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Abstract

This study utilized a novel phenomenological approach with a stimulated recall procedure to understand the pedagogical reasoning of eight early child teachers *during* the enactment of literacy instruction in whole-group meeting and language arts activities. This approach to investigating knowledge—in contrast to more traditional conceptualizations of knowledge—focused on knowledge use as a process and prioritized teachers' perspectives on knowledge used to enact literacy instruction in their own classrooms. Additionally, it allowed for a more nuanced investigation of the role of setting and teacher characteristics that are often examined in association with literacy instruction (e.g., degree attainment, years of experience, curriculum, instructional activity). Six types of knowledge were used by teachers in their

pedagogical reasoning. In order of frequency of use these were knowledge of: goals for instruction, children, feelings, school environment, developing skills, and past experiences. Importantly, teachers made more references to knowledge derived from their immediate contexts as compared to decontextualized knowledge. Implications for understanding connections between knowledge and literacy instruction are discussed.

Keywords: Emergent literacy, Early childhood teachers, Knowledge, Pedagogical reasoning, Stimulated recall

Introduction

Teacher knowledge is a critical component in the delivery of high-quality literacy instruction—starting with teachers of our youngest learners. This is well theorized in the literature (Ben-Peretz, 2011; Shulman, 1987; Wasik & Hindman, 2011) and evidenced in recommendations and policies regarding teaching and teacher credentialing (Friedman-Krauss et al., 2019; National Association for the Education of Young Children [NAEYC], 2020; Wright et al., 2020). However, there are some inconsistences in associations between early childhood (EC) teachers' knowledge and their enacted literacy instruction with some finding positive associations (Hindman & Wasik, 2011; Piasta et al., 2020; Piasta et al., 2020) and others finding variable or minimal associations between knowledge and instruction (Cunningham et al., 2009; Schachter et al., 2016). This inconsistency may be, in part, because researchers are not measuring knowledge that teachers use in-the-moment *during* teaching (Friesen & Butera, 2012). This problem is amplified when considering the evidence that what teachers know and value may differ from what researchers and policy makers know and value (Dwyer & Schachter, 2020; Hiebert et al., 2002). Thus, the purpose of this study is to utilize the stimulated recall procedure (Schachter & Freeman, 2020) to understand EC teachers' reports of their knowledge use *during* the enactment of literacy instruction.

Teacher knowledge and literacy instruction

Young children need a strong foundation in emergent literacy skills to successfully engage in reading and literacy-related tasks throughout

their academic career (Kendeou et al., 2009; Schleppegrell, 2012; Snow et al., 1998). Much research has been conducted to identify how children develop these skills and ways to support this development (Piasta, 2016). Teachers are encouraged to target both oral language development and code-focused skills (Whitehurst & Lonigan, 1998), including instruction on alphabet knowledge, shared book reading, conventions of print, phonological awareness, and emergent writing (National Early Literacy Panel [NELP], 2008; Snow et al., 1998). Despite this knowledge base, evidence suggests that EC teachers provide a range of literacy-learning experiences which may be less than optimal for encouraging long-term gains (Dwyer & Harbaugh, 2020; Justice et al., 2008; Pelatti et al., 2014).

As part of efforts to improve early literacy experiences, many researchers and professionals have focused on EC teacher knowledge. Knowledge is critical for teaching and is considered the foundation through which teachers make instructional decisions (Shulman, 1987; NAEYC, 2020). There are different types of knowledge that researchers have targeted to better understand and improve instruction, many of which draw from the extensive research base. There is knowledge of how children develop literacy skills (Cash et al., 2015; Cox et al., 2015; O'Leary et al., 2010), knowledge of disciplinary content (i.e., understanding of the content itself; Cunningham et al., 2009; Piasta, Ramirez et al., 2020), and knowledge to enact literacy instruction (Hindman & Wasik, 2011; Neuman & Cunningham, 2009). These types of knowledge are viewed to be based on facts, science, or research regarding what is known about how children develop emergent literacy skills (Hoy et al., 2006). Degree obtainment (Friesen & Butera, 2012) and professional learning (Cox et al., 2015) are viewed as ways to gain these types of knowledge and are often used as proxies for knowledge in research (Schachter et al., 2016). However, associations across these types of knowledge, literacy instruction, and child outcomes has been mixed (Cash et al., 2015; Cunningham et al., 2009; Gerde & Powell, 2009; Hindman & Wasik, 2011; O'Leary et al., 2010; Phillips et al., 2009; Piasta et al., 2020; Piasta et al., 2020; Schachter et al., 2016). Thus, although evidenced-based types of knowledge remain a research focus, there are inconclusive understandings of how this knowledge, teaching, and learning are connected.

Moving beyond current understandings and investigations of knowledge

One possible explanation for the lack of clarity is that knowledge use is a process (Shafto et al., 2014) and may involve multiple types of knowledge concurrently. Shulman (1987) refers to this as pedagogical reasoning, the assimilation of multiple sources of knowledge to make decisions in-the-moment to inform instruction. Currently, however, the field tends to conceptualize knowledge as general and often de-contextualized from its use. For example, researchers often use paper and paper measures to assess teachers' static knowledge about literacy instruction (e.g., Cash et al., 2015; Hindman & Wasik, 2011; Neuman & Cunningham 2009). An example of this is the *Teacher Knowledge Assessment* (Cunningham et al., 2009) which has been used by multiple researchers to measure teachers' knowledge of language structures (e.g., Piasta et al., 2020; Schachter et al., 2016). Although useful tools for conducting research across large populations and linked to evidence-based knowledge, these are removed from the actual act of teaching and may not have strong ecological validity (Frankel et al., 2015). This is a similar pattern in many professional learning experiences that focus on building teachers' knowledge but less on the act of teaching with the knowledge (see Cox et al., 2015 for a review). Indeed, there are many elements of the teaching environment such as curriculum, learning standards, and assessments which may inform the implementation of this knowledge (Cohen et al., 2003; Schachter, 2017). For example, priorities within learning standards and curriculum may shape which knowledge is utilized by teachers.

Further underscoring this problem is that by focusing on static knowledge more broadly, we may have overlooked other types of knowledge necessary for teaching or those prioritized by teachers (Cunningham et al., 2009; Happo & Maatta, 2013). Notably, there are many other ways to conceptualize knowledge for teaching (Ben- Peretz, 2011) which could be important for literacy instruction. NAEYC (2020) recommends that teachers have knowledge about "...commonality in children's development and learning, individuality reflecting each child's unique characteristics and experiences, and the context in which development and learning occur" (p. 6). Similarly, Shulman's (1987) well-used conceptualization of knowledge for K-12 teaching

includes: content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational contexts, and knowledge of educational ends.

Importantly, inherent in the aforementioned conceptualizations of knowledge, are the recognition of the role of knowledge regarding contextual factors such as knowledge of curriculum and learners. Others have expanded to include knowledge gained through experience (e.g., Clandinin & Connelly, 1988; Hiebert et al., 2002). These move the definition of knowledge beyond verifiable facts to understandings or information that may be gained through experiences with and interpretations of the world, which may be more subjective or less verifiable. Many conceptualize these subjective ideas as beliefs (Hoy et al., 2006). However, knowledge and beliefs are commonly considered as interconnected and challenging to disentangle as each are reliant on the other for their development (Borko & Putnam, 1996; Hindman & Wasik, 2008; Hoy et al., 2006; Pajares, 1992). Importantly, beliefs are often held as truths by individuals even if they may not be facts (Friesen & Butera, 2012) and in this sense serve as a source of knowledge for enacting practice (Pajares, 1992; Nespor, 1987). Thus, it may be important to understand a continuum of knowledge that collectively informs teachers' enacted practices.

A novel approach

One potential approach for uncovering teachers' knowledge in use is the stimulated recall (SR) procedure (Schachter & Freeman, 2020). SR allows access into teachers' pedagogical reasoning during instruction by using a stimulus—a recording of instruction—to help teachers describe their internal activities during instruction (Clark & Yinger, 1977). The use of SR in teacher education research has provided critical insights into teachers' internal processes and their enacted instruction, although it has typically favored researchers' a priori assumptions about knowledge use (Schachter & Freeman, 2020). Using SR, with a focus on the perspectives of teachers can provide a novel and more holistic understanding of the connection between observed and enacted practices. Thus, SR holds potential for learning about EC teachers' knowledge use during emergent literacy instruction.

Present study

There is a gap in understanding the connection between knowledge and emergent literacy instruction which may be due to current research procedures. To address this, it may be beneficial to understand knowledge use as a process that happens in context from teachers' perspectives. This study seeks to: (1) investigate what knowledge EC teachers use in their moment-to-moment instruction during whole-group time and targeted literacy (language arts) activities and (2) examine patterns of difference in knowledge use by instructional activity and teacher characteristics.

Method

Theoretical and methodological framework

Key to this work is moving beyond traditional measures of static knowledge, to conceptualize knowledge use as a process. Thus, pedagogical reasoning, the consideration and bringing together of multiple strands of knowledge to enact instruction in-the-moment (Nilsson, 2009: Shulman, 1987), is foundational to this study. To access pedagogical reasoning while focusing on teachers' perspectives, this study used a phenomenological approach (Marton, 1981). Phenomenology is both a theoretical orientation and a research methodology, shaping data collection and analysis (Creswell & Creswell, 2017). The researcher explains both the phenomenon individuals experienced, here literacy instruction, and *how* they experienced it, their pedagogical reasoning about instruction. In this sense, phenomenological research moves beyond traditional measures to deeply understand knowledge-in-use while accounting for context (Schachter & Freeman, 2020).

Participants

Teachers were purposively recruited from two highly regarded, religiously-affiliated schools in a large-Midwestern city. Both programs were non-for-profit serving mostly White, mid- to upper-income

families who paid tuition. Although not intended to be representative, these contexts are similar to those attended by a third of US children in EC settings, with approximately 20% of 3–5-year-olds attending school in a place of worship (Cui & Natzke, 2020) and approximately 30% attending privately-funded care (National Center for Education Statistics [NCES], 2021). These programs were purposively recruited (Marshall & Rossman, 2014) because each program had at least four classrooms serving 4–5 year old children of similar socio-economic backgrounds, employed teachers with a range of background experiences that may contribute to knowledge use (e.g., degree, years of experience; Friesen & Butera, 2012; Gerde & Powell, 2009; Schachter et al., 2016) and utilized different curricular approaches that may have also influenced knowledge use.

Although not directly required to follow early learning standards, each program referenced aligning curriculum with the state learning standards, albeit with different curricular emphases. The Friendship School (all names are pseudonyms) was focused on socio-emotional development and employed a letter, number, and theme of the week curriculum. Their curricular materials identified areas of development, but the learning goals were relatively broad and left mostly to teachers to specify. In contrast, the ABC School had a stated "academic" focus, using a published scripted curriculum for language arts (*Beginning to Read, Write, and Listen K-1*; MacMillan/ McGraw-Hill School Division, 1995), specific learning goals for children, and a list of sight and high frequency words to be taught in a specific order.[1]

Four teachers working with children ages 4–5 from each school consented to participate. All eight teachers were White females with an average age of 49.50 (*SD* = 16.19) and an average of 9.81 (*SD* = 7.35) years of teaching experience. Teachers had a variety of background experiences reflecting those typical of the workforce (The Institute of Medicine [IOM] & National Research Council [NRC], 2012; Whitebook

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1 Although there may be questions regarding the developmental appropriateness and datedness of the curriculum utilized by the ABC School, that is beyond the scope of this study. The use of this curriculum can be summarized in the director's explanation, "I think it's important to focus on learning letters, phonics, and handwriting. I don't like to do all of this new stuff." During data collection, children were observed actively engaging in the activities and subsequent analyses will delve into patterns of difference regarding the school-level curriculum.

Table 1 Teacher characteristics

	≤ 5 years of experience teaching preschool	> 5 years of experience teaching preschool
Friendship School		
No related degree	Amanda *(B.A. General Studies; 5 yrs)*	Catherine *(M.A. Religion and Art; 6 yrs)*
Education-related degree	Jacki *(B.S. Elementary Education, Special Education Certification; 1 yr)*	Pamela *(B.A. Elementary Education; 12 yrs)*
ABC School		
No related degree	-	Linda *(A.A. Secondary Education; 22 yrs)*
Education-related degree	Beth *(M.A. Elementary Education; 3 yrs)*	Abby *(B.A. Elementary Education, Early Childhood Certificate, Reading Endorsement; 15 yrs)*
		Deanna *(M.E. Education, 15 yrs)*

et al., 2018; **Table 1**). Friendship School teachers taught independently in classrooms with 8 to 10 children and ABC School teachers co-taught with at least one assistant teacher in classrooms with approximately 20 children.

Data collection

All data were collected over a five-week period in the fall. Prior to teacher-level data collection, semi-structured interviews were conducted with school directors to learn about the context and curriculum. Each teacher completed a survey about their background. Teachers were then observed and videoed four times, twice for each instructional activity, resulting in a total of 32 observations (M = 22.47 days across observations, SD = 9.55). Each observation was accompanied by a series of interviews to understand how teachers used knowledge to enact moment-to-moment instruction. Following the phenomenological approach, observations/videos constituted the documentation of the phenomenon (instruction) and interviews solicited participants' perspectives regarding the phenomenon (Marton, 1981).

Observations of instructional activities

Teachers' pedagogical reasoning was investigated in two common emergent literacy activities, whole-group meeting time and literacy/language arts instruction (Early et al., 2010; Fuligni et al., 2012) allowing for observation of differences in pedagogical reasoning across activities where teachers might target code-focused or oral language skills. Participants were asked to select two whole group and two language arts activities for observation. On average, whole group, referred to as "circle-time," lasted 22.78 min (*SD* = 9.85) and followed a similar routine of activities connected to the calendar, weather, storybook reading, and discussing letters and/or sight words. There was more variability in activities observed during language arts. For the ABC School, children were divided into smaller groups (approximately 10 children) pre-assigned to teachers and all instruction conformed to the school-wide curriculum, utilizing scripted lessons that corresponded to a student workbook (*Beginning to Read, Write, and Listen K-1*; MacMillan/McGraw-Hill School Division, 1995; *M* = 27.94 min, *SD* = 7.64). For the Friendship School, language arts included the entire class and activities targeted writing, rhyming, and phonics (*M* = 6.25 min, *SD* = 9.56). Examples of instruction presented subsequently are representative of the types of activities observed across participants and reflect the general range of practices in EC classrooms (NELP, 2008; Piasta, 2016).

Interviews

Immediately prior to the observation, a short planning interview was conducted during which teachers were asked about their plans for the activity. After instruction, teachers were interviewed using a SR procedure (Schachter & Freeman, 2015), typically occurring within four hours of instruction with two interviews occurring the next day but still within recommended timeframes (Ericsson & Simon, 1980). To conduct the SR interviews, teachers and the researcher were seated facing a laptop which played the videos of instruction. A video camera placed behind the teacher also facing the laptop was used to record the interview. Two sampling procedures were used to determine instances of instruction to discuss (Schachter & Freeman, 2015). First,

the researcher selected instances of instruction using a predetermined set of criteria: teacher deviation from plan, child errors or exclamations, or teacher use of recommended emergent literacy practices based on the likelihood that the observed action would require some form of pedagogical reasoning (see Online Supplement). This had the advantage of ensuring at least four points of discussion per teacher. Additionally, teachers were invited to stop the video when anything interesting or out of the ordinary happened, ensuring representation of their perspectives (Clark & Yinger, 1977). Each teacher stopped the video at least once per SR interview.

Analyses

After data collection, interviews were transcribed and double checked for accuracy by the author. Key to phenomenology is understanding a participant's experience of a particular phenomenon (Creswell & Creswell, 2017). As such, each moment of instruction that precipitated the stopping of the video was described to contextualize teachers' pedagogical reasoning and connected to the pedagogical reasoning about the moment of instruction. These were considered separate units for analysis (Lampert & Ervin-Tripp, 1993) or an "episode" of pedagogical reasoning. In total there were 537 different episodes of pedagogical reasoning with an average of 67 episodes per teacher (M = 67.13, SD = 5.87, range 61–77). All interview data were uploaded to QSR NVivo software package for analyses.

A grounded approach was used to develop an emerging theory regarding the types of knowledge employed by teachers in their moment-to-moment instruction. An emergent, iterative process was utilized with codes developed inductively from the data. As the codes emerged, they were confirmed by patterns of occurrence in other episodes of reasoning, either across teachers, instructional activities, or school settings. Then labels were created for these codes and working definitions were generated as a schema, often using teachers' own language as one way to ensure validity in the categories (Maxwell, 2013). Data were examined using constant comparative analysis (Corbin & Strauss, 2014) to see if the coding schema fit the data; and modifications or reframing of coding categories and subcategories were made as needed. This process was repeated until there were no more revisions to be made.

After the codes were finalized, NVivo was used to code each individual episode for the types of knowledge that were discussed. This accounted for the multiple types of knowledge that a teacher might report using within a single episode. The author coded all episodes twice and calculated intra-rater reliability of coding (Stemler, 2001) by dividing the total number of agreements by disagreements plus agreements, with 91% agreement. All disagreements were reconciled using the codebook. In total, 1,763 individual references to knowledge were identified. On average each teacher made 220 individual references to types of knowledge across interviews ($M = 220.38$, $SD = 35.68$, range 162–270).

Matrix analyses were then conducted to visualize meaningful patterns across the codes (Averill, 2002), moving beyond the individual codes to generate broader understandings of the data (Saldaña & Omasta, 2016). Specifically, in matrix analyses the researcher organizes data into tables to streamline the identification of systematic patterns in the data (Averill, 2002). Six categories or types of knowledge present in teachers' pedagogical reasoning were identified as key ideas within the data: goals, children, feelings, school environment, skill development, and past experiences (**Table 2** and described subsequently). Matrix analysis visualization enabled generation of two meaningful themes (Corbin & Strauss, 2014) representing broader patterns in teachers' knowledge use during instruction. This facilitated identification of a contrast between knowledge developed from within the teaching context from that outside of the context and typically, but not always, targeted or investigated by researchers (decontextualized knowledge; Table 2). For example, viewing knowledge about school environment juxtaposed next to knowledge about developing skills within the table facilitated a better understanding of the source for these types of knowledge (context versus prior experiences with schooling and teaching).

Data were enumerated allowing for quantitative presentations of frequencies (i.e., means, standard deviations, percentages) and exploration of patterns, a useful procedure in analyzing qualitative data (Marshall & Rossman, 2016; Maxwell, 2013). Presenting the mean number of references demonstrates how common the types of knowledge were across teachers' pedagogical reasoning and the standard deviations show variations across teachers where appropriate.

Table 2 Two way matrix analyses of knowledge codes (definitions and exemplars) by knowledge type and broader theme

Type of Knowledge	Code and Definition	Exemplar Quote	Frequency (n = 1,763)	Broader Theme
Goals			**756**	
	Pedagogical goals about learning academic content	"...I wanted him to get used to writing the lowercase."—*Catherine*	275	Context
	Socio-emotional goals about affective development	"... I want them to be able to do it on their own and if they want help, then say, 'I'd like some help, please.'"—*Deanna*	44	Context
	Activity-specific goals to be achieved during the activity; could be related to content or task	"When they go to the weather I want them to really think about everything that's going on, so is there clouds, is there sun, is it snowing, is it windy"—*Abby*	241	Context
	Ongoing goals cutting across activities and time	"I'm trying to make them aware of—they're really getting very good at initial sounds."—*Jacki*	101	Context
	Teaching strategies used to achieve a goal	"I think he just needed that little example to help him remember how to ask a question."—*Abby*	95	Decontextualized
Children			**503**	
	About *individual* children in the classroom	"He's been very moody and just been on a different level for the last couple of days. And I don't know if dad's out of town..."—*Beth*	140	Context
	About *groups* of children in the classroom	"Any time you can do something with a song they seem to really like it better."—*Abby*	97	Context
	Gained during the activity *(assessed)*	"The reason I did this is because I wanted to see if they remembered overnight what we did."—*Linda*	102	Context
	About what *"children of this age"* do or experience	"So in preschool, it's all about feeling like you're that helper."—*Pamela*	66	Decontextualized
	About *how children learn*	"... preschool through probably kindergarten is just so much repetition."—*Pamela*	98	Decontextualized
Feelings			**176**	
	About how *children are feeling*	"Because she felt confident and secure that, right or wrong, we would help her along."—*Linda*	98	Context
	About how *teachers are feeling*	"And I love the fact that they're excited and aware so, I pointed it out and reminded them what we do."—*Deanna*	78	Context

Table 2 (continued)

Type of Knowledge	Code and Definition	Exemplar Quote	Frequency (*n* = 1,763)	Broader Theme
School Environment			**174**	
	About instruction linked to the *curriculum*	"…it's part of our requirement that they know the sight words before they get into kindergarten."—*Deanna*	142	Context
	About a children's performance on *school measures*	"After doing assessments I just realized that the number part is more where… they're not as comfortable with it."—*Pamela*	6	Context
	About the physical *environment*	"…because I was busy getting glue sticks and climbing over grandparents."—*Linda*	16	Context
	About the *schedule* of the daily activities	"They were antsies in their pantsies…we were cooped up inside."—*Amanda*	10	Context
Developing Skills			**81**	
	Developing *reading skills*	"…it's a good early reading skill to focus on the beginnings of words. That whole left to right orientation."—*Jacki*	25	Decontextualized
	Developing *writing skills*	"…it gets them ready for when they're reading and writing, what's the difference between a question, asking, and a statement, which is telling."—*Abby*	6	Decontextualized
	Developing *math skills*	"I mean it's kind of like opposites and rhyming it's one of those things that helps them figure out how to make a pattern or how to make, how to figure something out number wise."– *Pamela*	7	Decontextualized
	Developing *"life skills"*	"… it's just life. It's a life skill."– *Linda*	15	Decontextualized
	Developing *kindergarten readiness skills*	"It's a skill they need to have for kindergarten. In the kindergarten readiness thing that we follow 'knows the days of the week.'"—*Deanna*	28	Decontextualized
Past Experiences			**73**	
	From formal *educational experiences*	"That's the way I was taught. If you let them do it, instruct, they will actually learn it better."—*Pamela*	4	Decontextualized
	From learning through being a *parent*	"I think I learned this when my kids were little."—*Beth*	5	Decontextualized
	From *past experience teaching*	"I found, when I worked in public school, that kids had a lot of trouble with numbers before and after."—*Jacki*	30	Decontextualized
	Phrases related to the identity or beliefs about what it *means to teach*	"…our job as teachers and educators is to give them the tools and to make sure that they know."—*Linda*	34	Context

Items could receive multiple codes, therefore there may be overlap in the examples.

Trustworthiness

Trustworthiness of data and interpretation was ensured through taking extensive field notes and memoing, reviewing all transcripts for accuracy, creating an audit trail documenting data collection and analyses procedures, and monthly peer debriefing with colleagues experienced in EC education (Long & Johnson, 2000). The later allowed for dialogue regarding patterns in findings and acknowledgment of multiple interpretations of the data (Smith & McGannon, 2018). Furthermore, collecting data through multiple methods and classroom visits allowed for the gathering of "rich data," varied and detailed enough to describe the phenomenon (Maxwell, 2013).

Results

Teachers' pedagogical reasoning was complex, including multiple types of knowledge simultaneously while engaging in literacy instruction. Within their reasoning, six main categories of knowledge were identified with teachers generally drawing on *goals* and *knowledge of children* and to lesser extent integrating knowledge of *feelings*, *school environment*, *developing skills*, and *past experiences* (see Table 2 for codes comprising these types of knowledge). Although the types of knowledge identified represent multiple conceptualizations of knowledge present in the literature, including potentially overlapping with beliefs, following a phenomenological approach, the types of knowledge elaborated here represent what emerged from participants' pedagogical reasoning (Marton, 1981).

Notably, when looking across these knowledge types, teachers relied more frequently on knowledge specific to their context in their pedagogical reasoning rather than decontextualized types of knowledge. That is teachers used knowledge that was tied to their immediate environment versus other types of knowledge that, although applied in the context, seemed to be derived from outside the specific setting (either through time or other experiences). Indeed, 78.50% of their knowledge references (n = 1,384) were context-specific, including goals for instruction, knowledge about the children in their classroom, curriculum, and the feelings of the participants in the activity.

Teachers infrequently referenced knowledge that was not specific to the immediate classroom (21.50%, *n* = 379)—knowledge about how children learn, teaching strategies, and skill development. Next, the types of knowledge present in teachers' pedagogical reasoning are described along with how they are connected to the two broader themes. I then turn to patterns in knowledge use by teacher characteristics and instructional setting. Throughout, I highlight the complexity of the knowledge use process.

Types of knowledge

Goals

This category of knowledge comprised the learning and developmental objectives that teachers had for children—"goals" that teachers were seeking to accomplish. Goals were the most frequently referenced type of knowledge during literacy instruction, consisting of 43% of references with teachers averaging 95 goal references across their interviews (*SD* = 16.90). Teachers' goals were connected both to learning (pedagogical or socio-emotionally focused) and to time (activity-specific or ongoing goals).

  A prototypical example of an activity-specific pedagogical goal is from a whole group observation wherein Jacki asked children to match rhyming words. She showed a picture of mice and asked them to label the picture. They responded "mouses." Her pedagogical reasoning in this moment was:

> They're not real good with irregular plurals...they still say mouses. They don't say mice. And, when you're looking for rhyming, you know, mouses is fine if you're doing the initial sound, but it's not fine if you want them to rhyme....

Jacki referenced an activity-specific goal of rhyming "if you want them to rhyme," using knowledge about how saying "mouses" would make it difficult for the children to be able to match the ending sounds with pictures to complete both the pedagogical and activity-specific goal. Her subsequent instructional moves, giving the correct word "mice," helped her address this problem and achieve her goal of having children rhyme "mice" with "dice."

Teachers also had ongoing goals that they were working on across activities and time. An example of this is Amanda's pedagogical reasoning in responding to a child who helped a peer during a whole group letter scavenger hunt. Amanda discussed using knowledge about an ongoing, socio-emotional development goal that she had for a child's behavior. She said, "I had to give Isaac more positive reinforcement, because he's having some behavior issues. So, I'm trying to focus more on the good things that he's doing." This quote illustrates that even in the context of a literacy-oriented activity (letter identification) teachers were integrating other knowledge into their pedagogical reasoning. In another example, Pamela described wanting children to learn problem-solving strategies. She used this knowledge when showing a strategy for figuring out the date during a routine calendar activity, "... if I can empower just a little bit by you can figure this out or you can work this out..." Knowledge about goals superseded the instructional activity and continued to inform teachers' pedagogical reasoning in a way that is well illuminated through this data collection strategy.

Occasionally knowledge of goals was tied to decontextualized knowledge. This was evident in teachers' use of knowledge about teaching strategies. For example, during a read aloud, Catherine reminded children that they read a book about one of the animals in the story. She connected this to her knowledge about reading books as a teaching strategy, "I'm fine with stopping on a certain page if they want to comment on a picture or I can connect with something we've already talked about and just reinforce the things we've been learning." Importantly, this knowledge was not used separately from her goal of reinforcing learning. One could argue these goals represent tacit understandings of how children develop skills because this knowledge would be necessary in developing goals. In Catherine's example, her goal to reinforce could be informed by ideas about how children learn words through making connections and strategies for shared reading. However, she does not make this connection explicit. In contrast, Jacki made an explicit connection between her goal and developing rhyming skills; yet these kinds of explicit connections between knowledge of developing skills or teaching strategies (decontextualized knowledge) were infrequent.

Children

Approximately a quarter of references in teachers' pedagogical reasoning were regarding knowledge of children (n = 503, M = 62.88, SD = 24.95), which came in a variety of forms (Table 2) including about individual or groups of children (context-specific) and about children more generally (decontextualized).

Knowledge about children in the immediate context was most prevalent among knowledge about children references (n = 339; 67%). In a prototypical example from a language arts activity, Beth asked a child what letter they were looking for ("s") and the child responded with the sound /s/. Beth reasoned, "...you have to know your kids. And I'm thinking, okay, that was closer than she would've been a week ago." Here Beth used knowledge gained during instruction about a child's letter understanding and compared it with the existing knowledge about that child, combining multiple sources of knowledge in the moment to enact instruction to give positive reinforcement to the child. Importantly, Beth highlighted the role of knowledge about children for teaching—"you have to know your kids"—an idea evidenced throughout participants' pedagogical reasoning.

Another example of this is in Deanna's pedagogical reasoning about a child placing a word card upside down on a chart during whole group. She says, "And she'll put it upside down. That was her latest thing. Because somehow, she's needing that extra little attention. She knows that it's upside down. And would do it anyway..." Here drawing on her knowledge about the child both developmentally and personality/socio-emotionally to inform how she corrects the child's error. This is in direct contrast to later during the same activity where, when asked to read the sight word "can," another child said "C." In this instance the error is not expected and Deanna explained,

> I had a presumption in my head that she's going to be the one who knows all of the sight words. She does everything so well and she doesn't know that that word is "can" ... I figured if I just pause maybe she could catch herself with saying the word, the letter 'c'.

Deanna responded differently to children's errors based on her knowledge of each individual child.

Using information about specific children in one's classroom was different than the way teachers discussed using general information about children. For example, Linda's understanding that children learn through routine was connected to her pedagogical reasoning about how to relate to the visitors in her classroom, "...so that [children] know that our routine is not going to change... we're carrying on. That's how they learn the best..." later explaining, "That's how they learn at this age." Her pedagogical reasoning with this knowledge led her to continue her regular procedures for literacy instruction, pretending there were no visitors. Similarly, in talking about explaining words, Beth reasons, "...a lot depends on your experiences, some kids have a larger vocabulary than others because they've traveled more and they've been exposed to different things, so they're going to use bigger words..." This type of decontextualized knowledge about how children learn, and about child development more generally, was less frequently used in teachers' reasoning (n = 164). Notably, knowledge of children represented both broader themes, with teachers sometimes utilizing context-specific knowledge and sometimes decontextualized knowledge as they enacted instruction. However, contextually driven child-related knowledge was utilized most frequently.

Feelings

Feelings or emotional states of children and teachers, also emerged as a type of knowledge (10%, n = 176; M = 22.00, SD = 4.69). Teachers attended to children's feelings, both positive and negative. For example, during an independent writing task Deanna reasoned,

> He doesn't want to feel different from anybody else.... So I was quietly showing him a few things... So if I said it a little louder as a lesson for everybody, then he would have felt like I— so I didn't want him to feel isolated.

Her use of knowledge led directly to the instructional strategy she used to support the child. Concern about children's feelings was repeated across teachers, particularly in wanting to support children's self-confidence and feelings of efficacy via comments like, "I don't want her to feel lost" (Pamela) and "They need to feel pride in what they are doing" (Jacki). This type of knowledge was tied back to achieving goals

and what teachers knew about children, such as in the writing activity with Deanna.

Teachers also considered their own feelings during pedagogical reasoning. For example, Jacki discussed her feelings about a particular child's response during whole group. "I actually was just pleased he gave me a color because lots of the times his answer, he—I don't always feel like he's listened well enough to the question to answer it correctly." These were positive emotional responses such as Jacki's or also negative responses such as in Catherine's pedagogical reasoning about "… getting frustrated with my friends who were talking." In this way, feelings emerged as a category of knowledge that teachers used in their pedagogical reasoning and were directly tied to how teachers engaged with children, driving how they responded during instruction.

Together, knowledge about feelings comprised contextually-driven knowledge informing literacy instruction. Whereas it might be intuitive to expect teachers to attend to children's feelings and feelings may not readily be recognizable as knowledge, that feelings factored so prominently in teachers' pedagogical reasoning is important to highlight for the role this knowledge played in informing instruction.

School environment

In teachers' discussions of their pedagogical reasoning, they also referenced knowledge related to the environment (10%, $n = 174$, $M = 21.75$, $SD = 7.96$). These were generally related to school context and requirements, most frequently referencing the curriculum ($n = 142$), and these references were often directly or indirectly connected back to goals. An example of this was in Deanna's pedagogical reasoning about how to respond to a child observing a picture of a "drop" her worksheet. Deanna replied to the child with, "/d/d/d/ drop." She explained, "It's the letter of the week. And in our curriculum, it's more important to say /d/, rather than 'd'." Deanna understood that the curriculum's intention was to focus on letter sounds and this was the knowledge she used to enact instruction and fulfill her goals related to teaching 'd'. Teachers also used knowledge of the curriculum more broadly, such as the aforementioned episode when Catherine linked the new book to a book the children had previously read—drawing connections across the enacted curriculum.

Importantly, knowledge in this category was reflective of the broader theme of context. Knowledge of the curriculum, be it the physical or enacted curriculum, is specific to the immediate context. This type of knowledge also included knowledge of scheduling and the physical environment which informed teachers' pedagogical reasoning in meaningful ways. For example, Jacki explained her decision not to explore a child's error, "Suddenly it's oh my gosh, we have to go to the bathroom, we have to do this we have to do that. And get to yoga and do all of those other things." This was common in teachers' descriptions of their schedules. In these cases, this knowledge impacted teachers' activities in ways that would be difficult to understand without context.

How children develop skills

Teachers used knowledge of how children develop skills infrequently (5%, n = 81; M = 10.13, SD = 4.12). This included knowledge about developing reading, writing, kindergarten readiness, and math skills, which are all decontextualized. For example, in Abby's pedagogical reasoning about introducing a listening activity she demonstrated knowledge of progression of emergent reading skills, "…they need to be able to read all the letter sounds to form words, so really focusing on hearing it in different part of the words helps them get ready to read and blend those letter sounds together." Another example is from Amanda's pedagogical reasoning when drawing children's attention to the sequence of printed, numbered directions. She reasoned, "It's important to know. It's like for reading… pre-reading skills and things happen in an order…. Just it's important for everyday life." Here Amanda described knowledge of reading development, although the articulation of the connection to reading was perhaps less sophisticated than that of Abby's. She also noted that this is a "life skill," a type of knowledge that appeared rarely in teachers' pedagogical reasoning (n = 15) and seemed to stem from commonsense understandings of the world. Knowledge of skills was representative of decontextualized knowledge, yet it was infrequent in teachers' pedagogical reasoning during instruction. Importantly, all instances of teachers' use of knowledge about children's skill development co-occurred with other knowledge as teachers integrated this into their pedagogical

reasoning and subsequent instruction, often in relation to goals (discussed previously).

Past experiences

This category encapsulated knowledge gained by teachers through their experiences in the world; yet this was rare, representing only 4% of knowledge references ($n = 73$; $M = 9.13$, $SD = 8.03$). Generally, teachers referenced educational training and experience in the classroom—experiences that are often investigated by researchers as proxies for (decontextualized) knowledge. An example of using previous experiences during pedagogical reasoning was evident in Catherine's decision to pause and ask a question during a book reading:

> I find it personally more effective to stop on the page because then they can have that visual cue that reminds them of something that they were thinking about or they wanted to ask about rather than waiting until the end and they forget.

She used knowledge gained over time as a teacher in her decision to stop and ask a question rather than waiting until the end of the story. Other teachers referenced knowledge they had gained through school or other training experiences. As Linda said, "Cuz I've been doing this a long time."

Role of teacher characteristics and setting

In addressing the second research aim, it was important to return to the interconnected use of the differing knowledge types within teachers' pedagogical reasoning. The use of knowledge manifested in several, mostly indirect, ways across teacher characteristics and instructional setting.

Teacher characteristics

Teacher characteristics of related degree and teaching experience did not seem to directly inform knowledge use. This was evidenced in the low frequency across teachers of explicitly referencing knowledge gained from past experiences. However, other patterns of difference

did emerge. The first was the differences in sophistication of language and concepts regarding children's skill development. Teachers with EC-related degrees tended to use more field-specific jargon such as: "blend" (Abby), "phonemically" (Beth), "left to right orientation" (Jacki), "initial sound" (Jacki), and "phonically" (Pamela). In contrast, although teachers with non-related degrees also discussed this type of knowledge, they tended to use general and less specified language such as "pre-reading" (Amanda and Catherine). This lack of specificity was exemplified in Catherine's pedagogical reasoning during a writing activity, "[they] start to learn words, then we can start to read. And it all goes together. It's just—it's a process." Similarly, Linda described correct letter formation as "laying the foundation" although she made no references to knowledge about developing reading skills in her interviews.

Second, teachers with more experience seemed to utilize more knowledge about children rather than goals in their pedagogical reasoning. This may be reflective of an ability to differentiate or be flexible in the moment of instruction. For example, during an activity identifying words starting with the /d/ sound Abby explained, "And see if she could, after she says doll, figure out that that begins with /d/... sometimes they have to be able to say it, and form that with their mouth, and be able to say it, and hear it at the same time..." Abby utilized knowledge of how children learn (saying the sound to hear it) to support her pedagogical reasoning, being flexible in-the-moment to support a child. Conversely, in the rhyming activity with the "mouses" error described previously, Jacki admitted she should have regrouped and switched activities sooner as the children were struggling with the task, but she was focused on achieving her pedagogical goals, despite knowledge gathered from children in-the-moment. Amanda demonstrated a similar goal adherence, continuing a letter activity despite observations that children were no longer engaged, stating, "I really wanted to get at least through the first round." This might in part be due to lack of experience or knowledge. Jacki admitted, "I'm still trying to figure out what 4-year-olds can and can't do. I've never taught 4-year-olds before." Indeed, goals were used more on average by less experienced teachers ($M = 99.00$, $SD = 9.54$) than more experienced teachers ($M = 91.80$, $SD = 20.73$) and more by those with an unrelated degree ($M = 100.00$, $SD = 6.00$) than a related degree ($M = 91.20$, $SD = 21.20$).

Setting

Noticeable patterns of difference in knowledge use appeared between whole group and language arts activities. Overall, there were more references to knowledge during circle time compared to language arts activities (*M* = 122.63, *SD* = 22.49; *M* = 97.75, *SD* = 19.12, respectively) and this pattern generally held by knowledge type, including more overall references to contextual than decontextualized knowledge. This was not due to a difference in the average number of episodes by activity as there were more episodes on average for language arts (*M* = 35.50, *SD* = 5.38) than for whole group (*M* = 31.63, *SD* = 5.37). Rather, teachers were just utilizing more types of knowledge more frequently in their pedagogical reasoning during whole group. This might be because of the broader range of activities across whole group—calendar, singing, letter identification, and book reading—as opposed language arts activities which typically were narrower in focus—writing, rhyming, and alphabet knowledge. Whole group instruction would have included more and differing goals as well as more opportunities for shifting foci on children and feelings.

The one exception to this pattern was in use of knowledge about the school environment. References to this type of knowledge were more frequent during language arts (*M* = 12.38, *SD* = 8.67) than whole group (*M* = 9.38, *SD* = 2.97) and tended to focus on knowledge about the curriculum. Largely, this seemed to be tied to the ABC School's scripted curriculum. ABC teachers, on average, discussed using more knowledge about the curriculum than Friendship teachers (*M* = 25.50, *SD* = 9.88; *M* = 18.00, *SD* = 3.56); often focusing on the intentions of the curriculum. Although generally supportive of the curriculum, Abby and Deanna did identify flaws. Both seemed to add more information/clarification to directions, express concern over inaccuracies ("sometimes they add blends"), or identify a disconnect between their knowledge about children and the approach of the curriculum (e.g., "I would love to be able to provide other opportunities").

Discussion

Using SR centered teachers' perspectives while recognizing knowledge use as a process. By focusing on teachers' pedagogical reasoning during instruction via the SR procedure, two important insights about knowledge were gained. First, teachers' reasoning was goal-directed and child-specific with knowledge of feelings, school environment, developing skills, and past experiences playing an integrated, but lesser role. Second, teachers relied on multi-faceted and context-specific reasoning more than the decontextualized knowledge often examined via static measures. These findings have important implications for how the field conceptualizes and investigates knowledge for literacy instruction and seeks to improve teachers' practice through enhanced knowledge.

Contextualizing knowledge

Importantly, the types of knowledge that emerged in teachers' pedagogical reasoning overlapped with differing conceptualizations of knowledge within and outside of EC. The most frequent source of knowledge–goals about children–aligns with Shulman's category of knowledge about educational ends (1987) and has emerged in other researchers' investigations highlighting the role of goals and strategies in teachers' use of knowledge (Wagner, 1987). For teachers in this study, knowledge of goals was directly tied to context as they related to individual children, the activity, and across time. These sources of knowledge drove teachers' decision-making processes and informed enacted instruction more so than any other types of knowledge. Specifically, knowledge of skill development was infrequently tied to teachers' goals. It may be that knowledge of skill development is tacit in the development of goals; these two may not be explicitly connected for teachers or easily disentangled when seeking to understand knowledge.

These findings also underscore the interconnected nature of knowledge and beliefs (Borko & Putnam, 1996; Hindman & Wasik, 2008; Friesen & Butera, 2012) and how they inform teachers' pedagogical reasoning about practice. This was prevalent in the indirect connection between knowledge of goals and knowledge of skill development as

well as the role of feelings in teachers' pedagogical reasoning. Teachers were attuned to children's feelings; their focus on efficacy and confidence suggests a possible connection to knowledge or beliefs about how children learn. Collectively these findings reinforce the importance of considering knowledge use as a process and how different strands of knowledge merge to inform practice (Pajares, 1992; Nespor, 1987). Complementary research methods incorporating multiple approaches to understanding knowledge may help provide more nuanced insight regarding the role of knowledge in practice.

Findings also provide insight into how experience informs knowledge and practice. Although there is reason to consider experience as a direct source of knowledge (Clandinin & Connelly, 1988; Hiebert et al., 2002), experience was infrequently referenced by participants. Importantly, experience seemed to influence teachers' use of other types of knowledge; more experienced teachers drew on knowledge about children over their goals to enact instruction compared with less experienced teachers. This provides a more nuanced understanding of the role of experience which has mixed connections with practice in the literature (National Institute of Child Health and Human Development Early Child Care Research Network, 2000; Phillips et al., 2009) and also underscores the role of experience in the development of knowledge and beliefs.

These findings also have important implications in thinking about how knowledge is conceptualized in connection to the context in which it used. For participants, both instructional activity and curricular context mattered in how they made decisions about practice. In particular, the curriculum influenced teachers' goals for children and how they achieved those goals in a way that would be difficult to see from observations alone. What teachers consider regarding their curricula has implications for what they do in the classroom. Specifically, teachers at the ABC school more frequently reasoned with knowledge about the curriculum—not only thinking about the goals and pedagogy within the curriculum, but, in instances, actively evaluating the curriculum and making connections to other knowledge about children and skill development. Additionally, instructional activity seemed to matter for the range of knowledge utilized by teachers; teachers used more types of knowledge more frequently during large group activities compared to more narrowly focused knowledge during language

arts. Thus, instead of conceptualizing knowledge for literacy instruction holistically, we may need to think about daily activities differently in the context of individual classrooms and curricula (Cohen et al., 2003; Schachter, 2017).

Enhancing knowledge use

Despite the emphasis on contextually-driven knowledge in teachers' reasoning, this does not mean that decontextualized or research-based knowledge is unimportant for emergent literacy instruction and this is underscored by evidence that this knowledge can matter for practice (e.g., Piasta, Park et al., 2020; Piasta, Ramirez et al., 2020). Indeed, in some instances participants seemed to use inaccurate knowledge in their pedagogical reasoning—indicating a need for more training. However, given the interconnectedness of context, knowledge, and practice these data may indicate that focusing on supporting *using* knowledge in context-specific ways could be more efficacious. Training might encourage teachers to utilize research-based knowledge in conjunction with contextually-driven knowledge sources (e.g., goals, children, curriculum). This could be accomplished through targeting teachers' pedagogical reasoning, which others have been successful in shifting (e.g., Nilsson, 2009; Risko et al., 2009).

Furthermore, these findings provide support for a link between teachers' educational experiences and knowledge use. Although the literature is ambivalent regarding associations between degree attainment, practice, and outcomes (Schachter et al., 2016), findings revealed indirect connections between teachers' degrees and how they articulated knowledge. Specifically, teachers described literacy skill development differently, demonstrating more sophisticated knowledge about children's skills. This aligns with research indicating that having an education-related degree seems to be positively connected with literacy instruction (e.g., Gerde & Powell, 2009; Friesen & Butera, 2012). Thus, a continued focus on supporting degree attainment could be beneficial while also using more nuanced ways to understand the connections between educational experiences and knowledge.

Limitations and future directions

There are limitations to this study. Teachers' pedagogical reasoning was only examined during two literacy-related instructional activities within two specific curricular settings. This was an intentional design decision to limit the breadth of the data collection. These, however, are not representative of the range of literacy activities in which teachers might engage, such as center-based activities common in EC classrooms (Early et al., 2010; Fuligni et al., 2012), nor do they represent the range of curricula utilized by EC teachers (Schachter et al., 2020) both of which might inform knowledge use. Indeed, the pattern of differences in the teachers' use of knowledge across the two instructional activities and curricula underscore the need for looking at pedagogical reasoning in other contexts.

Although appropriate for exploratory qualitative work (Maxwell, 2013) there are several limitations to the sample. Although teachers' backgrounds are representative of those found across the field (IOM & NRC, 2012; Whitebook et al., 2018), teachers and children were racially homogenous and the settings in this sample represent a specific subset of EC (Cui & Natzke, 2020; NCES, 2021). More research is needed to extend this work with different teachers, children, and settings.

Conclusions

Using SR provided unique insight into how teachers relied on knowledge about the instructional context and their children *during* emergent literacy instruction–providing a novel way of eliciting knowledge. Conceptualizing knowledge use as a process illuminated that teachers' pedagogical reasoning was multi-faceted and contextually-rooted, highlighting the wealth of knowledge teachers use to inform moment-to-moment literacy instruction and the variability across teachers, activities, and curricula. Efforts to understand and enhance teacher knowledge for literacy instruction would do well to investigate and engage teachers in equally context-specific reasoning, rather than in decontextualized ways.

Data and material — De-identified transcripts available upon request.

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