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A formative experiment to enhance teacher–child language interactions in a preschool classroom

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Abstract

A formative experiment investigated how two strategies aimed at increasing the quality and quantity of language interactions could be integrated into a preschool classroom. Strategies for enriching language interactions were introduced during book sharing, semi-structured group activities, and mealtimes. Mixed methods revealed factors that enhanced, inhibited, or sometimes prevented the integration of enriching language interactions during the school day and accordingly what adaptations might be warranted. Specifically, data revealed increases in the quantity and quality of teacher–child interactions during book sharing and mealtimes, but not during semi-structured group activities. Implications are discussed for professional development, classroom practice, and how formative experiments reveal unique insights about preschool classrooms.

Keywords

oral language development, teacher–child talk, book sharing, preschool activities, formative experiment

Introduction

Developing children’s oral language is an important goal of preschool instruction, because it is foundational to literacy development and subsequent reading achievement, including comprehension (McCardle et al., 2001; NICHD Early Childhood Care Research Network, 2005; Snow et al., 1998). Tabors et al.

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(2001: 334), in their longitudinal study of language and literacy development, state that 'children do begin literacy learning with language and that enhancing their language development by providing them with rich and engaging language environments during the first 5 years of life is the best way to ensure their success as readers.' Yet many children have impoverished opportunities to develop foundational oral language skills at home (Hart and Risley, 1995; Wells, 1986).

Preschool teachers are in a good position to enhance children's oral language skills and to mitigate deficits. However, they may resist or have difficulty implementing potentially useful interventions, particularly when those interventions conflict, for example, with established programs, with strong beliefs about the needs of children, and with routines that help them manage their teaching (Schwartz et al., 1996; Wells and Wells, 2001). Thus, research is needed not only to determine the overall effectiveness of promising interventions for enhancing language development, but also to determine what factors enhance or inhibit their adoption and effective use, how strategies and activities might be adapted to facilitate successful integration into varied instructional environments, and under what conditions they may not be likely to work (Walker, 2006). Formative experiments, the approach used in the present study, are intended to reveal such understandings and may thus offer insights not revealed through other approaches to research (Reinking and Bradley, 2008).

Young children's oral language and reading achievement

During the preschool years, children develop their oral language skills mainly through their interactions within their family. When they enter kindergarten, children have acquired much of the language structure of their first language (Hart and Risley, 1995; Wells, 1986). However, differences in children's exposure to language relate to their language skills (Hart and Risley, 1995; Huttenlocher et al., 1991; Wells, 1986). For example, Hart and Risley (1995) demonstrated that the quantity and quality of language interactions between caregivers and children profoundly influence children's vocabulary acquisition. In their influential study, they found dramatic differences in the number of words heard and acquired when comparing children from advantaged and disadvantaged homes.

Walker et al. (1994) provided evidence that these discrepancies are related to later reading achievement by following the children in the Hart and Risley (1995) study. The children were given periodic assessments of academic achievement and oral language skills in kindergarten through third grade.

They found that the children who entered school with poor vocabulary knowledge and oral language development often experienced difficulties in learning to read. Specifically, children's early oral language skills accounted for statistically significant and unique variance in predicting standardized measures of reading and spelling, beyond measures of socioeconomic status. Thus, enhancing the oral language skills of children from low socioeconomic homes has been argued to be a priority in preschool classrooms, in part because it affects subsequent reading achievement (Catts et al., 1999; Dickinson and Smith, 1994; Snow et al., 1998; Walker et al., 1994).

Role and current status of preschool classrooms

Numerous studies indicate that the quality of preschool classrooms is related to diverse aspects of children's linguistic development (e.g. Bryant et al., 1994; Burchinal et al., 2000; Dunn et al., 1994; NICHD Early Childhood Care Research Network, 2000). The dimensions of quality that matter most are reflected in the Early Childhood Environmental Ratings Scale (ECERS; Harms et al., 1998). That assessment measures the developmental appropriateness of classrooms activities and materials, but also notably teacher-child relationships including interactions that enhance children's oral language skills. Research indicates that classrooms with high scores on the ECERS are more likely to have teachers who engage children in analytic conversations about books and who use low-frequency words during free play (Dickinson and Tabors, 2001). However, Bryant et al. (1994) found that 26 of 32 preschool classrooms functioned below minimal standards in ratings of classroom quality on the ECERS, and scores related to teacher-child language interactions were particularly poor.

Although most language interactions are positive in preschool classrooms, they are frequently related to routine matters that involve low-level cognitive skills (Dunn, 1993; Kontos and Dunn, 1993; Kontos and Wilcox-Herzog, 1997; Smith and Dickinson, 1994). These interactions are also often directives that do not encourage children to respond using complex language or extended talk (Girolametto, Weitzman et al., 2000). Further, research indicates that preschool teachers talk relatively infrequently to individual children (Kontos and Wilcox-Herzog, 1997). Although there are diverse, interrelated factors that influence the quantity and quality of teacher-child language interactions, explicit attention to how teachers promote enriching interactions with children and how teachers create an environment conducive to such interactions is important. Thus, the pedagogical goal and research question guiding the present investigation was: How can the quantity and quality of teacher-child language

interactions be increased during several common preschool activities to enhance children's oral language skills?

Theoretical and empirical basis for intervention

The rationale for the intervention strategies, detailed in the subsequent section, is grounded in existing theory and empirical findings. For example, Hart and Risley (1995) identified several key factors that influence children's oral language development in their interactions with caregivers: (a) the quality of the language interaction between a child and a caregiver, (b) the quantity of language interaction between a child and a caregiver, and (c) the diversity of language content and structure a child hears. Further, they offered the following criteria for defining the quality of language interactions that enhance children's language development: (a) listening carefully to a child's utterances, (b) responding appropriately and in a positive manner to the specific content of a child's utterances, and (c) encouraging a child to elaborate on his or her talk. These factors and criteria guided our search for appropriate strategies that comprised the intervention.

We were also guided by the literature about how teachers can respond orally to children to enhance language development. Thus, we define quality of language interaction by a teacher's use of semantically contingent responses to engage a child in extended conversations (six or more exchanges) and decontextualized demands (i.e. questions or comments requiring or inviting a response), which moves the language interaction beyond the immediate context and engages a child in a more cognitively and linguistically challenging interaction. Specifically, according to Snow (1983), a semantically contingent response (a) expands on the content of a child's utterances, (b) adds new information to the topic of discussion, (c) requests a child to clarify utterances, and/or (d) answers a child's questions. For example, if a child says, 'Look at my picture,' a teacher might give a semantically contingent response such as 'Tell me about your picture,' which encourages the child to engage in a conversation with the teacher. As opposed to a teacher saying 'Oh, how nice,' which would typically end the interaction. The frequency of semantically contingent responses is positively correlated with a child's oral language skills, whereas the frequency of semantically non-contingent responses is negatively correlated with a child's gains in language skills (Snow, 1983). Thus, increasing teachers' use of semantically contingent response is one strategy that has the potential to enhance children's oral language skills.

Decontextualized talk (Snow, 1983) includes interactions that require reasoning skills and more complex language, such as defining words, predicting, and explaining. More specifically, decontextualized demands are questions or comments requiring or inviting a child to respond to and to use more complex cognitive and linguistic utterances. For example, when reading aloud a storybook such as *The Three Little Pigs*, a teacher might say, 'I wonder why this house didn't fall down when the wolf blew on it but the other houses did?', which invites children to compare the types of material used to construct the houses. Whereas a contextualized question such as 'What is this house made of?' can be answered with one word, perhaps derived from an accompanying picture. Research suggests that when children participate in decontextualized talk, they are more likely to develop advanced linguistic abilities (Blank et al., 1978), and there is a positive correlation between the amount of decontextualized talk and early literacy abilities (Snow et al., 1989; Smith and Dickinson, 1994). Thus, the intervention described subsequently involved increasing semantically contingent responses and decontextualized demands.

The intervention

In formative experiments the intervention may be a coherent, integrated cluster of instructional strategies, events, or activities (Reinking and Bradley, 2008; e.g. Duffy, 2001). Thus, we attempted to increase semantically contingent responses and decontextualized demands (i.e. questions or comments requiring or inviting a response), during three common events in preschool classrooms: (a) book sharing, (b) semi-structured group activities, and (c) mealtimes. This approach is supported by calls for instructional guidance and support for engaging children in enriching language interactions throughout the school day (Catts et al. 1999; O'Brien and Bi, 1995; Smith and Dickinson, 1994; Snow et al., 1998). Subsequently, we offer a rationale for selecting each of these activities.

Book sharing. Book sharing is a common and well-researched instructional activity in preschool classrooms (e.g. Wasik et al., 2006; Whitehurst et al., 1994). Book sharing exposes children to rich vocabulary (Hayes and Ahrens, 1988) and it encourages talk that enhances vocabulary acquisition (Wasik et al., 2006; Whitehurst et al., 1994). In addition to whole-class book sharing, we aimed to facilitate small-group (six to seven children) book sharing as a component of the intervention. A small group allows a teacher to focus more on

children's utterances (Morrow, 1989), to be more responsive to children's questions and comments (Richgels, 2002), and to encourage children to give more elaborated responses (Girolametto, Hoaken et al., 2000). Further, a small group provides children with more opportunities to participate in talk (Phillips et al., 1987).

Semi-structured group activities and mealtimes. Semi-structured group activities and mealtimes were included in the intervention, because they are typical preschool activities and because, when compared to book sharing, they entail more flexibility in the topics discussed, more opportunities for children to initiate talk, and more time for a teacher and child to engage in extended conversations. A semi-structured group activity in this study refers to an activity that a teacher plans toward achieving instructional objectives, although it is not necessarily teacher-directed. Such activities can focus on creating a product (e.g. making a collage) or completing a task (e.g. making patterns with small blocks). Likewise, mealtimes (i.e. breakfast, lunch, snacks) are routine parts of a preschool day, and they provide opportunities for a teacher and a child to engage in extended conversations on various topics (Cote, 2001).

Professional development and teacher change

The literature on professional development and teacher change is relevant to the present investigation because the literature suggests that preschool teachers have strong beliefs and well-established routines and practices (Kowalski et al., 2001; Yaden and Tam, 2000). Thus, they may be resistant to interventions and modifications inconsistent with the culture of preschool despite research demonstrating the benefit for children (Wasik et al., 2006; Whitehurst et al., 1994). To address that issue, we were guided by three factors that may influence teachers' abilities to connect research and practice (Malouf and Schiller, 1995).

First, teachers' attitudes and beliefs about teaching and research influence their ability to adopt new educational practices. Thus, changing patterns of language interactions may depend first on increasing teachers' understanding of the importance of children's oral language skills (Hughes and Westgate, 1997). For example, many preschool teachers believe that it is more important to facilitate children's social-emotional development than it is their language, literacy and math skills (Kowalski et al., 2001). Therefore, when working with the teachers in the present study, we looked for opportunities to emphasize that children's social-emotional development was not sacrificed when more cognitively oriented activities are promoted. Similarly, we emphasized that listening

and responding to children's utterances not only supports children's social-emotional development, it also enhances their oral language development (Whitebrook et al., 1989).

Second, contextual factors, such as the curriculum and instructional support, influence teachers' ability and desire to adopt new educational practices. Research suggests that an intervention must be ecologically valid (Bronfenbrenner, 1979) and congruent with teachers' educational goals or philosophy of the curriculum and the environmental constraints of the classroom to increase the likelihood that it will be implemented and maintained (e.g. Schwartz et al., 1996; Yaden and Tam, 2000).

Third, teachers need time and opportunities to reflect on their knowledge and experience in relation to the research. Reflection is a particularly important component of effective teaching (Shön, 1987) because teaching is 'complex, situation-specific, and dilemma-ridden' (Sparks-Langer and Colton, 1991: 37).

Method

Formative experiments

To investigate how the quantity and quality of teacher-child language interactions might be increased during several common preschool activities and to determine what factors enhance or impede accomplishing that goal, we conducted a formative experiment. Formative experiments are among a group of closely related approaches aimed at studying promising interventions in authentic instructional environments (Reinking and Bradley, 2008). These approaches, often referred to collectively as design-based research, are relatively new, but are nonetheless well established in the literature as a means to develop, test, and refine pedagogical theory and to align research more closely to instructional practice (Hoadley, 2004). Design-based research responds to calls that literacy research employ methods that are more likely to inform practitioners (Dillon et al., 2000) and that acknowledge and accommodate the complex interacting variables that affect instruction and instructional outcomes. Formative experiments, in particular, have been prominent in the research pertaining to literacy (e.g. Baumann et al., 1997; Duffy, 2001; Ivey and Broaddus, 2007; Jimenez, 1997; Lenski, 2001; Neuman, 1999; Reinking and Watkins, 2000).

Like all research approaches, formative experiments have limitations and raise methodological issues (Dede, 2004). For example, Shavelson et al. (2003) have questioned whether formative experiments can satisfy current scientific standards for warranting findings, and whether results can generalize

to other contexts. We believe these concerns are mitigated by considering formative experiments to fall into a category of research that Lagemann (2008) refers to as translational (i.e. research that can produce useable knowledge). In addition, findings can be viewed in relation to Firestone's (1993) expanded view of generalization in education research. He argued that in addition to generalization from a sample to a population, research can investigate theoretical generalization (testing theory in practice) and case-to-case generalization (findings that inform practitioners whose work occurs in similar environments).

In the present investigation, we used a framework for conceptualizing, conducting, and reporting a formative experiment proposed by Reinking and Watkins (2000) and used by other researchers (e.g. Ivey and Broaddus, 2007; Lenski, 2001). The following six questions comprise that framework:

1. What is the pedagogical goal of the experiment, and what theory establishes its value?
2. What is an instructional intervention that has the potential to achieve the pedagogical goal?
3. What factors in the environment enhance or inhibit the intervention's effectiveness in achieving the goal?
4. How can the intervention and its implementation be modified during the experiment to achieve the goal more effectively?
5. Has the educational environment changed as a result of the intervention?
6. What unanticipated positive or negative effects does the intervention produce?

The theoretical and empirical justification for the goal, increasing the quality and quantity of teacher-child language interactions to enhance children's oral language skills, and the strategies and activities comprising the intervention aimed at achieving it have already been discussed. The responses to the final four questions are presented in subsequent sections.

Participants and site

Participants included a preschool teacher, a paraprofessional, and 20 children. Ms Kephart (all names are pseudonyms), the teacher, had 20 years of teaching experience, the previous 10 years teaching preschool. She held a Master's degree in education. Ms Davis, the paraprofessional, had worked with Ms Kephart for three years and held a high school degree. The class was composed of 10 boys and 10 girls, aged between four and five years. Six children were classified as African American, nine as European American, and five as

Hispanic; 19 of the 20 children received free or reduced lunch. The class was located in an elementary school in a rural community in southeastern USA.

The teacher and paraprofessional used the High/Scope curriculum (Hohmann and Weikart, 2002). Teachers who implement the High/Scope curriculum are guided by five principles: (a) active learning, (b) adult-child interactions, (c) learning environment, (d) daily routines, and (e) assessment. Active learning, the central principle, emphasizes children's choice and initiative in play and other educational activities. Ms Kephart helped the school district choose the curriculum, she attended High/Scope workshops, and she was committed to the curriculum. However, Ms Kephart indicated in an interview prior to the project that she considered the needs of her students more important than the curriculum and that she was not bound entirely by the curriculum when making instructional decisions.

Procedures

When the teacher and her paraprofessional were recruited, I (here and subsequently, first person pronouns refer to the first author) met with them to explain the purpose of the study, the pedagogical goal, and their collaborative role in the formative experiment. However, strategies were not discussed until after baseline data were collected, so as not to influence their instructional practices. During the first seven weeks of the study, I observed in the classroom and the school to gain a thorough understanding of the context, and I interacted informally with the teachers and children to build trust and to accustom them to my presence. I gathered data systematically through a semi-formal interview (Appendix A) and informal discussions with the teacher and paraprofessional, classroom observations and field notes, and videotaping of book sharing and semi-structured group activities. At the end of the baseline phase, I presented the intervention to Ms Kephart and Ms Davis by (a) explaining the importance of preschool in developing children's oral language, (b) describing research related to children's language experiences at home and in school, (c) presenting the potential benefits of semantically contingent responses and decontextualized demands and providing examples of each type of interaction, (d) explaining the pedagogical goal and intervention in relation to their current practices and the various components of the intervention, and (e) discussing how their practices might be adapted or enhanced. For the next 16 weeks, while Ms Kephart and Ms Davis implemented the intervention strategies, I continued to collect and analyze data. Further, I met with them individually to discuss the children's responses to their interactions. At the end of this intervention

phase, I debriefed Ms Kephart and Ms Davis in a semi-structured interview (Appendix B).

Data collection and analysis

Qualitative data. Qualitative data included semi-structured interviews and informal discussions with the teacher and paraprofessional, and classroom observations and field notes. Qualitative data were collected and analyzed from an interpretive, participant-observation stance, which requires developing a close collaborative relationship with participants (Erickson, 1986). Our relationship with the teachers followed what Cole and Knowles (1993) refer to as teacher development partnership research. Toward that end, each week during the intervention phase I met individually with Ms Kephart and Ms Davis to informally discuss events that I observed, and/or to view and discuss video clips of their interactions with the children. These informal discussions were also opportunities to understand their perspectives, to discuss how the intervention strategies or activities might be adapted to better achieve the pedagogical goal, and to reiterate the rationale and goals of the intervention strategies. Further, some discussions served as member checks for the emerging data (Lincoln and Guba, 1985).

Qualitative data were collected (a) to characterize the context of the classroom prior to the intervention, (b) to determine what factors might enhance or inhibit the implementation and effectiveness of the intervention, and (c) to understand what aspects of the environment changed and what unanticipated effects were evident as a result of the intervention. Data were collected and reviewed to find emerging patterns and to develop categories (Spradley, 1980), specifically those patterns that revealed opportunities for increasing the quantity and quality of teacher–child language interactions and how the intervention strategies could be workable and effective. Categories emerged and were refined throughout the study. For example, during the baseline phase, four categories emerged as relevant: (a) school rules and expectations, (b) class rules and expectations, (c) teachers' style of interaction, and (d) child characteristics. However, as the intervention was implemented, two other categories emerged: curriculum and activities. As the intervention progressed, it became apparent that some categories needed to be divided and others needed to be merged. For example, 'teachers' style of interaction' was divided when it became apparent that the teacher and paraprofessional's interactions styles with children were distinctly different. Further, the teacher and paraprofessional's style of interaction were each merged under 'activities' and 'activities' were later subsumed

under 'school rules and expectations,' 'class rules and expectations,' and 'curriculum.' Finally, during a retrospective analysis (Cobb, McClain et al., 2003), which will be described later, categories were condensed and renamed. Table 1 shows the final categories with examples illustrating events that enhanced or inhibited language interactions throughout the school day.

To establish credibility through prolonged engagement, persistent observation, and triangulation (Lincoln and Guba, 1985), the class was observed for 55 days, across 23 weeks for a total of 297 hours. Triangulation was accomplished through the use of multiple data sources that included transcripts of interviews, notes related to discussions, observational field notes, transcripts of videotapes, and member checks with the teachers. For example, in January, field notes about and coded transcripts of the paraprofessional's book sharing indicated that she was engaging children in more talk. An informal discussion with Ms Davis indicated that she had indeed increased her attention to the children's vocabulary knowledge as she engaged them in book sharing, and it also provided an opportunity for professional development.

Ms Davis told me that she was impressed by the children's ability to figure out the vocabulary in *Flowers for the Snowman*, specifically 'plodded,' 'scampered,' and 'trudged.' She also mentioned that she was happy that many of the children responded, as opposed to just two of them (Daniel and Latoya). I suggested that it might be helpful to act out those words, possibly in the playground, to further reinforce their meanings and the differences between each style of walking.

Subjectivities. My background reveals the subjectivities that influence this investigation. I have taught preschool-aged children with special needs for 14 years. I have also provided professional development in the area of literacy to numerous preschool teachers and paraprofessionals. Based on my experience, and supported by early childhood research, I believe that children's oral language development needs to be the foundation of the preschool curriculum. I also believe that it is important for teachers to create a safe and nurturing environment where children are encouraged to express their wants, needs, ideas, and opinions. However, I respect teachers' professionalism, and their values and beliefs, in making pedagogical decisions, and I understand and accept the challenges they face in meeting the needs of children and their families. Thus, although invested in the strategies and activities that defined the intervention, I did not take the stance of an unrelenting advocate for them, nor did I romanticize their potential for achieving the pedagogical goal. Finally, my background helped me to establish good rapport with Ms Kephart, Ms Davis, and their children, and I was able to observe and, when appropriate,

Table 1. Emergent qualitative categories with examples from field notes illustrating events that enhanced or inhibited language interactions

School factors	Class factors	Curriculum	Child factors
<p><i>Upon arrival all children in the school wait in the cafeteria</i></p> <p>Teacher Planning time until school decreased children's wait time from 20 to 0 minutes; teacher continued to do paperwork</p> <p>Paraprofessional Helped supervise children in the cafeteria through directives; some short conversations with children</p> <p><i>School-wide morning announcements:</i> Weather, birthdays, lunch menu, 'Word of the Week,' other announcements, moment of silence, 'pace exercises'</p> <p>Teacher No talking, reminders to follow rules</p> <p>Paraprofessional No talking, reminders/directives to follow rules</p> <p><i>Hallways – walk quietly in line</i></p> <p>Teacher Emphasized rules but allowed some talking and I:I conversation; used praise, reminders, and friendly competition to control behaviors</p> <p>Paraprofessional emphasized walking in line; no touching; no talking; used idle threats to control behaviors</p>	<p><i>Morning routine</i></p> <p>Paperwork; writing lesson plans; preparing for, setting up and cleaning after activities; checking backpacks</p> <p>Teacher Monitored and redirected children's behaviors; responded briefly or for longer periods of time if child initiated interaction</p> <p>Paraprofessional Monitor children's behaviors and gave directives, responded briefly to children's initiation</p> <p><i>Quiet environment (expectation)</i></p> <p>Teacher Lights out and gave reminders or explanations why it is important to play quietly</p> <p>Paraprofessional General reminders to play quietly or gave directives to specific children to be quiet</p> <p><i>Class schedule</i></p> <p>Teacher Whole-class book sharing occurred before nap time but teacher would extend activity</p> <p><i>Small-group book sharing at end of the day limited time and energy</i></p> <p>Paraprofessional Whole-class book sharing occurred before nap time, no extension – stayed on schedule</p>	<p><i>Book sharing</i></p> <p>Teacher Taught concepts in books and related to past/present class topics</p> <p>Paraprofessional Focus on content within book but kept readings brief</p> <p><i>Book factors</i></p> <p>Genre/topic may influence readings</p> <p><i>Semi-structured group learning</i></p> <p>Teacher Experience or process important, asked questions related to activity, responded to children's initiatives</p> <p>Paraprofessional Completing task important, responded to children's initiatives</p> <p><i>Free play</i></p> <p>Teacher Taught children skills and concepts, I:I or with small groups of children</p> <p>Paraprofessional Facilitated activities, supervised children, kept class quiet</p> <p><i>Breakfast</i></p> <p>Discontinued use of a timer to limit talk; rescheduled so entire class attended breakfast</p> <p>Teacher Initiated conversations with children, sat at different tables; continued to tell children to stop talking and to drink their milk</p> <p>Paraprofessional Increased active listening, responded to children initiatives, occasionally initiated talk,</p>	<p><i>Children whose first language is Spanish</i></p> <p>Teacher Would make an effort to interact with children</p> <p>Paraprofessional Rarely initiated interactions but responded to children's initiatives</p> <p><i>Children with language delays</i></p> <p>Teacher Would make an effort to interact with children</p> <p>Paraprofessional Rarely initiated interactions but responded to children's initiatives</p> <p><i>Children with negative behaviors</i></p> <p>Teacher Would redirect and interact with until child(ren) behaved appropriately</p> <p>Paraprofessional Would give directives and idle threats</p> <p><i>Children who are quiet or reticent</i></p> <p>Teacher Would make an effort to interact with children</p> <p>Paraprofessional Rarely initiated interactions but responded to children's initiatives</p>

(continued)

Table 1. Continued

School factors	Class factors	Curriculum	Child factors
<p><i>Lunch rule</i></p> <p>School-wide rule implemented and enforced by all staff Music on – No talking Music off – Talk quietly</p>	<p><i>Small-group book sharing</i> at the end of the day, limited time and energy</p>	<p>continued to be concerned with children's behaviors but more tolerant, continued to be concerned that children eat all their food but reminded children to eat rather than insist they stop talking, always sat at the same table</p>	<p><i>Child with emotional needs</i></p> <p>Teacher had rapport with child; child who occasionally whispers to her Paraprofessional Tried interacting with the child but child would not talk to her or peers</p>
		<p><i>Lunch time</i></p> <p>Teacher Indicated that 'music' disrupts conversation but it gave adults 'down time'; initiated conversations with children; continued to tell children to stop talking and to drink their milk; sat at different tables Paraprofessional Indicated that the 'music' disrupts conversation but was needed so children would eat; increased active listening; occasionally initiated talk; continued to be concerned about children's behaviors but more accepting; children eat all their food but reminded them to eat rather than insist they stop talking; always sat at the same table with primarily the same children</p>	

participate in class activities without unduly interfering with their role, responsibility, or authority.

Quantitative data. Quantitative data included coded transcripts of videotaped book sharing and semi-structured group activities. The transcripts were coded as contextualized or decontextualized using a modified version of the Scale of Abstraction for Preschool Discourse (Blank et al., 1978; van Kleeck et al., 1997), and then totaled. Examples are shown in Table 2.

The proportion of decontextualized demands was calculated, plotted and scrutinized for trends in the frequency of demands teachers made during each book sharing and semi-structured group activity. Inter-rater reliability of coded demands using Cohen's κ statistic was .75 for the teacher and .79 for the paraprofessional, which represents good reliability using this approach (see Hammett et al., 2003).

Transcripts were also searched for extended interactions of six or more exchanges between the teacher or paraprofessional and a child to determine whether the teacher or the child led the conversations. Although adult-led interactions can be enriching, research shows that following a child's lead via semantically contingent responses is positively correlated with a child's linguistic skills (Snow, 1983). An example of an extended conversation based on semantically contingent responses is shown in Table 3, and an example of a teacher-led extended interaction is shown in Table 4.

Retrospective analysis. In addition to qualitative and quantitative data collection and analysis during the baseline and intervention phase, we also conducted what Cobb, McClain et al. (2003) refer to as retrospective analysis after the intervention phase. Analysis of multiple sources of data collected during the intervention phase ensures that retrospective analysis is rigorous and results in empirically based theory and instructional guidelines (Cobb, Confrey et al., 2003). Thus, after the intervention phase, all sources of data were reviewed to inform our responses to questions 3–6 in the framework guiding this formative experiment, which are addressed individually in the Results section.

Results

Factors enhancing and inhibiting the effectiveness of whole-class book sharing

Baseline phase. Before implementing the intervention, I recorded the number of Ms Kephart's decontextualized demands before, during, and after reading a

Table 2. Sample demands from the modified Blank et al. (1978) Scale of Abstraction for Preschool Discourse

Contextualized talk		Decontextualized talk	
Level 1: Matching Perception	Level 2: Selective Analysis of Perception	Level 3: Reordering Perception	Level 4: Reasoning about Perception
<ul style="list-style-type: none"> • Naming or remembering an object seen: <i>What do you see? What did you see?</i> • Simple cloze: <i>Jack and Jill went up the ____.</i> • Imitating a simple sentence: <i>Brown bear, brown bear what do you see?</i> • Tag-questions: <i>That was a good book, wasn't it?</i> • Following a simple direction: <i>Go wash your hands.</i> • Rote counting 	<ul style="list-style-type: none"> • Describing a scene/event: <i>What is happening?</i> • Recalling items named in a statement: <i>What things did we talk about?</i> • Recalling information from a statement: <i>Who? What? Where?</i> • Naming characteristics or functions of objects: <i>What color is this?</i> • Concepts: Attending to two characteristics: <i>You may ride the little red trike.</i> • Identifying differences: <i>How are these different?</i> • Citing an example within a category: <i>What other farm animals did we see?</i> • Following a set of directions: <i>Throw this away, go wash your hands and then go sit in circle.</i> 	<ul style="list-style-type: none"> • Describing events subsequent to a scene: <i>What will happen next?</i> • Assuming the role of another person: <i>What could he have done?</i> • Formulating a set of directions: <i>Tell me how you made that.</i> • Identifying similarities: <i>How are these the same?</i> • Defining words: <i>What does ____ mean?</i> • Recall past experiences: <i>Tell me about when you . . .</i> • Talking about future experiences: <i>Tell me what you will do.</i> • Making inferences • Judgment/Evaluation-including non-perceptual qualities and internal states: <i>How do you think Peter feels?</i> 	<ul style="list-style-type: none"> • Predicting and/or justifying a prediction: <i>What do you think will happen? Why do you say that?</i> • Identifying the causes of an event: <i>What made it happen?</i> • Formulating a solution: <i>What could you do? What could she do?</i> • Selecting and/or exemplifying the means to a goal: <i>What could we use? Why should we use that?</i> • Explaining an inference drawn from an observation: <i>How can we tell . . .?</i> • Explaining the obstacles to an action: <i>Why can't we . . .?</i> • Text-to-life comparisons: <i>Has that ever happened to you?</i> • Text-to-text comparisons: <i>Does this remind you of another story?</i>

Table 3. Examples of semantically contingent conversation

The teacher was reading <i>The Door Bell Rings</i> by Pat Hutchins during whole-class book sharing		
Ms Kephart	Tyrell, what happens at your house when the doorbell rings?	Teacher initiates interaction
Tyrell	Umhhh (seems confused by the question)	
Ms Kephart	Do you have a doorbell?	Teacher-directed – Simplifies question
Tyrell	Uh-huh [yes].	
Ms Kephart	Uh-huh [yes]. What happens?	Semantically contingent – Requests clarification
Tyrell	Sometimes my Daddy don't come to the door because he's mean.	
Ms Kephart	He goes to the door and he's mean?	Semantically contingent – Requests clarification
Tyrell	He don't go – he don't go answer the door because [unintelligible].	
Ms Kephart	Oh, he won't go to the door?	Semantically contingent – Requests clarification
Tyrell	But my Momma does.	
Ms Kephart	Oh, but your Momma goes to the door.	Semantically contingent – Expands utterance
Tyrell	Nods his head 'yes.'	
Ms Kephart	Latoya, what happens when the doorbell rings at your house?	Teacher initiates interaction with another child

book with children. Researchers have suggested that approximately 30% of teachers' demands should be decontextualized (Blank et al., 1978; Taylor et al., 1999). Ms Kephart's decontextualized demands were above the recommended 30% (Figure 1) and thus at a level associated with accomplished teachers. On the other hand, Ms Davis's proportion of decontextualized demands before, during, and after book sharing was below 30% (Figure 2).

The transcripts from book sharing were also searched for extended interactions and coded for semantically contingent responses. Although Ms Kephart and Ms Davis did use semantically contingent responses, the number of such responses that led to extended conversations was small, with only two instances during 76 minutes of videotaped book sharing (Table 5).

Interviews, observations, and coded transcripts indicated that the teacher and paraprofessional had different purposes for and styles of reading aloud to the children. Ms Kephart expected the children to participate actively in book sharing to learn concepts, whereas Ms Davis expected the children to listen quietly, which

Table 4. An example of a teacher-led extended interaction

The children were making patterns with small blocks during a semi-structured group activity

Ms Kephart	Flora, can we make a pattern with yours [small block]?
Flora	Mmhmm [yes].
Ms Kephart	Flora, we can build it up. Watch. Let's do it this way. Wait, Flora, watch Miss Kephart. We'll build it up. Watch. What color is this?
	<i>Teacher points to the block.</i>
Flora	Green.
Ms Kephart	Green. What is this?
	<i>Teacher points to each block as Flora names the colors.</i>
Flora	Blue, green, blue, green.
Ms Kephart	What comes next?
Flora	Green.
Ms Kephart	Not green. Green, blue, green, blue, green. . .
	<i>The teacher points to the blocks as she names the colors.</i>
Flora	<i>Flora puts a blue block on top of the stack of blocks.</i>
Ms Kephart	What goes next?
Flora	<i>Flora puts a green block.</i>
Ms Kephart	Mmmhmm [yes], you got it. You want to keep going? It's gonna fall. See how high you can go.
	<i>The teacher turns her attention to another child who is making a pattern with blocks.</i>

would help them 'to get ready for kindergarten,' as she stated in an interview. Further, Ms Davis indicated that she believed children had short attention spans, and therefore, it was necessary to keep book sharing brief. Thus, there were opportunities for Ms Davis to increase her use of decontextualized demands during book sharing and, possibly, for both the teacher and paraprofessional to provide more semantically contingent responses to engage children in extended conversations.

Intervention phase. During this phase, Ms Kephart's proportion of decontextualized demands increased beyond the relatively high levels observed during baseline (Figure 1). However, the overall proportion of decontextualized demands after book sharing decreased somewhat. Ms Davis also made more decontextualized demands (Figure 2) before and during book sharing when compared to the baseline phase, and also made fewer decontextualized demands after the book sharing during the intervention phase compared to the baseline phase. Based on a review of the field notes, we speculate that the decrease may

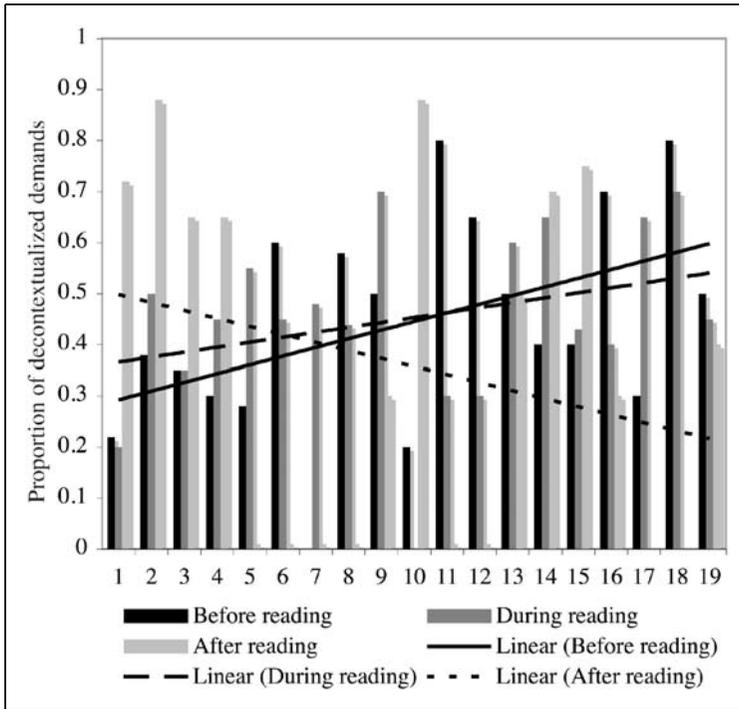


Figure 1. Teacher's proportion of decontextualized demands during the baseline and intervention phase of book sharing.

reflect greater attention to interactions before and during book sharing, thus lengthening the activity and consequently raising concerns about children's attention after the reading. Nonetheless, alerting Ms Kephart and Ms Davis to the issue of decontextualized talk and discussing possibilities in the context of viewing videotapes of their teaching led to an increase in their use of decontextualized demands to a recommended level. As will be explored further in the Discussion section, we believe that this finding is important, because it suggests that it may be relatively easy to increase the quality of talk within book sharing, even among teachers who engage in relatively high levels of decontextualized demands or who have strong views about book sharing. However, doing so may require an opportunity to view and discuss videos of their teaching.

Finally, the teacher did engage children in more extended interactions during book sharing; however, she was twice as likely to direct the conversation when compared to baseline. The paraprofessional also engaged children in more extended conversations but she, too, was more likely to lead these interactions (Table 5).

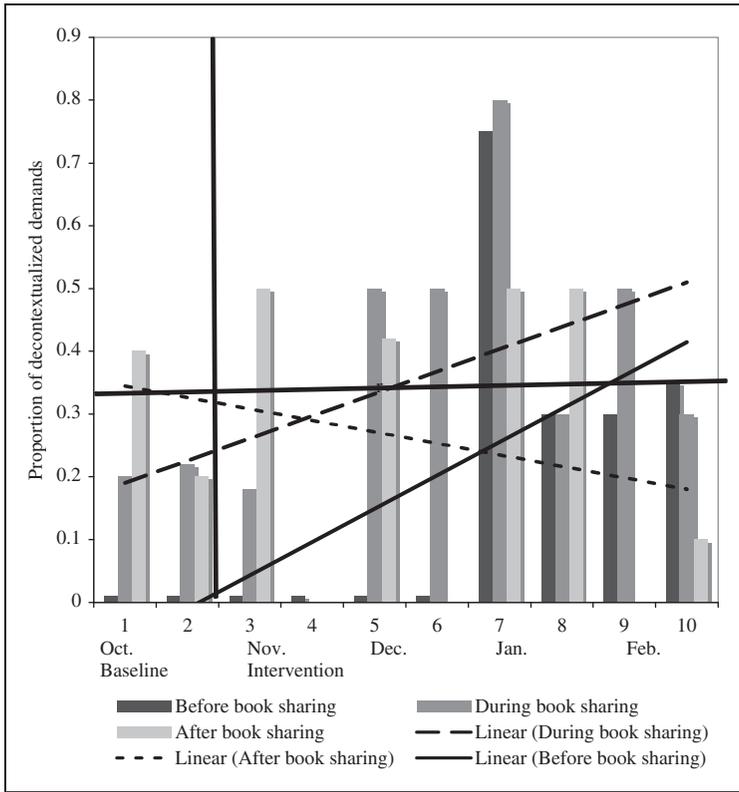


Figure 2. Paraprofessional's proportion of decontextualized demands during the baseline and intervention phase of book sharing.

Small-group book sharing

Baseline phase. Based on field notes and interviews, reading to children in small groups was not observed, nor was it a planned activity.

Intervention phase. Implementing small-group book sharing was a challenge for the teacher. When I suggested implementing small-group book sharing to increase children's opportunities for talk, Ms Kephart resisted. Mainly, she was concerned that by asking children to engage in another teacher-selected activity, children could not choose play activities, which is a hallmark of the High/Scope curriculum (Hohmann and Weikart, 2002). Further, Ms Kephart indicated they if she and Ms Davis were both reading to children, they could not adequately supervise the children who were not participating.

Table 5. Number of semantically contingent conversations and teacher-led interactions during book sharing and semi-structured group activities

Activity	Adult	Baseline phase			Intervention phase			Total minutes of video-recorded activity	Total minutes of video-recorded activity
		Number of semantically contingent conversations	Number of teacher-led interactions	Total minutes of video-recorded activity	Number of semantically contingent conversations	Number of teacher-led interactions	Total minutes of video-recorded activity		
Book sharing	Teacher	2	2	52	10	21	168		
	Paraprofessional	0	0	24	1	3	62		
Semi-structured	Teacher	1	6	58	10	26	108		
	Paraprofessional	2	4	24	3	6	80		

This discussion is an example of how the curriculum and classroom management influence whether and how an intervention is implemented. As a former teacher, I could empathize with a teacher being asked to change well-established class routines, but I also believe that teaching in small groups is in the best interest of children. However, when conducting a formative experiment, it is necessary to see the intervention from a teacher's point of view and to understand what factors prohibit the implementing aspect of an intervention.

Nonetheless, in January, after the holiday break, Ms Kephart indicated that she was interested in implementing small groups. Although she did not explain her reasons, it may have been based on an opportunity to reflect on the potential benefits of small-group instruction (Shön, 1987). We discussed possible modifications and decided on an approach that accommodated her concerns. Specifically, Ms Kephart and Ms Davis would each read to half the children in the class at the end of the school day, when they typically engaged children in a whole-class activity. Nonetheless, such book sharing was sporadic and did not seem to be fully integrated into the daily routine. Thus, teachers in contexts similar to the present investigation may need time to reflect on their practice and to consider how they can integrate more small-group work into their instructional routines derived primarily from a set curriculum, from their beliefs, and from efforts to manage the logistics of teaching. Gradual movement toward small groups, in this case from a class of 20 children to two groups, may also be more manageable when there is a teacher and a paraprofessional.

Semi-structured group activities

Baseline phase. During semi-structured group activities, children were expected to listen quietly while Ms Kephart or Ms Davis gave directions; otherwise, they were allowed to talk freely. Coded transcripts of these activities showed that the teacher and the paraprofessional engaged children primarily in contextualized talk. The proportion of decontextualized demands in which they engaged the children during these activities was in all instances below the 30% recommended in the literature (Blank et al., 1978) (Figure 3). The transcripts were also searched for extended interactions. There were only three instances during 82 minutes of videotaped semi-structured activities in which the teacher or paraprofessional used semantically contingent responses to follow a child's lead and seemingly aimed at engaging that child in extended conversations (Table 5). Thus, there seemed to be opportunities for engaging children more often in enriching interactions during these activities.

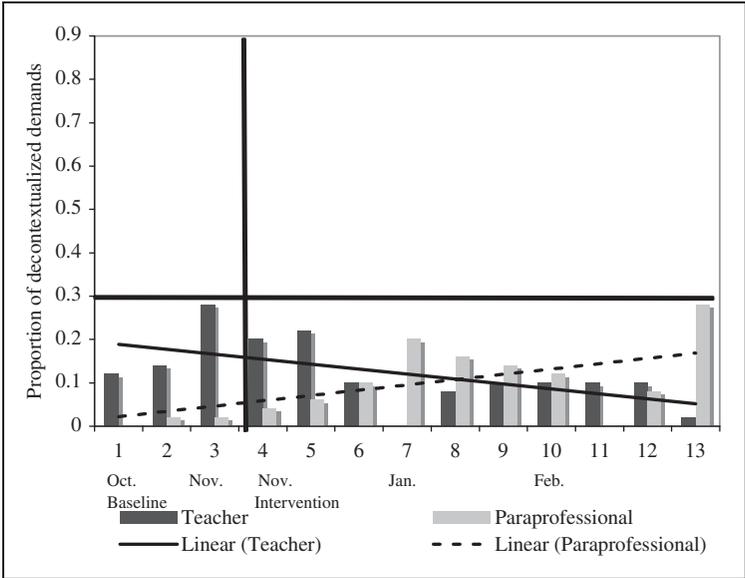


Figure 3. Teacher and paraprofessional’s proportion of decontextualized demands during the baseline and intervention of semi-structured group activities.

Intervention phase. Ms Kephart and Ms Davis continued to engage children in contextualized talk after the intervention was introduced (Figure 3), and, although there were more extended interactions, they were primarily teacher-led (Table 5). Because changing one’s style of interacting with children may be difficult, we assumed that these experienced educators might need more time to change the patterns of their interactions. Therefore, I waited until January before suggesting that they adopt a set of generic strategies for initiating more decontextualized demands, such as ‘Tell me how you made ___’ and ‘Tell me about your ___.’ Nonetheless, the data (Figure 3) indicated that Ms Kephart and Ms Davis were not able to increase decontextualized demands during semi-structured group activities. After reviewing the videotapes and transcripts several times, it became evident that asking questions or making comments to initiate decontextualized talk was difficult within the context of the activities. For example, the following is a typical exchange during an activity when the children were decorating gift bags, and where the children primarily negotiated for materials and the teacher provided assistance or managed behaviors.

Toward the end of this activity, only a few children remained at the table and Ms Kephart was able to engage a child in an extended interaction that began

Darlene	I can't open this [glue]. <i>The teacher hand Darlene another glue bottle.</i> Thanks.	Child initiates interaction with the teacher
Ms Kephart	Here, take this one. <i>The teacher gave a glue bottle to Tyrone.</i>	Teacher initiates interaction - Contextualized and semantically contingent
Darlene	I need a bead. <i>Darlene reaches across the table to a tray of beads.</i>	
Shane	Miss Kephart, can I go [wash my hands]?	Child initiates interaction with the teacher
Ms Kephart	You can go [wash your hands]. <i>Shane got up to wash his hands.</i> Tyrone, do you need some glue?	Contextualized and semantically contingent Teacher initiates interaction - Contextualized
Tyrone	Yeah. <i>Tyrone reached for a bottle of glue.</i>	
Joelle	Hey, that's mine!	
Tyrone	Oh, sorry.	
MsKephart	<i>The children were standing and reaching to get materials.</i> Okay, let's sit down when you pick out a few [decorations] that you want.	Teacher initiates interaction - Contextualized
Athena	Miss Kephart, I want some.	Child initiates interaction with the teacher
Ms Kephart	Athena, you want some of this? <i>The teacher held up a tray of decorations.</i>	Contextualized and semantically contingent

with the decontextualized demand, 'Why's he happy?' then naturally shifts between decontextualized and contextualized demands.

When extended interactions occurred, the transcripts also were coded for semantically contingent responses, as in the previous transcript. When compared to baseline data, Ms Kephart did engage children in somewhat more extended talk; however, the interactions were primarily teacher-led (Table 5). That is, comments were typically non-contingent because children were following the teacher's lead as she taught them skills and concepts. On the other hand, Ms Davis did not increase the frequency of extended interactions (semantically contingent or teacher-led) with respect to the total recorded observations.

Research suggests that open-ended activities, similar to those used in this classroom, provide a context that allow teachers to be more responsive to children, and they allow for more balanced turn taking between children and teachers when compared to book sharing (Girolametto, Hoaken et al., 2000).

Ms Kephart	Why's he happy? <i>Referring to design on gift bag.</i>	Teacher initiates interaction Decontextualized - requests an evaluation
Darlene	'Cause - 'cause um I made him happy.	
Ms Kephart	Because you made - how'd you make him happy?	Decontextualized - requests an explanation Semantically contingent - requests clarification
Darlene	I put one over here, that's blue. And - and one over here, that's gold. <i>Darlene pointed to the decorations that she used to make his 'happy face.'</i>	
Ms Kephart	It is gold. And he's got a nose.	Contextualized - identify salient information Semantically contingent - adds new information
Darlene	Yep and it's red.	
Ms Kephart	Oh somebody is gonna be really excited. Do you know why?	Decontextualized - requests/invites an explanation Non-contingent - changes focus of conversation
Darlene	And there's his chin. It can't reach. <i>The 'chin' didn't go to the bottom of the paperbag.</i>	
Ms Kephart	This is his chin? <i>After a while, Darlene appears to be finishing her bag.</i> Did you want to put anything else on it?	Contextualized - identify salient information Semantically contingent - requests clarification Teacher re-initiates conversation and maintains the lead Contextualized - requests/invites response related to salient materials
Darlene	<i>Darlene shook her head 'no.'</i>	
Ms Kephart	Do you want to put him up to dry?	Contextualized - requests/invites response to simple direction
Darlene	Darlene nodded her head 'yes.'	

Although children did engage in more talk, and Ms Kephart and Ms Davis did interact more with children during semi-structured group activities compared to book sharing, talk remained contextualized and extended interactions were primarily teacher-led.

To adapt the intervention activities in response to these data, I not only suggested the use of generic decontextualized demands, but I also suggested conducting the activities in small groups. That is, with fewer children at their table, Ms Kephart and Ms Davis might be better able to interact with individual children. Although they did implement small groups on several occasions, it seemed distracting. Field notes indicated that both Ms Kephart and Ms Davis were often monitoring the children at the third table to ensure that they were behaving appropriately and thus were less focused on the children at their tables.

I did not suggest other potentially useful modifications to the activities because Ms Kephart indicated that several High/Scope key experiences were introduced during these activities. I was not comfortable asking her to compromise further her commitment to that curriculum. As this illustrates, teachers' commitment to a curriculum and their core beliefs can be an inhibiting factor, but obviously not one that is easily, or perhaps ethically, open to an outsider's vision of how language interactions might be enriched in a classroom.

Mealtimes

Baseline phase. During breakfast Ms Davis remained in the cafeteria with the children, while Ms Kephart returned to the classroom. A timer with an alarm was set for 10 minutes and children were not allowed to talk until the alarm sounded. Nonetheless, after the alarm, Ms Davis discouraged talking and continued to encourage eating. The following field note illustrates the paraprofessional's typical manner of interacting with the children.

Hannah, Daniel, Clay, and Shelby are sitting together at a small table eating their breakfast. Hannah waves to Shane as he joins the children. Daniel calls to Shane, 'Shane. . . Shane, want me to tell you something funny?' The paraprofessional, who is helping children with their breakfast turns toward Daniel and says, 'Shhh. Be quiet now, eat your breakfast. Daniel eat.' Hannah then asks Ms Davis, 'When is Darlene coming?' The paraprofessional responds to Hannah, 'Shhh.' The paraprofessional announced to the group, 'Alright guys eat your breakfast.' As the paraprofessional walked to another table to monitor the children, a child had

already finished eating breakfast. The paraprofessional gives her permission to return to the class.

During lunchtime, Ms Kephart and Ms Davis remained in the cafeteria, and they would occasionally set the timer, again to regulate talking. Additionally, to control the noise in the cafeteria, there was a school-wide rule that when music was playing, talking was not allowed, which greatly limited the time for conversations. Analysis of field notes indicated that when the timer or music was not on, Ms Kephart and Ms Davis listened to the children's conversation, and participated in talk when children directed a comment or question to them. Occasionally, they would engage children in a conversation, but they were primarily concerned that the children eat their meals. During my initial interview and informal discussions with Ms Kephart and Ms Davis, they expressed concern that the children eat nutritious meals. Their concern about the children's welfare influenced how they interacted with them during mealtimes. In summary, there seemed to be opportunities for engaging children in enriching conversations during mealtimes, yet the teacher and paraprofessional's beliefs and mealtime rules and expectations limited these opportunities.

Intervention phase. During the intervention phase, Ms Kephart joined the children for breakfast, and she and Ms Davis, at my suggestion, discontinued the use of the timer to restrict talking. These changes increased conversations during breakfast, particularly among the children. Based on this documented increase in conversations, I suggested occasionally eating lunch in the classroom to avoid the music that cued no talking. However, that suggestion was rejected because Ms Kephart believed that it would be an inconvenience for the cafeteria staff and the custodian, which illustrates the wide range of factors that can limit opportunities for increasing the quantity and quality of verbal interactions in classrooms

Three factors emerged from field notes indicating conditions that enhanced or inhibited conversations during mealtimes: (a) concerns that children were eating nutritiously, (b) restricting talk to control noise, and (c) the inability of teachers to have an extended conversation with a child while other children were seeking attention. These factors illustrate how teachers' beliefs, practical issues, and the logistics of teaching can limit how the intervention strategies are implemented and consequently their effectiveness. For example, the following field note demonstrates how Ms Kephart listened to and engaged children in talk, how children naturally engaged in decontextualized talk (e.g. talk about

Marcus Miss Davis, guess what, I have snakes all over my house.
 Ms Davis You do?
 Tyrone Where do they live? Do they move?
 Marcus I live upstairs.
 Tyrone I live upstairs, too.
 Marcus I live way way upstairs
 Tyler I live upstairs, too.
 Tyrone No you don't.
 Tyler Yeah I do.
 Tyrone Downstairs.
 Marcus Upstairs.
 Ms Davis Shhh, eat guys.

The children ate briefly in silence then began talking again.

Marcus Today is Monday.
 Tyler Monday.
 Tyrone Yeah, today is Monday.
 Tyler Tomorrow I'm going to church.
 Ms Davis What comes after Monday?
 Marcus Tuesday.
 Tyler I'm going to church.
 Ms Davis On Tuesday?
 Tyler Yeah.

The children continued talking and the topic turned to a past field trip.

Tyrone To Ms Davis. Remember going to the pumpkin patch?
 Ms Davis I didn't go. Remember, my little boy was sick.

The boys continued talking and the topic switched to football, basketball, and then to a large stoplight that was located in the cafeteria.

Tyler Why do they have a red flag? The red light on the stoplight was on.
 Tyrone 'Cause.
 Marcus So they can shut our mouth.
 Tyler Why don't they turn on the green light?
 Marcus 'Cause that won't shut our mouth. 'Cause red light is stop and green is go and yellow . . . Marcus was unsure of what yellow meant.
 Ms Davis The yellow means slow down.

non-present objects, activities, and events), and how the music interfered with conversations.

Tyrone told the teacher that he had money. The teacher asked how much money he had and Tyrone told her he had \$1,000. The teacher asked what he was going to do with the money and Tyrone told her that he was going to buy a monster truck. The teacher asked why he wanted a monster truck and Tyrone told her, 'To crush cars.' Latoya and Shelby then told the teacher how much money they had to buy toys. The teacher asked the children how they got their money and Tyrone immediately said, 'I robbed a bank.' Before the teacher could follow-up, the principal turned on the music and children stopped talking.

Nonetheless, the following interaction illustrates Ms Davis's growing acceptance of conversations. Although she did not actively engage children in conversations, she allowed them to talk with each other, and occasionally she participated.

In summary, the data suggest that with increased awareness and support, Ms Kephart and Ms Davis could change their style of interacting with children during mealtimes, so that children could engage in more conversations. However, data also suggest that they struggled to break tacit habits related to former behaviors, in this case, of telling children to stop talking when the noise level began to rise or in order to eat. Finally, data suggest that there are contextual factors that not only inhibit the implementation of an intervention, but are, in some instances, beyond the control of a teacher or the purview of an outsider, such as a researcher, to change.

Did the intervention lead to changes in the educational environment?

Free play, a time during which children choose their own activities with minimal restriction, is another common preschool activity that provides opportunities for engaging children in enriching conversations (Farran and Son-Yarbrough, 2001; Roskos, 1990). I observed free-play periods to determine if Ms Kephart and Ms Davis increased the quality and quantity of their language interactions with children during times outside the intervention. Based on observations and field notes, there was no evidence that they changed their interactions with children during early morning free-play period. Ms Kephart and Ms Davis continued to use the early mornings to address school and class business. Late morning and afternoon free-play periods were also observed.

However, during the baseline phase children primarily played in the playground, while during the intervention they primarily played in the classroom, and because the context and contingencies for interaction were so different, they were not comparable.

Nevertheless, Ms Kephart indicated in a final interview that she had developed an increased awareness of children's vocabulary knowledge, particularly during informal conversations. Specifically, she stated:

...there are words that I think they have sometimes in their vocabulary and then I find out that even though we've been over them they're not there. . . Or, I know the other day we were having snack outside and drinking water, and someone's cup turned over and the bench was wet. I said, 'That's okay, the water will evaporate.' I realized the minute I said it, we needed to back up and talk about 'evaporation' and what that was. And sure enough when the water was all gone, the child noticed it. . . another child came back and said, 'Miss Kephart, it's all gone. You were right. It disappeared, it's like magic.'

Ms Davis, during the final interview, indicated that she believed she knew the children better and was more aware of their language abilities this year than in past years. Although their comments suggest that participating in the intervention helped them to become more aware of the children's language, it did not produce observable effects beyond the intervention activities.

Did the intervention produce unanticipated effects?

It is logical to assume that intervention strategies aimed at increasing teacher-child language interactions would deepen teachers' understanding of children's lives. However, we had not anticipated the distressing information that Ms Kephart and Ms Davis would acquire about the children and the pervasive effect that knowledge would have on their teaching and the classroom environment. Specifically, they learned that several children were witnessing family violence, and several children were suspected of being sexually abused. That information highlighted dramatically in this study the many social-emotional needs of children that may be revealed when teachers engage children in richer conversations. In the present case, it added stress to Ms Kephart and Ms Davis's work and raised new responsibilities. Because these are sensitive issues with potentially dramatic consequences, we discussed them during the final

interview. In that interview, Ms Kephart stated:

I've been asking myself because this year I've had to deal with it [abuse] more than any other year. And I've asked myself, is it because I'm listening to the children more or is it because I know that this classroom has more needy families in it. . . maybe eventually I would have heard it [abuse] but I doubt that I would have heard it in the detail and with the understanding of how the child felt about it if I had not been more focused on the conversations. . . it made me more patient with children as I've learned more where they are coming from and conversations have helped me do that.

Asking Ms Kephart and Ms Davis to focus on language interactions may have enabled them to be more sensitive towards the children's lives inside and outside of school. Or, their more responsive approach may have allowed the children to develop a more secure relationship with them. That greater security may have facilitated children's comfort in sharing their family situations with their teachers. Thus, one unanticipated positive effect of interventions aimed at enhancing language interactions in a preschool classroom may be an increased awareness of children's personal lives.

Discussion

The results of the present study support previous research showing that preschool teachers can change their book-sharing style (Wasik et al., 2006; Whitehurst et al., 1994). It extends that research by suggesting that drawing attention to possibilities for enriching language interaction along with viewing video clips, may lead to more decontextualized demands. However, the present study also demonstrated that the increase in decontextualized demands occurred before and during book sharing and was followed by a decrease in such demands after book sharing. That finding is significant because research indicates that rich discussions after book sharing are particularly important to language and literacy (Dickinson and Smith, 1994). Thus, researchers and teachers should carefully consider the subtleties of how strategies are implemented.

The present study also supports research showing that it may be difficult for some preschool teachers to implement small-group book sharing (Whitehurst et al., 1994). However, this study adds nuance to that understanding by identifying factors within a classroom that may affect the likelihood of adopting this practice and why implementation may be difficult. For example, the teacher

initially rejected small-group book sharing because of her beliefs and instructional routines based on the High/Scope curriculum, and her concerns about some children engaging in unsupervised activities. However, with time to reflect, the teacher and her paraprofessional later attempted to integrate reading to half the class into their routines. Acknowledging teachers' pedagogical beliefs and investments in curriculum that inhibit implementation may be overcome with opportunities to reflect on the importance of language development.

The results of the present study are also significant because they demonstrate the extent to which context influences teacher–child interactions. For example, book sharing enabled the teacher and paraprofessional to increase their use of decontextualized demands, and mealtimes allowed the teacher to engage children in conversations about a variety of topics. In contrast, semi-structured group activities, at least how they were implemented in this class, encouraged more contextualized talk. Nonetheless, semi-structured activities did provide opportunities for children to engage in other valued preschool experiences such as math activities. Because context is important in determining the types of language interactions that occur in classrooms (Girolametto, Hoaken et al., 2000), it is important to consider how a broad range of activities or other approaches might facilitate more enriching language interactions. For example, the Project Approach (Katz and Chard, 2000) or an approach based on the Reggio Emilia philosophy (Edwards et al., 1998) might create a context that would enable teachers to engage children in more enriching language experiences while still engaging in other valued preschool experiences. In these approaches, children's ideas, questions and opinions are valued and help shape the extended and in-depth projects in which they become involved. Yet, as suggested by the current study, such approaches may require substantial shifts in teachers' pedagogical beliefs and practices and are likely to be influenced by their values, by the curriculum, and the logistics of teaching in their school and classroom.

The results from the present study also demonstrated that contextual factors that inhibit the implementation of an intervention may, in some instances, be beyond the control of a teacher or the purview of a researcher or facilitator, to change. For example, in this study, teacher–child conversations and conversations among children were often prohibited during lunchtime because of a school-wide rule that regulated the level of noise.

Finally, the present study considered how the intervention might produce unanticipated effects in the environment. One unanticipated positive effect of intervention was that it increased the teacher and paraprofessional's awareness of

children's personal lives. On the other hand, that information was distressing, adding stress to their work lives, and it required them to shift their attention from providing instruction to seeking social services for the children and their families. These findings demonstrate the need for teachers and researchers to consider how an intervention may produce positive and negative influences, which formative experiments, unlike other approaches to research, reveal.

Professional development and classroom practice

Several findings from the present study suggest implications for professional development and classroom practice. First, teachers' beliefs clearly influence how they interact with children, how they structure the classroom and activities, how they implement the curriculum, and so forth. For example, at meal-times the teacher and paraprofessional were concerned that children eat a nutritious meal, and they often prohibited conversations in order to encourage children to eat. Yet, even after learning about the benefits of teacher-child language interactions and realizing that it was possible for children to both eat their meals and engage in conversation, it was difficult for them to change practices that discouraged talking. Similarly, Rowe (1998) discovered when observing videotapes of her own interactions with preschool children, that her talk and actions sent unintended implicit messages about what was or was not appropriate literacy practice. Further, changing those behaviors proved difficult, despite her desire to do so. Thus, to expand and enrich verbal interactions with children, it may be important to provide teachers with explicit opportunities to reflect on how their beliefs are instantiated in their behaviors and the potential consequences of those behaviors.

Our findings also suggest that the curriculum and the extent to which teachers are committed to it influence how they interact with children. For example, the teacher and paraprofessional implemented semi-structured group activities to meet the key experiences of the High/Scope curriculum. Although these are valuable experiences for children, the traditional approach of presenting these activities led to language interactions that were almost exclusively contextualized. As Rowe (1998) observed, it might be difficult, if not impossible, to change patterns of talk without changing aspects of the classroom. To engage children in more enriching language experiences, it may be necessary for teachers to implement approaches that might move them out of their comfort zone. Thus, teachers will need support to learn about and to implement a new approach, particularly if it is not easily merged into an established curricular framework.

Finally, behavior management interfered with teacher–child language interactions. For example, the teacher and paraprofessional struggled to implement small groups because some children would be unsupervised, and a low tolerance for noise during mealtimes inhibited conversations. Thus, the goals and limits of behavior management may figure prominently in implementing the intervention strategies investigated here.

Methodology of formative experiments

The present investigation, we believe, illustrates that formative experiments reveal aspects of instructional interventions in preschool classrooms that are not as apparent through other approaches to classroom research. That is, conventional experiments require fidelity when implementing an intervention, regardless of contextual variables, and they typically focus on a narrow range of variables and outcome measures. Formative experiments, on the other hand, take a flexible, adaptable, problem-solving approach that are responsive to the realities of authentic teaching, and consequently, reveal factors that emerge as critical to success or that are obstacles to be accommodated and that sometimes undermine success. Further, in the present case, a formative experiment enabled us to investigate how a valued pedagogical goal might be advanced across boundaries (e.g. book sharing, semi-structured activities, mealtimes) that are not often crossed in conventional experiments. Formative experiments also extend qualitative studies typically aimed solely at deep descriptions of educational environments as they are, as opposed to what they might become. In short, formative experiments reveal the process of integration and change and the factors that influence that process when interventions are introduced into classrooms toward achieving specific goals.

However, formative experiments in general, and our investigation in particular, like all approaches, have limitations. For example, it is always unclear how a researcher's presence in a classroom may influence the process of implementation, particularly if the researcher becomes involved in instruction. However, that limitation was not as prominent in the present investigation because the first author who worked in the classroom did not directly teach the children. Another limitation is that the present investigation took place in a single classroom. Although the results may generalize to similar classrooms (see Firestone, 1993), the results from this study can be generalized no further. Thus, as is recommended in the literature on formative experiments (Reinking and Bradley, 2008), only replication in diverse contexts would reveal factors and consequences that are critical regardless of context.

Our experience in this investigation also enriches understanding about the conduct of formative experiments. Most prominently our experience reinforces the need for researchers conducting formative experiments to seek a delicate balance between encouraging teachers to explore the full opportunities that promising interventions offer and respecting teachers' beliefs and the contingencies under which they teach. Perhaps, when conducting a formative experiment, a researcher is obligated to inform teachers that participation may require them not only to critically evaluate their beliefs and practices, but it may also strain those beliefs and practices.

A teacher's style of language interaction, and teaching, is not only deeply ingrained but it is personal, therefore making useful modifications toward accomplishing a pedagogical goal when such modifications confront beliefs and routine practices will sometimes be difficult even when a teacher desires to do so (Rowe, 1998). Thus, to avoid being evaluative when discussing language interactions, the first author focused as much on how the children were responding as she did on what the teacher and paraprofessional were doing. Also, she shared what she discovered about her own style of interaction to help put the teachers at ease. However, these actions may not have been adequate. Thus, it may be useful to work with several teachers and to create opportunities for them to meet and to collaborate on issues related to a study and their teaching.

Formative experiments may also benefit from establishing ongoing, long-term relationships with teachers (Lehrer and Schauble, 2004). The teacher and paraprofessional in the present study were committed to the goal, but establishing mutual trust and collegial openness require time. Finally, because of the first author's insider perspective, she identified with the struggles the teacher and paraprofessional faced relating to the welfare and social-emotional needs of the children. Thus, in the final weeks of the present study, discussions focused as much on obtaining support for the children and their families as on the intervention. Yet, this limitation highlights the realities and complexity of teaching, and the realities and complexity of doing classroom research involving close collaboration between researchers and teachers.

Conclusion

Despite its difficulties and limitations, indeed in some sense because of them, the results of this formative experiment can inform professional development, classroom practice, and research. What is clearly shown in the present study is how difficult it is to change preschool teachers' patterns of language interactions with children, at least beyond conventional whole-group book sharing.

But it also shows that it is possible to integrate into preschool classrooms strategies aimed at enhancing teacher–child language interactions even when aspects of teachers’ beliefs, and their well-rehearsed routines and designated curriculum, are not perfectly aligned with the interventions. Further, we believe the present study provides more nuance to the existing research related to developing children’s oral language as part of a strong foundation for literacy.

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Appendix A

Semi-formal interview guide: Baseline data

1. Tell me about your educational background and teaching experience?
2. Tell me about your class? How does this year compare to past years?
3. How do you plan for your class? Prompts: How you decide (a) what to teach? (b) what activities to present to your children? (c) what books to read to your children? How do you plan for (a) children's language and literacy activities? (b) the diversity of children in the classroom?
4. How do you evaluate children's learning? What assessments do you administer?
5. How do you get to know the children in your class? Their families?
6. Think about a child that you have taught/are teaching and describe that child and how you accommodate his/her needs. Prompts: (a) high cognitive abilities, (b) low cognitive abilities, (c) talkative, and (d) not very talkative.
7. Is there anything else you would like to tell me about your class or your teaching?

Appendix B

Semi-structured interview guide: Post-intervention

1. Did your interactions with the children influence: (a) what you decided to teach? (b) the activities you presented? (c) the books you read to the children? If so, how?
2. Tell me about your interactions with children during: (a) book sharing, (b) small group, (c) mealtimes, and (d) free play. Prompt: Those activities in relation to semantically contingent responses and decontextualized talk? Tell me about working with small groups (6–7 children).
3. What factors make it difficult to interact with children? What factors make it easier to interact or have a conversation with children? Prompts: (a) school factors, (b) class factors, (c) curriculum, (d) child factors.
4. Did your interactions influence you relationship with the children? If so, how?
5. Have your interactions influenced how you think about children's abilities?
6. Who was easiest/most difficult child or children to have conversation with and why?
7. Tell me about you interactions with each focus child.
8. Is there anything else you'd like to tell me about?