IJEC (2017) 49:95–111
DOI 10.1007/s13158-017-0179-3

ORIGINAL ARTICLE

Early Childhood Teachers' Pedagogical Reasoning About How Children Learn During Language and Literacy Instruction

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Published online: 9 February 2017

Abstract The knowledge that teachers hold about children's learning is important to teachers' practice. Few studies have examined how early childhood teachers use such knowledge during moment-to-moment instruction for language and literacy learning. This study employed a phenomenological approach to understand the knowledge that eight early childhood teachers used to inform their pedagogical reasoning during language and literacy activities. Stimulated recall interviews about practice were conducted with the prekindergarten teachers. Results indicated that the teachers used multiple sources of knowledge to inform their pedagogical reasoning that included: conceptions about how children learn; knowledge about specific children and the learning goals for these children; factors related to the school context; and ideas about themselves as teachers. The analyses revealed that the teachers' various sources of knowledge functioned together to influence their enacted practice. Implications for professional learning and policy are discussed.

Keywords Early childhood education · Pedagogical reasoning · Language and literacy instruction · Phenomenology · Stimulated recall interviews · Knowledge for teaching

Résumé Les connaissances que les enseignants ont de l'apprentissage des enfants sont importantes pour leur pratique. Peu d'études ont examiné comment les enseignants de la petite enfance utilisent ces connaissances sur le vif lors de consignes relatives au langage et à la littératie. Cette étude a utilisé une approche phénoménologique pour comprendre les connaissances que huit enseignants de la petite enfance utilisaient pour former leur raisonnement pédagogique au cours d'activités de langage et de littératie. Des entrevues de rappel stimulé sur la

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pratique ont été menées avec les enseignants de pré-maternelle. Les résultats indiquent que les enseignants utilisent diverses sources de connaissances pour former leur raisonnement pédagogique, y compris: les conceptions de la façon dont les enfants apprennent; des connaissances sur des enfants particuliers et les objectifs d'apprentissage pour ces enfants; des facteurs liés au contexte de l'école; et des idées sur eux-mêmes en tant qu'enseignants. Les analyses révèlent que les diverses sources de connaissances des enseignants fonctionnent ensemble pour influencer leur pratique concrète. Les implications pour l'apprentissage professionnel et les politiques sont discutées.

Resumen El conocimiento que los docentes tienen sobre el aprendizaje de los niños es importante para la práctica docente. Pocos estudios han examinado cómo los educadores preescolares utilizan esos conocimientos durante momentos de instrucción para el aprendizaje de lenguaje y alfabetización. Este estudio empleó un enfoque fenomenológico para comprender el conocimiento que ocho maestros de la primera infancia utilizaron para informar su razonamiento pedagógico durante actividades de lenguaje y alfabetización. Entrevistas de recuerdo estimuladas sobre la práctica se llevaron a cabo con los maestros de pre-kinder. Los resultados indicaron que los maestros utilizaron múltiples fuentes de conocimiento para informar su razonamiento pedagógico que incluyeron: concepciones acerca de cómo los niños aprenden; conocimientos específicos acerca de los niños y los objetivos de aprendizaje para los niños; los factores relacionados con el contexto escolar; e ideas acerca de sí mismos como maestros. El análisis reveló que las variadas fuentes de conocimiento de los maestros funcionan juntas para influir en la práctica. Implicaciones para el aprendizaje profesional y político son discutidas.

Introduction

Knowledge about how young children learn as it relates to language and literacy instruction has received extensive attention in the early childhood field (Lonigan et al. 2011; National Early Literacy Panel 2008; Snow et al. 1998), including recommendations about what quality professional development should include (Buysse et al. 2009; Sheridan et al. 2009). In a recent study, Cox et al. (2015) found that providers of professional development focus more on teachers' knowledge about children's development and learning than any other type of knowledge, including content knowledge or how to apply knowledge into practice. Thus, both the empirical research and research on the design of professional development indicate that teachers' knowledge of children's early learning for language and literacy is important for practice. The present study is focused on early childhood teachers' knowledge in use, in this paper referred to as pedagogical reasoning. Specifically, this study focuses on prekindergarten teachers' pedagogical reasoning with knowledge about how children learn during language and literacy instruction as well as other knowledge influencing their practice.

Pedagogical Reasoning

Shulman (1987) conceptualized the process of assimilating knowledge to enact practice as pedagogical reasoning. Pedagogical reasoning is when teachers use various sources of knowledge to make choices about their actions and practices while teaching. Using the concept of pedagogical reasoning is important in two ways. First, in delineating the types of knowledge that teachers may use in their pedagogical reasoning, Shulman (1987) considered knowledge about how children learn as one of the multiple strands of information that inform pedagogical reasoning. Second, an important part of pedagogical reasoning is acknowledging teachers' agency in making choices during instruction. Conceptualizing knowledge in use during instruction as pedagogical reasoning focuses on the internal processes that teachers engage in during teaching.

In order to describe teachers' experiences of teaching and their use of knowledge about how children learn, there must be a means for teachers to talk about their pedagogical reasoning. A phenomenological research approach was used in this study (Marton 1981). There are two important components to phenomenological work: describing the phenomenon of interest, in this case, teaching young children, and describing the participants' experiences of the phenomenon. In the context of this study, phenomenology is used as a way to understand how teachers reason about their practice as it is enacted. In this sense, phenomenological research moves beyond a traditional measurement approach for assessing teachers' knowledge in order to connect teachers' experiences and pedagogical reasoning with their actions in practice. Through this approach to the research, we can investigate the different ways teachers use their knowledge to inform practice for language and literacy instruction.

The Present Study

The purpose of this study was to investigate how teachers' pedagogical reasoning informs practice for language and literacy instruction. The research focuses on both what was happening in a teacher's moment-to-moment language and literacy instruction and how teachers used their knowledge to reason about those moments of instruction. This study addresses the following research question: *How do prekindergarten teachers use knowledge about how children learn to inform their pedagogical reasoning in their moment-to-moment instruction during two different language- and literacy-centered instructional activities?*

Method

The data presented in this study come from a broader study investigating the types of knowledge that teachers used in their pedagogical reasoning. The study was approved by a University Health Sciences and Behavioral Sciences Internal Review

Board. Participating teachers signed a written consent form before engaging in the study.

School Settings

Two private parochial schools in one large Midwestern city in the USA, the Friendship School and the ABC School, agreed to participate in the study. The Friendship School director identified that children's socio-emotional development was the main curricular focus, and the ABC School's director identified that their primary focus was "academic." Each school had different learning goals for the children. The ABC school had more specified learning objectives such as, "Children are expected to: Follow simple directions (3–4 at a time)" compared to the Friendship School curriculum which listed curricular topics like "stories" or "poetry." There were also different center-wide structures for how content was to be delivered to children. For example, to address learning about letters the Friendship School implemented a "letter of the week" curriculum and the ABC School used a published workbook-based program titled *Beginning to Read, Write, and Listen K-1* (MacMillan/McGraw-Hill School Division 1995).

Participants

All of the prekindergarten teachers at each school were invited to participate in the study. Four of the six prekindergarten teachers from the Friendship School and all four teachers from the ABC School agreed to participate. The eight teachers who participated had a range of formal educational backgrounds and years of experience teaching preschool. There was an almost even distribution across teachers in their educational backgrounds with five holding degrees related to education. Teaching experience ranged from <1 to 22 years ($M = 9.79$, SD = 7.38). Three of the teachers had <5 years of teaching experience, an important cutoff for teaching effectiveness (Palmer et al. 2005; Rivkin et al. 2005). All participants were Caucasian females aged 27–67 ($M = 49.5$, SD = 16.19). Table 1 provides more description about the teachers and their practices.

Instructional Activities

To understand how teachers used knowledge about how children learn in language and literacy instruction, two instructional contexts were selected—whole-group instruction time (called "circle time" by teachers) and teachers' self-selected language arts time. These included the scripted curriculum implementation at the ABC School along with a variety of phonological awareness (rhyming) and book-reading activities at the Friendship School. These two instructional contexts were chosen because of their common frequency within early childhood classrooms (Fuligni et al. 2012) and for the focus on fostering language and literacy learning (Han et al. 2005; Yifat and Zadunaisky-Ehlrich 2008).

Each teacher was observed twice in each activity, resulting in four total observations per teacher. This allowed opportunities to confirm patterns across

Table 1 Teacher descriptive characteristics and number of episodes of pedagogical reasoning

	Number of years teaching preschool	Highest degree and certifications	Total episodes of PR	Episodes of PR using knowledge of how children learn
Friendship School				
Amanda	5	B.A. General Studies	72	5
Jacki	>1	B.S. Elementary Education, K-5 Special Education Certification	64	6
Catherine	6	M.A. Religion and Art	61	27
Pamela	12	B.A. Elementary Education, K-6	61	20
ABC School				
Beth	3	M.A. Elementary Education, K-6	77	18
Linda	22	A.A. Secondary Education	72	6
Abby	15	B.A. Elementary Education, K-6 Early Childhood Certification Reading Endorsement	64	8
Deanna	15	M.E. K-12 Education	66	8

All school and participant names are pseudonyms

PR Pedagogical reasoning

teachers as well as allowed for variations in pedagogical reasoning within and across differing instructional activities.

Data Collection

Data collection lasted approximately one month and occurred simultaneously at both schools. Three types of data were collected: (1) background information on teachers and schools; (2) observational data on instructional activities; and (3) teacher interview data. The author conducted each stage of the data collection process. The author's goal was to build rapport with participants and ensure their comfort with being observed and interviewed, in order to increase the authenticity of the data collected (Schachter and Freeman 2015).

Background Information

Information about each school was collected through informal, semi-structured interviews with each center director and the collection of curriculum documents. Basic demographic information about the teachers was obtained through a survey.

Observation Data

Each teacher was observed and video-recorded twice during circle time and twice during language arts activities. Each instructional activity was recorded in its entirety, regardless of the length of the activity. Teachers selected the day of the

observation and which language arts activity was observed. This varied slightly across participants, although teachers at the same school were covering similar content (i.e., letter of the week, pages of the workbook). Whole-group activities lasted from 10 to 36 min ($M = 22.78$, SD = 9.85; all times were rounded to the nearest half-minute), and language arts activities lasted from 6 to 34 min ($M = 22.16$, SD = 9.55). Field notes were taken during the observations. This served two purposes: as a means for recording information about the context, teachers, and children; as well as to identify moments of practice to revisit during the stimulated recall interviews.

Planning Interviews

As a way to facilitate the stimulated recall interviews, planning interviews were conducted (McAlpine et al. 2006). Prior to the start of instruction, each teacher was asked to explain her plans for the activity using two short, open-ended questions, "What is your plan for whole-group/language arts instruction today? Why did you plan that/those activities?" All interviews were video-recorded.

Stimulated Recall Interviews

In order to access teachers' pedagogical reasoning, a stimulated recall procedure was used. Stimulated recall is when instruction is recorded and afterward teachers view or listen to their teaching and describe their thinking during the instruction (Shavelson and Stern 1981). This process allowed for the investigation of non-visible components of teaching, pedagogical reasoning, without interrupting the act of teaching (McAlpine et al. 2006). There were 32 stimulated recall interviews, four for each of the eight teachers. To increase the accuracy and validity of teachers' discussions of their pedagogical reasoning, the stimulated recall interviews were scheduled to occur as close in time to the instruction as possible (Schachter and Freeman 2015). Typically, interviews occurred within 4 h of instruction; however, there were two interviews that occurred a day after instruction due to teachers' scheduling conflicts.

Prior to the stimulated recall interview, the researcher reviewed each observation video along with the corresponding field notes in order to select four moments when teachers may have engaged in pedagogical reasoning as a point for discussion in the stimulated recall interview. See Table 2 for the various indicators that teachers may be reasoning about their instruction along with the corresponding rationale.

The stimulated recall interview procedure was the same for each teacher across all four interviews. The teachers were seated with a laptop (for viewing the instruction) in front of them and the video recorder behind them. Teachers were informed that the researcher would stop the video periodically. Similar to other studies using stimulated recall (Gatbonton 2008; Westerman 1991), participants were also invited to stop the video when anything "interesting or out of the ordinary" occurred, in order to allow teachers to identify moments of instruction that were meaningful for them. An interview question protocol for accessing instances of pedagogical reasoning was used depending on who stopped the video,

see Table 3. After answering the protocol questions, the observation video was restarted.

Data Analysis

Prior to the analysis, all of the interviews were fully transcribed. Each transcript was double-checked against the interview video for accuracy. After transcription, a brief objective description of the instruction preceding the stopping of the video was written in order to describe the phenomenon and contextualize the moment of pedagogical reasoning. Although not included in the results presented here, these descriptions were an essential component of the phenomenological approach to understanding teachers' experiences and how the pedagogical reasoning was connected to the observed instruction. These descriptions were used in the data analysis and interpretation. All of the interview data, including the descriptions, were uploaded into the QSR NVivo (2013) software package.

Table 2 Instances of instruction that may indicate pedagogical reasoning used to select moments to discuss in the stimulated recall interview

Visual cue	Examples from data	Rationale
Teacher deviates from plan described during the planning interview	Teacher stops the audio recording mid language and literacy activity to clarify the task for children or teacher skips an activity that she said she would do	When the teacher deviates from her intended plan, it may indicate that she was reasoning about something that would lead her to that decision (Mcalpine et al. 2006)
Child error or child generated question/exclamation	Child responding incorrectly with, "Thursday" when asked about the day that is "Tuesday" or one child asks the teacher "What does 'too' mean?"	When children give answers, ask questions, or make statements that are unexpected teachers must reason about if or how they will respond to error or question. Other researchers have also used this as a stopping point in stimulated recall interviews (Parker and Gehrke 1984). Contingent response to children is also viewed as an important practice in early childhood (Pianta et al. 2008)
Observation of teacher engaging in practices typically considered "best practices" related to language and literacy instruction or teacher–child interactions	Teacher indicating to a child she should start writing her name on the left side of the paper or teacher asking "do you know what the word 'lyrics' means?"	These are practices that are valued by the early childhood research community and are shown to be linked to children's outcomes (e.g., ELLCO or CLASS). This attempts to capture knowledge that teachers use to reason about enacting these practices

CLASS The Classroom Assessment Scoring System, Pianta et al. (2008), *ELLCO* The Early Language and Literacy Classroom Observation, Smith and Dickinson (2002)

Table 3 Stimulated recall interview protocol: questions about individual moments of instruction

If teacher stops the video	If researcher stops the video
Why is this interesting or out of the ordinary?	At this moment, what were your thoughts?/At this moment what were you thinking about?
What was the reason for doing what you did next?/ There are lots of things you could focus on, why did you focus on that?/tell me more about why you focused on that" *If necessary provide description about what teacher did next*	What was the reason for doing what you did next?/ There are lots of things you could focus on, why did you focus on that?/tell me more about why you focused on that" *If necessary provide description about what teacher did next*
Why do you think that?	Why do you think that?

As part of the larger study, teachers' reports of their reasoning about practice were explored for patterns in the types of knowledge teachers reported. Open-coding and memoing were used to discover patterns in teachers' descriptions of knowledge used in their reasoning about practice (Patton 2002). After the codes were finalized, NVivo was used to apply codes to each individual episode of pedagogical reasoning. In order to ensure the researcher's consistency in coding, all episodes of pedagogical reasoning were double-coded by the researcher for intra-rater reliability (Stemler 2001). This was calculated by dividing the total number of agreements by disagreements plus agreements to achieve a reliability of 91% agreement. There were six main categories that emerged, knowledge about: goals, children, context, feelings, past experiences, and skill development.

Of interest for the present analysis is the subcategory of how children learn, nested under the main category of knowledge about children. A query in the QSR NVivo software was run in order to identify all of the episodes of pedagogical reasoning using knowledge about how children learn. In total, there were 98 instances of reasoning with knowledge of how children learn.

Findings

Each teacher in the study discussed using knowledge about how children learn, although there were variations in the number of discussions of pedagogical reasoning. Table 1 presents the frequencies of pedagogical reasoning overall and the frequencies for pedagogical reasoning related to how children learn. Catherine, Pamela, and Beth reported the highest frequencies of pedagogical reasoning about how children learn, although they had a similar number of overall episodes of pedagogical reasoning as the rest of the teachers.

In the 98 instances of pedagogical reasoning about how children learn, it was evident that there were multiple conceptions about how children learn; knowledge about specific children in the classroom and learning goals for those children; knowledge of broader contextual features affecting learning; and knowledge about themselves as teachers. In order to be representative of the data, this section presents pedagogical reasoning from all of the participants.

Multiple Conceptions About How Children Learn

In discussions of pedagogical reasoning, teachers often simultaneously used multiple conceptions about how children learned. For example, during circle time Amanda explained her decision to use tweezers in one episode as being related to understanding that children learn in multiple ways and that they also learn by being interested and engaged.

> It's just a new learning technique. Everyone is different, and I think bringing in something that a kid's [sic] interested in will help him focus more on the task. So I just had to kind of improvise on that one - make it more fun.

Amanda's conception that children learn by being engaged, "mak[ing] it more fun," informed her instructional decision to change her plan and use the tweezers. Her understanding of incorporating "new learning techniques" as a tool for helping children learn was also part of her pedagogical reasoning. Both of these conceptualizations informed Amanda's decision to use the tweezers in a different way than intended during her circle-time activity.

Similarly, in discussing her reasoning to revisit the word "eye" during a discussion of words that start with the letter 'e' Pamela said,

> … they're like sponges. But it can be lost, too. It just gets washed away. I revisited just to see them—it's like memorization…The more I do it, they're going to memorize it. They're going to put it in their brain, and at least it will be familiar. And as I tell my parents, what I was always taught is memorization is how we learn.

There were multiple theories about children's learning expressed in Pamela's statement: Children absorb information like sponges, they can easily lose what they learn, and that they learn through memorization. These theories, however, seemed to complement and reinforce each other. Because children can absorb but also lose information, she employed a method in her teaching of revisiting information such that the children could memorize a word.

Knowledge About Children in the Classroom and Learning Goals

Although teachers had knowledge of how children learn, it did not mean that they would always use those ideas to inform instruction. In some cases, other knowledge was weighed more heavily by teachers during their pedagogical reasoning. For example, when reasoning about an activity during circle time, Amanda discussed knowledge that children learn through being engaged, but observed that her children were not engaged saying, "They were already starting to get a little weeble-wobbly… They're getting over it I mean they're not learning anything if they're over it…." Although this was part of her reasoning, she also discussed her goal of making it through the activity in order to help children identify words that start with the letter 'f'. Ultimately, her goals for the activity, "to at least go through the first round" were weighted more in informing her instructional decision.

Catherine used knowledge about a specific child as she responded to his incorrect answer. She discussed her conception that there are "different learning styles" and identified a particular child as an "oral learner" and used this knowledge along with another conception about learning through reinforcement. Catherine was very explicit that her goal for this specific child was to produce the letter's sound.

> But I wanted him to make the sound so he could figure out himself rather than just me telling him that it wasn't 'e'—it didn't start with 'e', it was the 'b' the 'b' sound. So that way I reinforced it, but he also reinforced it himself by making that sound. There are all sorts of different learning styles, so with him I think he needs that. He's a very talkative, I believe oral learner [sic]. So when he forms that shape in his mouth, or he makes that sound, there's the muscle memory in your body that that's how you make the sound. So it reinforced it for him I think, I hope.

Teachers held differing types of knowledge about individual children and specific goals for those children. For example, when discussing her goals for a writing activity Beth said, "…you can tell that the stuff that we're doing is what they need, because it reinforces everything for them… they have fine motor difficulties, so it makes it harder." Here, she discussed children with special needs who have difficulty with their writing skills and she uses her conceptions of learning through reinforcement to work on her goals to get these children to write, and the need to continue to prompt them through the activity.

Sometimes teachers held competing goals that informed their reasoning and subsequent practice. This was evident in Jacki's reasoning about a moment during circle time when a child says, "/e//e//e/-f" emphasizing the initial sound of /e/ in pronouncing "f" over the sound an "f" makes /f/. Jacki discussed her concern that the child would get confused identifying the letter of the week, "f," because of the work the class was also doing with initial sounds. Informing her reasoning was the conception that children learn by making connections, and she reported being concerned that the child would incorrectly make connections between activities that were driven by her own learning goals with an activity that was driven by the Friendship School's curriculum.

Knowledge of the Broader Context

Teachers' pedagogical reasoning about how children learn was often informed by the broader contexts of the school setting and the nature of the instructional activity.

School Setting

The school context contributed to teachers' reasoning about practice. For example, Deanna expressed frustration about the inability of the children in her class to master identifying the days of the week which was a task that she knew that many children were unable to do but that it was something "we have to teach."

> I will tell you this is a little frustrating for me…. for the most part when it comes to the days of the week, pointing to them or knowing the order of them, it's a hard concept. So I know we have to teach it and I know it's an important thing to do. So I thought, well, if most of them are struggling with this, then we'll just keep on repeating it every day. And at some point they'll get it.

Deanna discussed reasoning about teaching a concept that she knew was difficult for children and so her solution for helping children to learn the concept was through repetition, every day. She continued to have children engage in the task everyday stating that, "at some point they'll get it," despite the fact that the activity and children's inability to complete the activity frustrated her. In order to achieve a school-level academic goal, her approach was driven by her pedagogical belief that children learn through repetition.

Instructional Activity

The context of the instructional activity also played a role in teachers' pedagogical reasoning and interacted with knowledge of learning in ways that influenced practice. The repetition of certain practices in circle time was indicated as important by a number of teachers in this study. One of the affordances of circle time as an instructional activity may be that it allows for repetition of concepts. Deanna repeatedly focused on identifying the days of the week because the instructional activity of circle time permitted revisiting this particular concept each day. Abby reported using repetition of the concepts of seasons and months, across various circle-time tasks, as a means for helping children makes connections between these concepts, both of which were curricular requirements at the ABC School.

> We want to learn all the months, and seasons and the year after that she's going to walk over to the calendar… I mean she's not going to be able to read that word but she should to be able to recognize maybe the same letters on the calendar. So again, that was just kind of the carry on to the next step of going over to the calendar and being able to recognize that it's November and where that word was on the calendar… Maybe they can just look at those first few letters and be able to know them. Again that's just something in our curriculum that we want them to learn…

Like Deanna, Abby's reasoning about practice was informed by the curricular requirements at the ABC School. Abby's conception was that repetition makes things easier for children to learn. The repetition was within topics, discussing the month in relation to the season as well as in relation to the physical calendar, and was meant to make it easier for children to learn the content of the curriculum.

Ideas About Themselves as Teachers

Teachers' ideas about themselves as teachers, and what it meant to teach, influenced their reasoning about practice in multiple ways. Examining personal ideas about how children learn is important in understanding the process of pedagogical

reasoning. For example, Catherine discussed her own experiences as a learner as the reason for enacting particular practices.

> ….Well, I know, as a student, I was more interested in things when I felt like I really understood what was happening. And I understood things better when they were repeated, or we learned more about the same thing as we went on. So we were learning more and more about Humpty Dumpty as we went on with the activity. I would also get super bored if I was just told, 'Here's the nursery rhyme and color it,' instead of talking about the rhyming words, or talking about putting the pieces together. I wanted to make it as engaging as possible rather than just a coloring page, so they would be more interested.

Catherine's experience as a learner, when she was bored or when she was not bored, informed her knowledge about how children learn, by being engaged and through making connections, and this then influenced her pedagogical reasoning and enacted practice.

Pamela's experiences with formal education also influenced her knowledge about how children learn. She explained that she learned in her coursework that children learn through "memorization." Pamela also talked about her enjoyment of things she liked to do as a teacher saying things like "It's just fun for me." Her emotional investment and enjoyment of the activity, teaching information because it is fun, held embedded knowledge of learning, which ultimately influenced her practice.

Similarly, Linda frequently talked about "what it means to teach." In fact, she offered it as the explanation for enacting a particular practice. For example, she said:

> … I want to engage each and every one of them. To be part of the group discussion to use their voice. Because I think that it's important. That's how they learn. They learn from peer pressure but they also, it's a good tool for the other kids who know the answers not only to wait their turn and know that they're not going to be called on that I'm fair and square and I will hit everybody whether their hand is up or not. I think that's very important as an educator.

Part of Linda's pedagogical reasoning was the knowledge that her identity as a teacher rested on the notion that children knew that she was fair because she thought that was important as an educator. In the rest of the circle-time activity, she ensured that all children participated in order to be "fair and square."

Discussion

The purpose of this study was to investigate how prekindergarten teachers used their knowledge about how children learn to inform pedagogical reasoning during language and literacy instruction. Using a stimulated recall interview procedure and a phenomenological approach to understand teachers' perspectives found that teachers reported multiple conceptions about how children learn, knowledge about specific children and their learning goals, knowledge related to the context of the

school, and ideas about themselves as teachers. These various sources of knowledge influenced practice.

Employing a phenomenological approach for conceptualizing this study and examining the connection between teachers' instruction and their reported pedagogical reasoning provided insight into teachers' perspectives on their work. The findings presented here revealed that participants' pedagogical reasoning was influenced by specific learning goals or curricular mandates and mediated by personal experiences. Thus, teachers engaged in a process of reasoning that was specific to the moment of instruction which could not be separated from their classroom and the children.

Contribution to Theory

The present study focused on knowledge in use within a specific instructional context. Although efforts are made to link knowledge about how children learn with practice and efforts to improve practice, without actually understanding how teacher knowledge is used in specific instructional situations we may not be able to effectively improve teaching such that it supports learning outcomes for children. In this study, teachers often used more than one source of knowledge in their pedagogical reasoning to inform their instruction. When researchers study knowledge, it may be necessary to understand how multiple strands of knowledge are used simultaneously to inform practice.

Another important conceptual shift may be to incorporate the understanding of different contextual issues into investigations of knowledge and its relation to practice. The pedagogical reasoning of the teachers in this study seemed to be informed and complicated by broader contextual variables, such as the nature of the instructional activities and the specific curricular requirements at the participating schools. Although curricular and school-level variables are studied as correlates in investigations of practice (Fuligni et al. 2012; Pianta et al. 2005), their role in teachers' use of knowledge has not been as thoroughly investigated. Given the way that the participants made decisions about practice, such as focusing on the days of the week even when they knew that children were having a hard time with the concept, the context or the nature of the curriculum heavily informed their practice. Curricular influences may mask or moderate the relationship between knowledge and practice, as teachers are required to act in particular ways within school contexts (Cohen et al. 2003; Lee 2014), such as teaching letters of the week something that complicated Jacki's learning goals for the children in her classroom.

Unlike other research that looks directly at the associations among teacher background characteristics and practice, teacher characteristics such as previous teaching and educational experiences seemed to emerge in teachers' pedagogical reasoning in indirect ways. They shaped both teachers' knowledge about how children learn as well as their ideas about themselves as teachers. For example, Catherine's understanding that children learn by being engaged was based on her own experiences as a learner. Similarly, Pamela's knowledge that children learn through memorization came from her formal training; however, this knowledge actually shaped her identity as a teacher, becoming her "method."

Contribution to Research

Employing phenomenology as both a philosophical and a methodological approach (Marton 1981) provided a more nuanced understanding of the intentionality behind early childhood teachers' instruction which would not be visible from external measures that do not account for teachers' perspectives. Moreover, the stimulated recall procedure provided a means for linking teachers' moment-to-moment pedagogical reasoning with enacted practice in ways that are not possible from standardized observational measures or traditional tests of teachers' knowledge. In particular, it illuminates the intentionality behind teachers' actions and the connections between knowledge and practice. This data collection method provides an alternative means for examining teachers' knowledge and is particularly important for capturing teachers' perspectives on their work. Other researchers have also begun to shift to looking at early childhood teachers' perspectives about their practices (Friesen and Butera 2012; Happo et al. 2013; Sumsion 2002). Continuing this trend through theoretical and methodological orientations such as phenomenology is necessary in order to advance our understanding of teachers and their work.

In addition, the use of stimulated recall interviews can enable researchers to better understand the actual practices of teachers, helping them to connect observable practice with teachers' pedagogical reasoning as that practice occurs. The stimulated recall procedure can help researchers actually understand why or how that practice is chosen by teachers and how it is related to their knowledge. For example, understanding Catherine's beliefs that children learn through repetition explains why Catherine decided to give children the answer to her question about whether a letter was upper- or lowercase instead of rephrasing a question—something that could not be explored through traditional observational or survey measures.

Implications for Professional Learning and Policy

Findings from this study also have several important implications for professional learning opportunities, both pre- and in-service. In particular, teachers may need help learning how to assimilate knowledge into their reasoning about practice. All teachers in this study engaged in pedagogical reasoning; however, there were differences in the frequency with which these teachers used knowledge of how children learn. That some participants used this knowledge less often supports the need for helping teachers learn to incorporate this knowledge into their pedagogical reasoning.

In addition, there were variable ways that knowledge was or was not implemented into practice. For example, sometimes teachers held knowledge about how children learn but did not actually use this knowledge to inform practice, such as when Amanda prioritized her goal of completing her activity rather than stopping because she knew that children were no longer engaged, something she saw as an important component of children's learning. Teachers may need to understand how to prioritize their knowledge for use in practice. Professional learning opportunities

should help teachers to think about how contextual imperatives can be integrated with their knowledge of how children learn.

This work identifies a need for more nuanced ways of understanding teachers and their work. Tests of knowledge used for certification (e.g., Praxis, ETS 2015) do not fully assess how teachers are able to use their knowledge in practice, nor do observation measures relay a complete understanding of what teachers are doing. Furthermore, these measures do not account for teachers' own perspectives about working in specific contexts. Having more nuanced ways of understanding practice from teachers' perspectives is important for fully comprehending what is occurring in early childhood classrooms and for making decisions about teaching quality. This is particularly important given the way that the participants in this study balanced knowledge of how children learned with the broader contextual imperatives, as well as ideas about themselves as teachers.

Conclusions

Knowledge that teachers hold about how children learn is important as it is the basis on which they make moment-by-moment decisions when teaching through the process of pedagogical reasoning. Even when trying to unpack how knowledge that teachers hold about learning informs their moment-to-moment practice, other knowledge such as that about learning goals or school context may interact with this knowledge to inform pedagogical reasoning and practice. Given the process of teachers' pedagogical reasoning described in this study and the advantages of understanding practice from teachers' perspectives, there is a need for more nuanced ways and research methodologies for both investigating teachers' practice.

Many efforts for in-service and pre-service professional development strive to improve teachers' understandings of how children learn and develop skills (Cox et al. 2015); yet they may not consider the knowledge that teachers already hold and use moment-to-moment in their instruction, as was evidenced in participants' reflections on their pedagogical reasoning. Policy efforts that advocate for and provide time for embedded professional learning where teachers practice using knowledge in contexts, such as coaching (Early Reading First, U.S. Department of Education 2002) should be continued and other embedded models such as professional learning communities (Ackerman 2008; Kuh 2012) need to be explored on a larger scale in further research.

Acknowledgements The research reported here was supported in part by the Institute of Education Sciences, US Department of Education, through Grant R305B12008 to The Ohio State University. The opinions expressed are those of the author and do not represent the views of the Institute or the US Department of Education. A special thank you to the teachers and schools who agreed to participate in this research, for opening both their classrooms and their thoughts in service to this work.

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