschool, community-based child care center, and community-based early childhood programs.

5. Head Start: Head Start is a federal program that promotes the school readiness of children from birth to age five from low-income families.

6. Preschool: Preschool is an umbrella term for center-based early childhood education services that serve three-year olds and four-year-olds. I include private centers as well as other publicly-funded settings within the scope of preschool (Chaudry & Datta, 2017).

7. Developmentally Appropriate Practices (DAP): Developmentally appropriate practice (DAP) is a teaching philosophy in early childhood education grounded in the research on how young children develop and learn, and in what is known about effective early education. Its framework was designed by the National Association for the Education of Young Children (NAEYC) in 1987 to promote young children's optimal learning and development. There are three core considerations in DAP (NAEYC, 2009): 1) knowledge of child development and learning, 2) knowledge about what is individually appropriate (interests, abilities, and developmental progress), and 3) knowledge about social and cultural contexts in which children live (values, expectations, and conventions).

8. National Association for the Education of Young Children (NAEYC): NAEYC is a practitioner-based early childhood education organization.

9. Professional development (PD): PD is a continuing education effort for in-service teachers to develop an individual's skills, knowledge, expertise, and other characteristics as a teacher (OECD, 2009).

10. PreKPD: PreKPD is the professional development program for PreK teachers in which this study is based.

11. Funds of Knowledge (FoK): FoK are historically accumulated and culturally developed bodies of knowledge and skills essential for household or individual functioning and well-being (Moll, et al., 1992, p. 133).

12. Pedagogical Content Knowledge (PCK): Pedagogical content knowledge (PCK) is defined as "a knowledge of subject matter for teaching which consists of an understanding of how to represent specific subject matter topics and issues appropriate to the diverse abilities and interest of learners" (Shulman & Grossman, 1988, p. 9, as cited in McCray & Chen, 2012). Three knowledge bases that are identified as elements of PCK are 1) knowledge of content ideas (CK), 2) knowledge of appropriate teaching practice for illustrating those concepts, and 3) knowledge of the development of student understanding of the content.

13. Content Knowledge (CK): Content knowledge (CK) refers to the necessary subject matter knowledge base for teaching (Shulman, 1987).

Appendix B. Interview Protocol

Initial Interview September 30, 2011

1. Tell me about yourself.
2. If you were going to describe your philosophy of teaching young children, how would you describe it?
3. There's a lot of buzz about PreK – what is your understanding of the role of PreK in the K-12 system? What kinds of messages have you gotten about the goals of the program?
4. What is the best way to find out what a child knows about number concepts?
    a. Can you think of examples of how children show what they know?
5. What have you found successful in working with and learning from parents, both around mathematics and about education in general?
    a. In learning from families in general, what barriers have you found in working with parents?
6. In any classroom there's variability – whether you're talking about mathematics or social skills or physical skills. How could you address these differences in your classroom?
7. What are you hoping to get out of the PreK professional development?
8. Is there anything else I should ask you about that you think is important?

End of the first year interview on May 15, 2012

1. This has been an exciting year, getting ready for PreK. How would you describe the first year in PreK?
    a. Can you think of any like highlights or challenges or successes or failures or things that like really stand out to you across the year?
2. How would you describe your students in Septembers and then how would you describe them now?
3. How would you describe your teaching at the start of the year and now at the end?
4. How has the PreKPD project supported your teaching this year?
5. What do you think that you've learned about developmentally appropriate teaching?
    a. How do you think that worked into your play or what they're learning through play in your classroom?
6. Could you tell me a little bit about what you've learned about funds of knowledge and how it impacts your teaching?
7. How do you think the PreKPD has helped with teaching that focuses on early math and how has your thinking changed?
8. Could you brainstorm the different ways that your kids have learned math this year? What would be on your brainstorming list?
9. When you observe your kids in play, how did they take up mathematical ideas that you present? Could you share examples?
10. What did you learn from working with one focal child and and his/her family over the time?
11. What are you hoping to get out of it next year, the PrePD?
12. Is there anything else you think I should ask you or know about?

Exit Interview on June 2013

1. The action research process was a community effort during which you were all learning from each other. What are some lessons you took away from your work or from somebody else's?
2. One of the things we were trying to do was to get you to bring together some pretty complex topics in your practice. While we know it would be easy for you to talk about these topics separately, can you give me an example of something that you or somebody else did that built on children's funds of knowledge with mathematically rich play?
3. If you were going to describe funds of knowledge for someone who wasn't in the PD, how would you describe it?
4. How would you describe the value of funds of knowledge to someone who's skeptical?
5. If you're going to describe mathematically rich play to somebody who wasn't in the PD, how would you describe it?
6. What is the role of mathematically rich play in PreK?
7. Who are the advocates for this? And who are the skeptics? And how would they talk to each other?
8. How has your thinking about math in PreK changed?
9. What are some things you do in your class now that you didn't do before?
10. As a community, you all came up with some interesting activities and practices in your classrooms. What are some examples of things you incorporated this year that you might try again next year?
11. What some examples of some things your colleagues tried that you might try next year?
12. These past two years have been a wonderful learning experience for us, and as we worked with you, if we were going to do this kind of PD again, what recommendations would you have for changing it? And if we could only do a small part of the PD, what would you suggest we focus on?
13. Is there anything else that you would like to add?

Appendix C. Assignments and Reading List for the PreKPD (From Course Syllabi)

Assignments and Reading List for the First Course (Fall, 2011)

Early Childhood Education
PreK Program

DATE	TOPICS & READING ASSIGNMENTS
9/14	*Introduction* What is PreK? Hopes & fears of teaching PreK? early mathematics? Working with families
9/21	*Starting with the Child* Guberman, S. R. (2009). Cultural aspects of young children's mathematics knowledge. In J. Copley *Mathematics in the Early Years.* pp. 30-36. Pianta, R. (2007). Preschool is school, sometimes. *Education Next.*
9/28	**Reciprocal Funds of Knowledge** *Choose 1* Moll, L. Amanti, K., Neff, D., Gonzalez, Funds of knowledge for teaching: Using a qualitative approach to connect homes & classrooms. In N. Gonzalez, L. Moll & C. Amanti *Funds of knowledge: theorizing practices in households, communities, and classrooms.* p. 71-88, Mahwah, NJ: Lawrence Erlbaum Ginsberg, M. (2007) Lessons at the kitchen table. *Educational Leadership.*
10/5	**Reciprocal Funds of Knowledge** *Thinking Like an Ethnographer* *Ethnographic Eyes, Chapter 2 (The neighborhood map) and 3 (Ethnographic interviews for teachers.* *Introduction to Action Research* *Reflection Assignment 1* *Describe the process you used to choose your focal child. Describe him/her as an individual, as a member of your class, and as a mathematics learner.*
10/12	**Reciprocal Funds of Knowledge** Balfanz, R. (1999). Why do we teach young children so little mathematics? Some historical considerations. In J. Copley *Mathematics in the Early Years.* pp. 3-10. *Choose 1* Amanti, C. Beyond a beads and feathers approach. In N. Gonzalez, L. Moll & C. Amanti *Funds of knowledge: theorizing practices in households, communities, and classrooms.* p. 119-130, Mahwah, NJ: Lawrence Erlbaum

Tenery, M.F. La Visita In N. Gonzalez, L. Moll & C. Amanti *Funds of knowledge: theorizing practices in households, communities, and classrooms.* p. 119-130, Mahwah NJ: Lawrence Erlbaum.

10/19 **Mathematics**

Carpenter, T. C. (2010). Counting. Working Paper.

Reflection 2
All children come to school with resources for learning. Describe what you know about your focal students' funds of knowledge for learning mathematics.

10/26 **Mathematics**

Copley, J. V., Jones, C., Dighe, J. (2010). The creative curriculum for preschool: Mathematics. p. 441-449. Washington D.C.: Teaching Strategies
Choose 1
Sections from Chapter 24 Mathematics Learning in Interest Areas and Outdoors (to be handed out in class)

11/2 **Mathematics**

Hill, S. Learning Stories. Retrieved Sept. 13, 2011.

Go to the follow website and scroll down to 'Learning Stories and Assessment of Powerful Mathematics Ideas'. Make sure to click on the PDF of the learning stories.

Developing an Action Research Question

11/9 **ECE**

Bodrova, E. & Leong, D. (2003). Chopsticks and counting chips. Do play and foundational skills need to compete for the teacher's attention in the early childhood classroom? *Young Children.*

11/16 *ECE Seeing history in today's practice*

Choose one of the following:

Wolfe, J. (2000). Maria Montessori. Learning from the past: Historical voices in early childhood education.

Wolfe, J. (2000). Lucy Sprague Mitchell. Learning from the past: Historical voices in early childhood education.

Wolfe, J. (2000). John Dewey. Learning from the past: Historical voices in early childhood education.

Piaget in Theories of childhood St Paul: Redleaf Press

Vygotsky in Theories of childhood St Paul: Redleaf Press

11/23 no class

11/30 ECE

Wien, C.A. 2004. From policing to participation: Overturning the rules and creating amiable classrooms. Young Children 59 (1): 34-40.

Action Plan for Action Research

Home visit reflection
Describe your home visit with your focal child, detailing the neighborhood context, the nature of your interactions with family, and the child's disposition at home.

12/7 What should PreK look like?

12/14 PreK Lab

Reflection 3

Write a learning story about your focal child.

PreK-PD Focal Child Project

Early childhood curriculum is most relevant, effective, and true when designed in relation to particular children's interests, needs, experiences, and resources. For this reason, the main assignments in the PreKPD courses are related to working with a focal child to connect the ideas we discuss in class to the experiences of a four year old.

To challenge you in this task and to help you develop responsive practices, we ask that you select a child in your class who is different from you on two dimensions of difference. These differences include: dis/ability, class, race, language, socioeconomic status, family structure, gender. Part of DPI funding for PreK requires home-school connection activities, so we hope that this will just enrich work that you are already doing.

Here are the basic dimensions of the assignment, which will run across the three courses through the year:

Identify a four year old in your class and contact the family to ask for a partnership.
We've attached a letter that explains the research side of the relationship.
Follow this child's development over the course of the PreK year in school and home settings.
The syllabus for each course will include activities that involve learning from your focal child. Keep that timeline in your head as you plan your activities and recognize that you can gather more than one artifact at a time.
We will work together to develop interview protocols to help you learn about the child's early mathematics knowledge, particularly as it relates to counting and number.
Keep in mind that the syllabus is secondary to the importance of forming a meaningful relationship with the child and his/her family.

Important ideas to remember as you develop relationships:
Work to connect with families-- they are an important source of knowledge about the child. A key element of this program is learning how to build reciprocal funds of knowledge - recognizing that home and school have something to offer in education and working to capitalize on that relationship.

You'll share information about your visits and about the focal child's learning. Remember that respectful relationships require that you keep the child and family's identity confidential and that you always speak of them as if they were in the room.
Working across difference can be intimidating – what if the family is shy/irritated/scary/mean/suspicious/bossy/etc? These are quite likely the very same questions families ponder each year when they send their children to a classroom.

If you have any more questions about this aspect of the program, please let us know. We're here to help as well as stretch you- and we're happy to-really!

Assignments and Reading List for the Second Course (Spring, 2012)

Learning Environments for Initial Education Programs- PreK PD Program

> Current understandings of development suggest that, in principle, the younger the learner, the larger proportion of time should be allocated to informal activities. However, there are at least three kinds of informal activities: (a) spontaneous dramatic play, (b) arts and crafts activities, and (c) cooperative work on extended group investigations or similar exploratory and constructive projects in which the teacher's role is consultative rather than didactic. (Katz, 1995)

This is the second course in a program created through a collaboration among SSD, THE UNIVERSITY, and the National Science Foundation to build developmentally & culturally responsive programming for Snowcity's four-year-olds. Using pre-K mathematics as a prism for understanding four-year-old learning and development, we will create a model for PreK programming in both school & community contexts. We will blend attention to best practices in early childhood education, culturally responsive design and children's number sense. In this second course we conceptualize environments broadly to include the multiple contexts in which children learn. The key elements of this experience will be learning to:
think about your role as a teacher from a design perspective
consider how environments inform each other
use your understanding of environments to design and evaluate
recognize the resources available for learning within children's homes and communities and use them to enrich the interactions children have with important adults in their lives.

Assignments:

FAMILY MATH GROUP PROJECT:

You will be working with your Focal Child group to develop plans for a family math project. In designing the project, your group will consider the funds of knowledge of each of your focal child families. In addition, it is expected that you will consider your other PreK students in designing activities. Though you will work together, each of you will design an activity. Each activity should be described using the Family Math Activity form, with relevant details of the activity, connections to funds of knowledge and potential learning outcomes across domains.

MATH LEARNING STORIES:

During the semester you will add more chapters to your learning story about your focal child. You'll be asked to write three learning stories about your focal child in the following contexts: in relation to learning in the classroom, your planning of a family math night activity, and in relation to curriculum, standards, and assessment.

Date	**Topic**
1/11	**Introduction & Home** Graue, M. E., & Oen, D. (2008). You Just Feed Them With a Long-Handled Spoon Families Evaluate Their Experiences in a Class Size Reduction Reform. *Educational Policy, 23*(5), 685. PEA. doi:10.1177/0895904808321271
1/18	**Home** Griffiths, R. (2007). Young children counting at home. *Mathematics Teaching Incorporating Micromath, 203* (July). p. 24-26. Grant, K.B. & Ray, J.A. (2010). Preparing for familiy events. In K.B. Grant & J.A. Ray. *Home, school, and community collaboration. Culturally responsive Family involvement.* (p. 317-344)Los Angeles: Sage Publications.
1/25	**Equity** *Choose 1* Espinosa, L (2010). Research findings and recommendations for children living in poverty. *Getting it right for young children from diverse backgrounds: Applying research to improve practice.* Washington: NAEYC *OR* Espinosa, L (2010). Research on the development, learning, and teaching of young ELL's. *Getting it right for young children from diverse backgrounds: Applying research to improve practice.* Washington: NAEYC *AND* Wager, A. (in progress). Equitable mathematics pedagogy in preK.
2/1 kw, bc	**Language** Long, S., & Volk, D. (2010). Networks of support. Learning from the other teachers in children's lives. *Home-school connections in a multicultural society* (pp. 177-200). New York: Routledge. Dale, B. Ryder, E. Strong, L. Houssart, J. (2009) 'Listen, it's easy: Children as teachers of counting. In. J. Houssart & J. Mason (Eds.) *Listening counts. Listening to young learners of mathematics.* (p. 127-142) Stoke-on-Trent: Trentham Books.
2/8 ak, si *Learning Story 1 Due*	**Intentional Teaching in Play** Jones, E. & Reynolds, G. (2011). *The play's the thing. Teachers roles in children's play.* 2nd edition. New York: TC Press. Ch. 4 & 5. **For Fun**, meaning you don't have to read it, but if you're interested… Jones, E. & Reynolds, G. (2011). *The play's the thing. Teachers roles in children's play.* 2nd edition. New York: TC Press. Ch. 6
2/15	**Teacher child interaction**

kw, bc

Tharp, R. & Eritz, S. (2011). From high chair to high school: Research-based principles for teaching complex thinking. In C. Copple. *Growing minds. Building strong cognitive foundations in early childhood*. p. 131-136. Washington: NAEYC

Dombro, A.L., Jablon, J., Stetson, C. (2011). Powerful interactions: First look. In *Powerful interactions: How to connect with children to extend their learning*. p. 1-10. Washington, DC: NAEYC

Pound, L. (2008). Looking for patterns. *Thinking and Learning about Mathematics in the Early Years.* p. 31-39. New York, NY: Routledge.
Tucker, K. (2010). Mathematics Through Play in the Early Years.

2/22 **Classroom Space**

ak

Pound, L. (2008). Playing maths. *Thinking and Learning About Mathematics in the Early Years.* p. 40-54. London: Routlege.

Home Visit Reflection Due

Curtis, D. & Carter, M. (2003). Enhancing children's use of the environment. In Designs for living & learning. *Transforming early childhood environments*. p. 178-189 St. Paul: Redleaf Press.

NEW DATES!!!

3/7 **Management**

kw

All: search in progress

Jigsaw

Whitechurch, S, & Sprague, J. The problem solver job. Peer-mediated conflict resolution. In *Teaching Young Children 5*(2)

Koralek, D. Adapt the environment to meet differing emotional needs. *Teaching Young Children 4*(2).

Soundy, C.S. & Stout, N.L. (2002). Pillow talk. Fostering the emotional and language needs of young learners. *Young Children* p. 20-24

Jones, N.P. (2008). Grouping children to promote social and emotional development. *Young children*. p. 34-39.

Pica, R. (2011). Helping children cooperate. Young children. p. 60-61.
Colker, L.J. Teaching young children to think optimistically. *Teaching Young Children.*

3/21 **Present family math activities**

ak

4/11 **Standards**

kw

Learning Story 2 Due

Graue, E. (2008). Teaching and learning in a post-DAP world. *Early Education & Development, 19*(3), 441–447. Routledge. doi:10.1080/10409280802065411

Moomaw, S. Math Begins in Preschool: Talking the Language of Math

4/25	**Curriculum**
ak	TBA
5/9	**Assessment**
kw	Seitz, H. (2008). The power of documentation in the early childhood classroom. *Young Children*. P. 88-93.
Learning Story 3 Due	Moomaw, S. (2011). Integrating curricula to mathematics goals: Putting it all together. *Teaching Mathematics in Early Childhood*. p. 163-190. Baltimore, MD: Paul H. Brooks.
	Copley, J. V., Jones, C. & Dighe, J. (2010). *The Creative Curriculum for Preschool: Mathematics.* p. 469-472, 448, 457, 463-464. Washington, DC: Teaching Strategies.

Assignments and Reading List for the Third Course (Fall, 2012)

ASSIGNMENTS

This semester you have 5 assignments: your autobiography; a conference summary in lieu of class on 11/14; a home visit reflection; and 2 learning stories. Each learning story will have a different focus as outlined in assignments 1&2. Your learning story should include the following:

- DESCRIBING- A structured written narrative describing what you observed.
  - The context (Where/When did the activity take place? Positions of you and child?)
  - The activity (What was s/he doing?)
  - Any interaction with others or materials if appropriate (with whom/what?)
- DOCUMENTING- Evidence of the activity such as photographs of the activity, videotape of the activity, and/or photograph of your focal child's work
- DISCUSSING- What does the story demonstrate- be sure to consider which of the aspects of child development and counting apply.
- DECIDING- What is your plan of action to build on what you have observed?

Assignment #1: Autobiography DUE: 9/10

Assignment #2: Learning Story – Student Observation DUE: 10/17
In this learning story you will describe an observation of your focal child during free choice/play in your classroom. You will DESCRIBE the setting, provide evidence of the experience, DISCUSS what you learned about the child's development in mathematics, and DECIDE what to do next. Think about ways you have described your focal child's understanding of counting or number concepts and capture a learning experience connected to what you have planned/ is happening in the classroom. Further, how does the classroom space and/or interactions with you or classmates (or solo play) prompt your focal child's learning in counting or number. Comment on the Critical Relevant Pedagogy that may or may not be present in this learning experience; why or why not?

Assignment #3: Learning Story – Student Interview DUE: 10/17
In this learning story you will describe an interview/direct assessment of your focal child. You will DESCRIBE the setting, provide evidence of the experience, DISCUSS what you learned about the child's development in mathematics, and DECIDE what to do next. Think about what you have learned about your focal child's understanding of counting or number concepts and how that differs (or not) from what you've observed happening in the classroom.

Assignment #4: Home Visit Reflection DUE: 11/7
The home visit assignment will push you to apply your knowledge of the *funds of knowledge* approach (in regards to ethnography) by visiting, observing and gathering information about the child's home life experiences. This is an opportunity to learn about your focal child's family and their daily activities. Reflecting on the planning and questions created last year, you will plan a home visit that allows you to be a participatory observer (one who is active in the experience while observing and later reflects). Your reflection should have the following sections:

- Setting: Describe the context, including your knowledge about the focal child's family, the neighborhood and any other relevant information.
- Interactions: Describe the interactions between you and the family member(s) present. The responsiveness to questions? The body language? Divulging information?
- What connections can you make between home and school?

Assignment #5: Two-way Conference Information DUE: 11/28
Similar to last year, this assignment is in lieu of class on the Wednesday before conferences. Prior to conferences, you will characterize the counting skills for each child in your class. During conferences you will ask families to describe their child's counting skills and then share what you know. All of the information will be recorded on a worksheet and submitted.

READINGS

Books provided:

Castle, K. (2012). *Early Childhood Teacher Research: From Questions to Results.* New York, NY: Routledge.
Hubbard, R. S. & Power, B. M. (1999).*Living the Question: A Guide for Teacher Researchers.* York, ME: Steinhouse Publishers.
MacNaughton, G. & Hughes, P. (2008). *Doing Action Research in Early Childhood: A Step by Step Guide.* New York, NY: McGraw-Hill.

Week 1 9/12	*Welcome Back* Pizza Party Catching up & semester overview Preview Culturally Relevant Pedagogy	<u>Readings:</u> None
Week 2 9/19	*Culturally Relevant / Developmentally Responsive Pedagogy:* Revisit CRP definitions developed – where does developmentally responsive fit in? Focal Child Project Overview FC Project Activity *Action Research:* Presentations by Cohort 1	<u>*Assignment:*</u> **Autobiographies** <u>*Readings:*</u> But That's Just Good Teaching (Ladson-Billings) Smartness as a Cultural Practice in Schools (Hatt)
Week 3 9/26	*Academic Achievement:* Math in Play Math in Play lessons – spanning whole group to spontaneous *Action Research* Introduction - Book Club	<u>*Readings:*</u> Mathematics Curricula in Early Childhood (Clements & Sarama) Practices that Support Mathematics Learning in Play-based Classrooms (Wager)
Week 4 10/3	*Academic Achievement:* Math in Play lessons – spanning whole group to spontaneous	<u>*Readings:*</u> Ch 1 (MacNaughton & Hughes) Ch 1 (Hubbard & Power) Ch 1&2 (Castle)
Week 5 10/10	*Academic Achievement:* EC math is more than counting jigsaw.	<u>*Readings:*</u> ONE OF THE FOLLOWING:

	What are learning trajectories/developmental guidelines? Can learning trajectories be culturally relevant? Guests	Measuring experiences for young children (Coply et al.) Mathematical pattern hunters (Whitin & Whitin). Young Children's ideas about geometric shapes (Clements & Sarama) I scream, you scream: Data analysis with kindergarteners (Cook) VARIOUS: Creative Curriculum for Preschool Math (Copley, Jones, & Dighe) ALL: Thinking about learning trajectories in preschool (Brown, Sarama, & Clements)
Week 6 10/17	*Academic Achievement:* CGI refresher CGI through a culturally relevant/ developmentally responsive lens CGI in play	*Readings:* CGI (Carpenter) *Assignment:* **Learning Story #1 – Student Observation**
Week 7 10/24	*Action Research:* Generating Topics *Academic Achievement=>Cultural Competence:* The math/home connection	*Readings:* Ch 2 (MacNaughton & Hughes) Ch 2 (Hubbard & Power) Ch 3 (Castle) ABCs of Early Mathematics Experiences (Hansen)
Week 8 10/31	No Class - Halloween	
Week 9 11/7	*Cultural Consciousness*: Connecting identity, culture, and mathematics	*Readings:* Honoring the Lives of All Children (Nieto, 2012) What isEthnomathematics and How Can It Help Children in Schools? (D'Ambrosio) *Assignment:* **Learning Story #2 – Student Interview**
11/14	*Cultural Consciousness:* How home visits support cultural awareness? Discuss home visit experiences	*Readings:* Mathematics as social: Understanding relationships between home and school numeracy. (Baker, Street & Tomlin) *Assignment:* **Home Visit Reflection**
11/21	No Class – Thanksgiving	
Week 10	*Action Research:*	*Readings:* Ch 3 (MacNaughton & Hughes)

11/28	Brainstorming questions about culturally relevant and developmentally responsive EC math *Cultural Consciousness => Social Justice* Strategies for home-school connections	Ch 3 (Hubbard & Power) Ch 4 (Castle) Engaging families in meaningful mathematics (Burton & Baum) *Assignment:* **Conference Response**
Week 11 12/5	*Social Justice:* Teaching math for social justice in EC: what content is developmentally okay? How can we make math connections?	*Readings:* What Color is Beautiful (Segura-Mora) Raising Issues of Race with Young Children (Tenorio)
Week 12 12/12	*Putting it Together with Action Research:* Refining research questions and developing plan for culturally relevant and developmentally responsive EC math	*Readings:* Ch 10 (MacNaughton & Hughes) Ch 4(Hubbard & Power) Ch 5 (Castle)

Assignments and Reading List for the Final Course (Spring, 2013)

ASSIGNMENTS

This semester you have one final action research project. We will provide scaffolded support throughout the semester as you design the research project, gather and analyze data, find supporting literature, and compile your work into a final written product.
DUE: 05/08/2013

Not a required assignment for the class, but you may find conducting one (or more) home visit to be beneficial as you move forward with your Funds of Knowledge- based action research project. We will read and respond to any home visit reflections.

READINGS:
Books provided:

Castle, K. (2012). *Early Childhood Teacher Research: From Questions to Results.* New York, NY: Routledge.

Hubbard, R. S. & Power, B. M. (1999).*Living the Question: A Guide for Teacher Researchers.* York, ME: Steinhouse Publishers.

MacNaughton, G. & Hughes, P. (2008). *Doing Action Research in Early Childhood: A Step by Step Guide.* New York, NY: McGraw-Hill.

Session 1 1/16	*Welcome Back/ Develop Action Plans*	**Questions to Discuss** How does my plan for data collection fit in with what I am doing in my class? How does it fit in with the schedule for this class? Bring schedule of data collection plan	<u>Readings:</u> Ch 10 (MacNaughton & Hughes) Ch 4 (Hubbard & Power) Ch 5 (Castle) **Review readings from last semester
Session 2 1/30	*Finding Supporting Literature*	**Questions to Discuss** How do I find literature that aligns with my project?	*<u>Readings:</u>* Ch 4 (MacNaughton & Hughes) Ch 6 (Hubbard & Power)
Session 3 2/13	*Literature Review*	**Questions to Discuss** How do I organize and write up my literature review? Bring list of supporting research you will be using.	*<u>Readings:</u>* Ch 6 and 8 (MacNaughton & Hughes) Review last week's readings (about literature reviews)
Session 4 2/27	*Data Analysis*	**Questions to Discuss** How do I analyze the data I am collecting? Bring any data you have collected	*<u>Readings:</u>* Ch 12 (MacNaughton & Hughes) Ch 5 (Hubbard & Power) Ch 6 (Castle)
Session 5 3/13	*Data Analysis*	**Questions to Discuss** What do the findings from my data analysis reveal?	*<u>Readings:</u>*

		Bring data to share and what your analysis of the data has told you	Ch 13 and 15 (MacNaughton & Hughes)
SPRING BREAK 3/27	*SPRING BREAK*		*SPRING BREAK*
Session 6 4/10	*Writing up the project*	**Questions to Discuss** How do I turn my outline into a paper? Bring outline to class	*Readings:* Ch 16 (MacNaughton & Hughes) Ch 7 (Hubbard & Power) Ch 7 (Castle)
Session 7 4/24	*Writing up the project/Peer-Editing*	**Questions to Discuss** How do we provide constructive feedback? Bring all materials (outline, data, final papers) to work with partners to provide feedback	*Readings:* Ch 14(MacNaughton & Hughes) Ch 8 (Hubbard & Power) Ch 8 (Castle)
Session 8 5/8	*Presentation Development/ Presentations*	A work session provided for any wrap up work on AR projects: designing the presentation, final peer feedback, informal presentations of work to our cohort	
5/28 4:15-6:15 Location: TBA	*Classroom Action Research Presentations*	Present with district CAR participants	