Top Lang Disorders
Vol. 42, No. 4, pp. 336–359

Teacher–Child Conversations in Preschool

Insights Into How Teacher Feedback Supports Language Development

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Back-and-forth conversations with adults are critical for developing children's language, and, therefore, an important part of the early childhood classroom learning environment; however, the specific nature of teacher feedback, one component of teacher–child conversations, on child language has not been widely studied. This article examined preschool teacher–child conversations during interactive book reading. We coded and analyzed the frequency and content of teacher talk, including feedback, among 20 teachers (11 who participated in a language and literacy intervention; 9 in business-as-usual instruction). Findings revealed that, particularly when teachers were guided on how to initiate and sustain intentional conversations, more conversations took place and were associated with higher overall classroom quality on a commonly used global assessment (the Classroom Assessment Scoring System); likewise, more teacher feedback occurred in intervention classrooms. The frequency of teacher feedback was uniquely linked to children's vocabulary learning on standardized measures beyond the effects of global classroom quality. Findings support the importance of understanding and supporting teacher feedback as an essential part of classroom conversations. **Key words:** *language interventions*, *preschoolers*, *vocabulary development*

BACK-AND-FORTH conversations with adults are critical for developing children's language and, therefore, an important part of the early childhood classroom learning environment. Given the high stakes of language development for young children, and especially those in economic poverty, myriad studies have focused on identifying specific features of teacher–child exchanges that most benefit early language development, converging on the importance of teacher's efforts to solicit and respond to child talk. For decades, considerable work has focused on the questions teachers ask (Dickinson & Tabors, 2001; Whitehurst et al., 1994), whereas far less has explored children's responses and teachers' subsequent feedback (Justice et al., 2013). Teacher feedback can be nuanced and difficult to capture and categorize, both because classroom observations are resource-intensive to collect and analyze and because teachers can be highly idiosyncratic in how they talk with children (Deshmukh et al., 2022; Kurkul et al., 2022). However, young children's understanding of concepts and language may depend heavily on the feedback that they receive from teachers throughout a conversation,

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This study was funded by grant, R324A180192, from the Institute of Education Sciences, U.S. Department of Education. The opinions expressed are those of the authors and do not represent the views of the Institute or the U.S. Department of Education.

Author disclosures can be found at http://links.lww.com/TLD/A99.

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DOI: 10.1097/TLD.0000000000000295

which can act as a powerful scaffold (Frazier et al., 2009).

To facilitate deeper understanding of this theoretically and empirically important element of teacher–child conversation, the present study delved into the nature and frequency of preschool teachers' feedback in conversations during interactive book reading, a conceptually and linguistically rich instructional context (Hadley, Barnes, & Hwang, 2022). Reexamining a recent professional development (PD) intervention (Wasik & Hindman, 2020a), we coded teachers' talk during conversations, including their initial questions/comments and their subsequent feedback to children. Results we present here describe the nature of teachers' conversations and feedback at the start of the preschool year; explore how feedback changes over time, with or without a PD intervention; examine how feedback is aligned with or independent of global classroom quality, as measured by the Classroom Assessment Scoring System (CLASS-PreK; Pianta et al., 2008); and, finally, determine how feedback uniquely predicts preschoolers' vocabulary learning. Ultimately, these efforts expand our understanding of preschool teachers' feedback and its role in children's vocabulary development, specifically in the context of a PD intervention.

TEACHERS' OPEN-ENDED AND CLOSED PROMPTS IN CLASSROOMS

Foundational Vygotskian sociocultural theory posits (Gauvain, 2020) that adult talk introduces children to new ideas and words and provides an important model of syntax and prosody, potentially with systematic scaffolding (Bruner, 1960) that supports children in building new understandings. Several recent projects (Hadley, Barnes, Wiernik et al., 2022; Justice et al., 2018; Rowe & Snow, 2020) have refined the field's understanding by summarizing the literature on adult–child exchanges. Across studies, one distinct element of the learning environment, whether in the home or the classroom, is adult talk that invites and extends child talk, variously termed interactive (Rowe & Snow, 2020), communication-facilitating (Justice et al., 2018), and bridge language (Hadley, Barnes, Wiernik et al., 2022). Interestingly, Systemic Functional Linguistics theory (Halliday, 1978) highlights that language may be used in unique ways and for distinct purposes in different contexts, and relative to the home, the early childhood classroom may offer a particularly high level of explicit instruction (Hadley, Barnes, Wiernik et al., 2022), making classroom conversations fruitful vehicles for language learning. Indeed, building on other recent studies (Ronfard et al., 2018), Justice et al. (2018) found teachers' communication-facilitating talk to be the primary predictor of children's vocabulary learning from preschool to kindergarten. Framed by Vygotskian thinking, these links to vocabulary may lie in the extent to which teachers' conversations implicitly and/or explicitly scaffold children's emerging word knowledge (Dickinson et al., 2019).

To date, the preponderance of research on language-facilitating talk in early childhood classrooms has focused particularly on the power of teachers' open-ended prompts as tools to elicit children's thinking and language; open-ended prompts are heavily emphasized in both the research (Cabell et al., 2011; Dickinson & Porche, 2011; Girolametto et al., 2003; Piasta et al., 2012; Wasik & Hindman, 2020b) and the practice literature (Wasik & Hindman, 2013). Open-ended prompts may begin with wh-forms (who, what, when, where, and why, and how) or include requests such as "tell me" and "describe for me." They typically require more than a "yes/no" and/or a one-word response and generally have multiple possible correct answers (e.g., "How did you feel when the character ran away?"), which in turn invite the child to think deeply and respond extensively. Although closed prompts can be very useful in building or checking student understanding (Rojas, 2021), there is consistent evidence of the positive effects of using open-ended prompts for a variety of early outcomes (Cabell et al., 2011; Justice et al., 2018). For example, Cabell et al.

(2015) examined the amount and quality of teacher–child conversations in 44 preschool classrooms. They coded the conversations for teachers' use of responsive strategies, including open-ended prompts, and found a positive association between a high concentration of open-ended prompts and children's vocabulary gains.

Some specific classroom activities may lend themselves more to asking open-ended prompts, such as play (Meacham et al., 2014) or science investigations (Cabell et al., 2013; Lee et al., 2013). Of these, however, book reading is the most heavily researched (Hadley, Barnes, & Hwang, 2022), with considerable evidence that open-ended prompts in this context provide opportunities for children to consider and discuss book content and connect their own prior experiences to the text (Wasik et al., 2016). For example, a critical component of dialogic reading is asking children questions that tease apart their thoughts on the content of the book, over time transferring control of the conversation to children (Whitehurst et al., 1988; Whitehurst & Lonigan, 1998). Decades on, research continues to show benefits of open-ended prompts specifically during book reading (Deshmukh et al., 2019; Zucker & Landry, 2010), reflective of Vygotskian theory.

Unfortunately, observational data show that most early childhood classrooms have limited teacher–child back and forth, with relatively few open-ended prompts (Deshmukh et al., 2019; Wright & Neuman, 2013, 2014). Moreover, even when teachers offer open-ended prompts, they may be quickly interrupted, stalling conversation. For example, our research (Hindman et al., 2019) shows that teachers may ask an open-ended prompt but then immediately follow up with a closed prompt. For example, a teacher may ask, "Describe what you see in this picture" but then, before children have a chance to answer, immediately add, "Are they playing?" Another frequent challenge to open-ended prompts is that teachers provide minimal wait time for a student to respond and instead immediately ask the same or a different prompt to another student (Hindman et al., 2019). Both experiences undermine the opportunity that an open-ended prompt should create the chance for children to thoughtfully respond with extended language. The current study focuses on how and how often preschool teachers use open-ended and closed prompts in the classroom, particularly during book readings, both in a business-as-usual (BAU) public preschool setting and in a language-focused PD intervention.

TEACHERS' FEEDBACK ON CHILDREN'S RESPONSES

Teacher prompts typically represent the start of a conversation, but far less work has focused on how the exchange actually unfolds. Of particular interest is teachers' verbal feedback, or the prompt and comments they offer in response to what children say, which could play a key role in encouraging child understanding and talk. Next, we review the evidence regarding teacher feedback in early childhood, including the findings that (1) more feedback may be better, and (2) feedback can serve a variety of specific purposes. We also highlight major knowledge gaps.

Amount of feedback via conversational turns

Unfortunately, most classroom exchanges are relatively brief, with little teacher feedback (e.g., Cabell et al., 2015), at least in the absence of training (Milburn et al., 2014). However, when teachers do provide feedback, research generally indicates that more, as measured in conversational turns, is generally better, predicting gains in child outcomes (Cabell et al., 2015; Hirsh-Pasek et al., 2015; Rowe, 2012). The likely mechanism is that more turns offer more in-depth discussion of a topic and elicit more child talk, both of which in turn increase children's language and understanding.

Relatively few studies have explored conversational turns in early childhood

classrooms, and studies have differed considerably on how many back-and-forth turns were minimally needed to constitute a formal conversation. For example, our own prior work initially explored two-turn conversations (one teacher remark, one child remark; Wasik et al., 2016) but more recently has defined conversations as having at least three turns (teacher remark, child remark, and teacher remark; Wasik & Hindman 2020a). In contrast, Cabell et al. (2015) recently suggested that four semantically contingent turns (teacher–child–teacher–child) represent the minimum for a give-and-take conversation. And as another example, Milburn et al. (2014) were particularly interested in conversations as long as seven turns. Across these studies, though, even when very brief exchanges are considered as conversations, feedback turns are relatively infrequent and brief in the absence of specific training (Cabell et al., 2015; Chen & de Groot Kim, 2014). Consequently, in this project, we examined teacher feedback within conversations during book reading both in a BAU preschool setting and in the context of a PD intervention.

Purpose of feedback

Teachers use their feedback for varied purposes (e.g., Zucker, Bowles, et al., 2021), falling into two broad categories (one of which includes additional subcategories).

Building language

One major purpose for feedback is building child language. One strategy, recasting, involves the teacher responding to a child's comment by modifying what the child says and adding new or different words and/or syntactic structure(s) (Cleave et al., 2015). For example, if a child remarked, "Red coat," the teacher's feedback might be, "Do you want your red coat?" A vast literature in the early intervention field (Girolametto et al., 2000; Levickis et al., 2014; Milburn et al., 2014), as well as other very recent studies (Deshmukh et al., 2022; Piasta et al., 2012), has found that teachers' recasting builds children's language and vocabulary, likely through exposing children to new words and potentially other linguistic structures that may support vocabulary acquisition (Farrow et al., 2020; Weisleder & Fernald, 2013). However, that recasting may not happen frequently in the absence of PD (Deshmukh et al., 2022) and in fact may remain challenging for teachers even with PD (Piasta et al., 2012).

Building information

A second major purpose for feedback is building children's knowledge. Conceptual comments, often related to science, social studies, mathematics, texts, or metacognition, help children make connections between or among ideas, thoughts, or concepts relating to academic content; they go beyond a simple definition to tap into a larger explanation of an idea. For example, after a child's "Red coat" comment, the teacher might follow with, "You would like your red coat to wear outside (recasting) with the yellow zipper" (adding information, specifically vocabulary). Some work has found that conceptually focused feedback may be relatively common. For example, Barnes et al. (2017) coded conversations of 52 Head Start teachers and their children and found that teachers' feedback most frequently provided or explained information. However, other work has found that conceptually focused feedback may be relatively rare; Deshmukh et al. (2019) examined teacher talk during 96 preschool and kindergarten whole-class book readings and found that conceptually oriented conversations were infrequent but powerful, in that they elicited longer, multiword responses from children; a follow-up study yielded similar results (Deshmukh et al., 2022). Thus, understanding how teachers use feedback to build conceptual knowledge is important to study.

Building information—decontextualized talk

A subtype of conceptually oriented feedback involves using decontextualized language. Decontextualized talk targets

information beyond the here and now, including recalling the past, making predictions about the future, or discussing world events or concepts (Leech et al., 2018; Mascareño et al., 2016). For example, if a child remarked, "Red coat," the teacher could respond by saying, "Your red coat is almost the same color as a stop sign!" or "Your red coat will keep you so warm outside this winter!" Leech and Rowe (2021) showed that adults' decontextualized feedback could increase in dyadic turn-taking. They trained half a sample of parents ($n = 18$) to use more decontextualized talk when giving feedback to their children and ultimately determined that parents with the training offered more decontextualized language, which led to more conversational turns. This work highlights the value of decontextualized feedback specifically and raises questions about its prevalence in BAU and PD-enriched settings.

Building information—vocabulary

All feedback strategies mentioned previously—building language, offering conceptual comments, and providing decontextualized talk—might produce gains in children's vocabulary, because all three expose children to new words and ideas, mostly implicitly (i.e., in passing). However, one additional subtype of decontextualized feedback involves explicitly using novel vocabulary, or a sophisticated synonym for a commonly used word. For example, when the child asks, "Red coat," the teacher could respond by saying, "Did you want your coat? That's also called a *jacket*, which is another word for a short coat." Here, the teacher specifically provides the child with a new word. Our own work (Wasik & Hindman, 2020a) has shown that children's vocabulary grows when teachers talk more about vocabulary, consistent with prior work (Ard & Beverly, 2004; Piasta et al., 2012; Sénéchal & Cornell, 1993). However, questions remain about the extent to which teacher feedback, in particular, targets vocabulary, or how this contributes to child outcomes.

Major gaps in the literature

In summary, the empirical literature on teacher–child exchanges in early childhood classrooms has widely endorsed the value of teacher–child conversation, and particularly teachers' use of prompts (especially open-ended), for children's language outcomes, and particularly vocabulary (Dickinson, 2011). A smaller, but still very promising, body of research has investigated the kinds of feedback teachers provide after children respond to those prompts, but pressing gaps in our understanding of feedback remain.

To what degree do teachers provide feedback on language and conceptual information in both BAU and PD-enriched contexts? Given the relatively patchwork nature of the current body of feedback research, the field would benefit from a comprehensive portrait of how teachers in both BAU and intervention settings use both language- and information-focused feedback, as well as a descriptive analysis of whether any other types of feedback are in use. Along with other research teams (see Deshmukh et al., 2019; Deshmukh et al., 2022, for two relevant studies), our team recently began working toward this goal (Wasik & Hindman, 2020a) by observing teachers in the spring after a year of PD in either the Story Talk program or a year of BAU district PD for our control teachers. In that study, we first examined the efficacy of the Story Talk model (described later), determining that the PD raised teachers' global quality on the CLASS-PreK (Instructional Support and Classroom Organization domains), children's knowledge of taught words, and children's receptive and expressive vocabulary on standardized assessments. Second, to understand which particular practices drove effects on child learning, we captured teachers' open-ended prompts and their feedback on children's responses. We roughly categorized teacher feedback as *simple* ("That's great," or "Good job," or "OK"), in which the teacher acknowledged the child(ren)'s remark but did not provide any new

information or invite additional child talk, or *extended*, including any elaboration on the child's idea. We found that, in spring, teachers in the intervention condition asked three times as many open-ended prompts as control peers, provided twice as much simple feedback, and offered three times as much extended feedback. We did not, however, examine the extent (in conversational turns) or the purpose of the feedback at the same time, nor did we explore change in teachers' practices from fall to spring in the intervention or comparison conditions. The current study takes up these questions.

How is teacher feedback related to or independent of broader classroom quality? Another apparent gap in the field is the extent to which teachers' feedback (amount and varied purposes) is consistent with or divergent from global measures of classroom quality such as the CLASS (Pianta et al., 2008). By design, CLASS is a domain-general (i.e., appropriate across content areas) observation tool that emphasizes the conceptual, affective, and organizational quality of teacher–child interaction. CLASS captures three features of teachers' language as an indicator of Instructional Support: Concept Development (what they talk about), Language Modeling (how they talk about it), and most important for the current study, Quality of Feedback (how they respond to child remarks). However, in the interests of parsimony, for each of these three aspects of Instruction Support, a single score from 1 (lowest quality) to 7 (highest quality) is assigned; it is beyond the scope and purpose of the tool to count or otherwise analyze the nature of specific teacher remarks. In part because of this larger grain size, CLASS scores have been found to be highly reliable across trained raters and routinely predictive of child outcomes (Pianta & Hamre, 2009).

However, in-depth coding of teacher talk, including feedback, could potentially offer fine-grained, practice-relevant information for teachers that could be translated into very precise coaching guidance that might complement CLASS data. As we explore more nuanced ways of capturing the frequency and nature of teachers' real-world classroom feedback as a specific indicator of quality, it is important to understand how feedback is convergent with or divergent from established tools such as the CLASS, a question we pursue in the current study.

How does teacher feedback uniquely predict child vocabulary outcomes? A final gap of importance in the field is the missing link between teacher feedback and child vocabulary outcomes. To our knowledge, it has been beyond the scope of any study (including our own prior work) to examine how both the amount and purposes of teacher feedback predict child language, net of the effect of broader classroom quality. As noted, language- and information-building feedback often implicitly or explicitly target vocabulary. A rigorous analysis of this nature would help isolate the contributions of this type of teacher talk to child vocabulary learning.

Current study

The current study explored preschool teacher–child conversations during interactive book reading, with a particular focus on teacher feedback. We used the corpus of observation data from our prior study (see the study by Wasik & Hindman, 2020a), which included public prekindergarten teachers who received PD and those who remained in a BAU setting, to answer four novel research questions.

Research question 1: What is the nature and frequency of teachers' conversations (prompts and feedback) during book reading in preschool classrooms before teachers receive specialized PD?

Research question 2: How do teacher-led conversations, including feedback, change from fall to spring, both in classrooms where teachers receive PD and in BAU settings?

Research question 3: To what degree are features of teachers' conversations, including feedback, correlated with or distinct from global classroom quality, as measured by the CLASS?

Research question 4: How do features of conversations, including feedback, predict preschoolers' expressive and receptive vocabulary learning, net of the effects of broader classroom quality?

Method

Procedure

Recruitment and random assignment

These data are drawn from an intervention project designed to enrich the language and vocabulary environment in preschools. All public preschool teachers in one urban school district in the Northeast United States, which primarily served children of color from lower SES backgrounds, received an invitation explaining the PD and the study design. A total of 15 schools containing 35 total classrooms agreed to participate; ultimately, 20 classrooms were randomly assigned to the intervention and 15 were assigned to the BAU control. For this follow-up study on feedback, we randomly selected some of the teachers (9 of 15 comparison teachers and 11 of 20 treatment teachers) for in-depth classroom conversation coding.

Intervention

Story Talk is a language intervention designed around 10 common preschool themes (e.g., the season of fall, transportation, community helpers), each covering 3–4 weeks of daily instruction. Teachers receive 10 high-quality trade books for each theme, so that Story Talk can provide the central instructional shared/interactive book read aloud each day. A central feature of the program is that we provide Story Maps for each book. Story Maps are essentially loosely scripted lesson plans, which first identify (a) several target vocabulary words from the book, along with child-friendly definitions that teachers can share before the reading and then offer (b) two to three open-ended prompts about the book for teachers to ask before reading, four to six open-ended prompts to ask during reading, and two to three open-ended prompts to ask after reading (prompts tap key concepts in the story and allow children to hear and use target vocabulary), and, finally, (c) suggest activities for use in classroom centers that reinforce the story concepts and vocabulary. Ultimately, the Story Maps aim to make specific vocabulary words highly salient throughout the classroom environment through open-ended prompts that invite child language. Teachers are asked to read each book three times, on nonconsecutive days, so we provide three separate Story Maps for each book, posing increasingly complex prompts from the first to third reading.

Apart from these materials, teachers also receive four group trainings, each approximately 2 hr in duration, to learn to use the Story Maps, delivered by an expert coach. In addition, the coach visits each teacher's classroom every other week to support his or her use of the Story Maps through 1 hr of observation and an individualized feedback conference. The conference focuses on the extent to which teachers used the Story Maps with fidelity (i.e., using the prepared definitions, asking the prepared questions) and quality (i.e., keeping children engaged, pacing the reading activity appropriately). Notably, Story Maps, trainings, and coaching all heavily emphasize defining words and asking open-ended questions but *do not specify any feedback* that teachers should provide *nor offer guidance on any ideal number of conversational turns*.

Control

Control teachers received the same books as the intervention teachers but no Story Maps, group training, or coaching.

Data collection

Teachers in both conditions were videotaped for a morning of instruction (about 120 min) in fall of the school year, before any PD began, and again in spring after all PD was completed. Children's receptive and expressive vocabulary was directly assessed in fall (before PD) and spring (after PD).

Participants

Teachers

Among our 20 (11 intervention and 9 control) teachers, based on teachers' self-reports, 42% were African American, 3% were Asian, 36% were White, 3% were Hispanic/Latino, and 16% were of other backgrounds. In addition, 100% held a bachelor's degree, and 50% also had a master's degree. On average, teachers had 12 years of teaching experience ($SD = 8.31$, range = 1–32 years). All teachers were female.

Children

All children in each teacher's classroom were invited to participate in the study. Ultimately, a total of 519 children returned consent forms signed by their families (82% of eligible sample). Average child age in the sample was 55 months ($SD = 4.25$, range = 44–76 months) and the sample was evenly divided by gender. Six percent of children were dual language learners (predominately speaking Spanish at home). Within this community, the majority (83%) of children were African American, whereas 8% were White and 9% were Hispanic/Latino. In addition, 87% of children received free or reduced-price lunch, and 15% of children had identified special needs.

Measures

Global instructional quality

Global quality of classroom instruction was assessed in fall and spring by trained data collectors using the CLASS tool (Pianta et al., 2008), a gold standard observation tool that captures the overall quality of the instructional environment.

Psychometric data across more than 3,000 classrooms show that the CLASS has reliability above 85% between trained raters and over multiple test sessions, and strong validity with other observation tools (e.g., Early Childhood Environmental Rating Scale—Revised), and with later child academic achievement (Pianta et al., 2008). The CLASS was used to code the videotapes of classroom instruction collected in fall and spring. Specifically, we coded classrooms on all three domains of the CLASS: Emotional Support, Classroom Organization, and Instructional Support. However, because we were particularly focused on classroom instruction, we also included the three distinct subscales of the Instruction Support domain in analyses: Concept Development, Quality of Feedback, and Language Modeling. For parsimony, we simply used the overall domain scores for Emotional and Classroom Organization so that we could efficiently account for these aspects of classroom quality that were somewhat more peripheral to our main aims.

Receptive vocabulary

Child receptive vocabulary was individually assessed with the Peabody Picture Vocabulary Test-4 (PPVT-4; Dunn, & Dunn, 2007), a gold standard early childhood measure that asks children to identify one image out of four that best represents a word given by the experimenter. Internal reliability in the standardization sample ranged from 0.96 to 0.97, whereas test-retest reliability ranged from 0.92 to 0.96, and alternate-form reliability ranged from 0.87 to 0.93. This individually administered measure requires about 10–15 min per child. Growth score values were used in analyses to optimally capture change from fall to spring.

Expressive vocabulary

Child expressive vocabulary was individually measured with the Expressive One-Word Picture Vocabulary Test-4 (EOWPVT-4; Martin & Brownell, 2010). In this gold standard tool, children verbally identify images presented to them one at a time by the experimenter. In the preschool standardization sample, internal consistency coefficients ranged from 0.94 to 0.95, and test–retest correlations exceeded 0.97. This measure requires 15–20 min per child. Because growth score values are not available for this measure, raw scores were used in analyses, with age as a covariate.

Classroom book reading conversations

All three authors and a research assistant together developed the coding scheme, including several codes predetermined from the literature: open-ended and closed questions, conversational turns, feedback expanding language, and feedback providing information (including subcodes for a focus on decontextualized language and, even more specific, vocabulary). In addition, as coding proceeded, additional codes were added as needed to capture the array of teachers' talk (noted later). Coding was conducted by the second author and a research assistant. Reliability checks throughout the process focused on both segmentation of teacher remarks and assignment of specific codes resulted in 100% agreement between the two coders.

We note that our coding scheme captures teacher-initiated conversations. Initial versions of the coding scheme included codes for child-initiated conversations, but we ultimately found these to be extremely rare and were concerned about our ability to clearly hear all relevant child talk. Thus, coding focuses on teacher-led conversation.

Coded remarks

For this study, we coded only teacher talk within the context of a book-related conversation. We thus did not code stand-alone comments that did not solicit child input ("That's a butterfly!", after which the teacher moves on to reading again) or any behavior management remarks ("Jana, please sit down"). Because teachers often have highly idiosyncratic ways of using language, we separated teacher remarks based on their conceptual contributions to the conversation, rather than by the teacher's phrasing when articulating them. For example, the single feedback comment, "The butterfly is flying all around the garden because she's looking for food to eat," would be counted as two separate remarks: the first about the butterfly's activity and the second about looking for food. Because it was sometimes challenging to hear children's responses in the video recordings, we did not code the content of child talk in the current study.

Conversational turns

Because we coded only language in the context of a conversation, we first identified the conversations, which we considered as back-and-forth teacher–child(ren) exchanges with a minimum of three turns (i.e., teacher talk, then related child talk, and then related teacher talk), as three represents the smallest number of turns that would afford teacher feedback.

Total number of back-and-forth conversations

We counted the total number of exchanges that qualified as conversations in each video, using the three-turn definition of a conversation mentioned previously. We tallied the total number of conversations per classroom for each observation.

Brief versus extended conversation

To provide a sense of the complexity of the conversation, we marked conversations with three total turns, including one turn for the child (i.e., teacher–child–teacher), as *brief*. Following Cabell et al. (2015), we marked exchanges with four or more turns in which the child/children had a minimum of two turns (i.e., teacher–child–teacher–child), as *extended*. We tallied the frequency of both across the book reading episode for each classroom for each observation.

Total number of teacher and child turns

Summing across all conversations in the classroom's book reading activity, we counted the total number of teacher turns and the total number of child turns. This metric offered insight into how much teachers and children talked overall in a classroom. We also calculated a ratio of child-to-teacher turns to represent the degree to which children's contributions figured into conversations.

Teacher remark format

Within these conversations, we coded all teacher language—whether it started the conversation or served as feedback—as one of three types of teacher talk: open-ended prompts, closed prompts, and comments. These codes helped establish the degree to which, overall, conversations involved teacher asking or teacher telling.

Open-ended prompts

We defined open-ended prompts as questions or statements that invited children to offer a response and for which there was more than one possible correct answer. In addition, these prompts generally required children to use more than one or two words to provide their response. Examples include, "What do you see on the cover of this book?" or "Tell me what you would do next if you were this character." We did not count open-ended prompts that were quickly followed by a closed prompt before children had a chance to answer, such as "Where do you think she's going? [no pause] Is she going to her house?" In this case, we coded only "Is she going to her house?" because this was the prompt that children had the opportunity to answer.

Closed prompts

We defined closed prompts as questions or statements that invited children to offer a response for which there was one or a limited number (e.g., yes or no) of correct answers. These prompts generally required less child language as well. Examples include, "What color is the butterfly's antennae?" or "Do you think the butterfly is hungry?"

Comments

We defined comments as remarks that shared information with children but did not, explicitly or implicitly, invite a child response. Examples include, "That's a butterfly," or "You're right."

Teacher feedback purpose

Finally, within conversations, we coded remarks (whether questions or comments) that teachers directed toward a child/children after they had responded. We distinguished between two main purposes, expanding language and providing information, but added additional codes as novel strategies emerged.

Expanding child language

We coded teachers' repeating the essence of what children said and expanding on their language without providing additional, meaningful information. For example, a teacher might ask, "How do you think Leo feels?" and a child might answer "Sad," after which the teacher might reply, "You think Leo feels sad."

Providing information

These comments or questions offered explicit additional information about a child's previous remark. For example, if a child noted, "The car!" the teacher might add, "That car is heavy!" As another example, a child might say, "That caterpillar has a lot of legs," and the teacher might respond, "I see six legs" or "And he's turning into a butterfly." Another example involves recalling a prior experience or information. For example, if a child misidentified a butterfly as a bird, the teacher might add, "We see this kind of insect outside on the playground ...." or "This word is actually in the title of our book–can anyone remember?" Importantly, feedback that provided information frequently also expanded language, as in the "car is heavy" example mentioned previously. We also flagged feedback that provided information specifically through decontextualized language, as well as feedback that provided information specifically via introducing or reinforcing target vocabulary. For intervention teachers using Story Maps, the target vocabulary was specified by the Maps. For control teachers, we collected information about target words from the teachers' own lesson plans.

Why do you think that?

This code emerged as the coding process was underway. This code captured instances of teachers responding to children by

asking why they gave a preceding response. Common ways of phrasing this remark by teachers included, "Why do you think so?" or "What makes you say that?" Ultimately, this code prompted children to explain their reasoning and, although not a part of our research on early childhood teacher questions and feedback, it does figure prominently into the CLASS tool.

Correction

This code emerged as the coding process was underway. Teachers sometimes responded to children by indicating that their response was incorrect. This code included both explicit statements ("No, that's not right") and more elliptical statements (e.g., "Very close!"). Corrections did not explain why the comment was incorrect or give the correct answer; however, a correction could be accompanied by a longer explanation, which would be coded as providing information (e.g., "No, that's not a butterfly [correction]; that's a bird [providing information]").

Clarify

This code emerged as the coding process was underway. Teachers sometimes responded to child remarks or activities in which an error was made by clarifying key information for the child about why the child was incorrect. For example, if a teacher were reading *Leo the Late Bloomer* and a child mentioned that Leo looked sad in school, the teacher might reply, "You're telling me about his feelings, but I'm asking you what Leo wants to be able to learn in school."

Confirm

This code emerged as the coding process was underway. This code captured teachers' explicit, verbal confirmation that a child's response was correct, including remarks such as "Yes!" or "Right!" As with corrections, this code could be accompanied by a more extensive instance of feedback (e.g., A child says, "Butterfly!" and the teacher responds, "Yes [confirm], that's the butterfly [expanding language]!"

Praise

This code emerged as the coding process was underway. Teachers sometimes offered praise to children, including through simple indicators (e.g., "Good!") or longer phrases ("I like the way Shanea is thinking hard about that question").

Results

Question 1: Conversations and feedback in fall

Analytic strategy

We captured the teacher talk during these book readings using frequency counts, and we analyzed these data with means, *SD*s, and ranges. Complete descriptive results for fall are presented in Table 1.

Amount of conversation

On average, teachers' book-related talk in both the intervention and control conditions was clustered into nearly 11 back-and-forth exchanges, comprising 36 total teacher turns and 23 total child turns. The average ratio of child-to-teacher turns was 0.64, meaning that children offered about two remarks for every three teacher remarks. Most (on average, eight, or 80%) of these conversations were brief and few (on average, two, or 20%) were extended. There were no differences across conditions ($p > .09$ for these variables), which is not surprising, given the random assignment. Within these conversations, teachers used, on average, approximately 79 remarks, including about 15 closed prompts, 20 open-ended prompts, and 46 comments, during their book reading conversations, with no differences across conditions ($p = .781$, .212, and .743, respectively). Within conversations during fall book reading, just less than half (43%) of teacher talk comprised prompts (i.e., invited children to use language), and 25% of teacher talk featured open-ended prompts (i.e., was likely

Table 1. Descriptive statistics, fall

	Minimum	Maximum	Mean	*SD*
Video length (sec)	458.0	1620.0	890.2	305.6
Open questions	3.00	40.00	19.70	12.70
Closed questions	4.00	33.00	14.80	9.12
Think questions	0.00	14.00	2.20	3.25
Comments	14.00	117.00	45.65	26.13
Provide information	4.00	96.00	31.10	22.80
Expansion	0.00	17.00	5.40	3.94
Correction	0.00	6.00	1.30	1.42
Clarification	0.00	10.00	1.40	2.50
Confirmation	0.00	11.00	2.35	3.28
Praise	0.00	7.00	1.80	2.40
Total feedback	7.00	142.00	45.55	29.39
Back-and-forth conversations	2.00	26.00	10.50	6.66
Teacher turns	4.00	87.00	35.55	22.57
Child turns	2.00	62.00	23.45	15.69
Ratio child–teacher turns	0.50	0.79	0.64	0.10

to encourage children to offer multiple different contributions using multiple different words).

Purpose of feedback

In fall, feedback specifically comprised approximately 45 teacher remarks, or 54% of total teacher talk. Of this feedback, on average, five remarks (or 11% of feedback) exclusively expanded language, whereas 31 remarks (or 69% of feedback) provided additional information and, in many cases, also implicitly expanded language. For example, a teacher asked, "Why do you think Leo [the story's main character] feels sad?" A child responded, "Cause he can't do nothing." The teacher replied, "He's sad because he can't read or write or draw like the other kids." There were no differences by (randomized) condition in total number of feedback remarks provided.

Regarding subcategories within providing information, an average of 69% of providing information feedback featured decontextualized content, with no differences by (randomized) condition. Moreover, of this decontextualized providing information, vocabulary, in particular, was the focus of just six remarks in the control but 13 in the intervention, a significant difference ($t(18) = 2.85$, $p = .011$).

Finally, many codes developed in the current study were observed infrequently. On average, each reading contained two or fewer examples of asking about child thinking, clarifying, correcting, confirming, and praising. There were no differences between conditions in fall ($p > .075$ for all these code types).

Patterns among teachers

Beyond these central trends, however, standard deviations and ranges for most variables were large, suggesting a high degree of variability among teachers. We explored bivariate correlations among variables to understand whether teachers who were outliers on one variable tended to display similarly unusual scores on one or more other variables; in other words, we looked for patterns of teacher talk.

First, we explored bivariate correlations among our conversation-level variables. Findings reinforced the interconnectedness of teacher and child talk within a conversation. More back-and-forth conversations were linked to more teacher feedback ($r = .63$, $p = .001$), and teacher turns were highly correlated with child turns ($r = .98$, $p < .001$),

Table 2. Descriptive statistics, spring

	Intervention			Control		
	Minimum	**Maximum**	**Mean (*SD*)**	**Minimum**	**Maximum**	**Mean (*SD*)**
Video length (sec)	772.0	1500.0	1062.1 (237.5)	861.0	1324.0	1137.4 (147.9)
Open questions	18.00	73.00	34.00 (14.29)	7.00	45.00	25.11 (11.67)
Closed questions	5.00	29.00	14.91 (6.83)	6.00	41.00	16.00 (11.18)
Think questions	0.00	8.00	2.73 (2.53)	0.00	7.00	2.22 (2.44)
Comments	24.00	68.00	39.27 (13.76)	14.00	74.00	30.67 (18.85)
Information	11.00	39.00	22.36 (9.41)	2.00	67.00	18.89 (19.69)
Expansion	3.00	27.00	10.73 (7.27)	4.00	11.00	6.11 (2.52)
Correction	0.00	7.00	2.82 (2.04)	0.00	5.00	1.78 (1.92)
Clarification	0.00	7.00	2.45 (2.02)	0.00	6.00	2.11 (1.96)
Confirmation	0.00	13.00	5.91 (4.16)	0.00	7.00	2.11 (2.32)
Praise	0.00	16.00	4.45 (4.55)	0.00	13.00	3.11 (4.14)
Total feedback	30.00	80.00	56.45 (18.01)	14.00	85.00	38.22 (20.93)
Back-and-forth conversations	1.00	39.00	16.18 (9.56)	5.00	20.00	11.56 (4.75)
Teacher turns	3.00	119.00	54.64 (28.29)	29.00	69.00	47.89 (15.60)
Child turns	2.00	79.00	35.36 (19.69)	16.00	52.00	34.22 (13.39)
Ratio child-teacher turns	0.50	0.90	0.65 (0.11)	0.52	0.86	0.71 (0.11)

which would be expected, given our strategy of coding only conversations with at least one teacher and one child contribution. These findings have implications for data reduction, discussed under Research Question 2.

Next, we examined bivariate correlations among types of teacher talk, finding that those who made more comments also asked more closed prompts ($r = .73$, $p < .001$), whereas open-ended prompts were unrelated to comments ($r = .12$, $p = .620$) or closed prompts ($r = -.10$, $p = .772$). This result suggests that some teachers may take a more directed approach to discourse (comments, closed prompts) whereas others are less restrictive (open-ended prompts).

Finally, we examined bivariate correlations among types of feedback. We found that language expansions were moderately correlated with providing information ($r = .51$, $p = .020$), and both were generally correlated with less frequently seen codes including confirm, correct, clarify, and asking children about their own thinking. Thus, findings did not reveal distinct patterns of feedback used, but rather that teachers who used one type of feedback used most of the others as well.

Question 2: Change over time

Analytic strategy

We captured the teacher talk during these book readings using frequency counts, and we analyzed these data with means, *SD*s, and ranges. We used paired samples *t* tests to explore within-teacher change from fall to spring and multiple regression to understand spring differences in the two conditions while accounting for fall performance. Complete descriptive results for spring are presented in Table 2.

Amount of conversation

Control teachers did not significantly change from fall to spring on the frequency of back-and-forth conversations, $t(8) = -0.63$, $p = .349$, whereas intervention teachers used more conversations over time, $t(10) = 2.29$, $p = .045$, increasing from an average of 11 per reading to an average of 16. Interestingly, for teachers in both conditions, only 27%–30% of spring conversations were extended. Regarding conversational turns, control teachers did not change over time on number of teacher turns ($p = .184$) or child turns ($p = .163$), or

on ratio of child-to-teacher turns ($p = .462$). However, intervention teachers increased on both number of teacher turns, $t(10) = 2.77$, $p = .020$, and child turns, $t(10) = 2.77$, $p = .020$, growing on average to 55 and 35, respectively, compared with control teachers ($M = 48$ and 34, respectively). At the same time, however, intervention teachers did not change on ratio of child-to-teacher turns ($t(10) = 0.77, p = .458$), indicating that their conversations had much the same balance of child–teacher talk in spring as they did in fall.

Multiple regressions, accounting for fall performance on the same variable and book reading length in seconds, showed that intervention teachers had significantly more back-and-forth conversations in spring than control peers did ($\beta = .39, p = .037$). The ratio of child–teacher conversational turns did not differ across conditions ($\beta = -.27, p = .283$).

Purpose of feedback

Control teachers did not change from fall to spring on frequency of total feedback, $t(8) = 1.21, p = .262$, nor did intervention teachers, $t(10) = 0.92, p = .380$. However, accounting for fall feedback and length of book reading in seconds, regressions showed that intervention teachers provided significantly more feedback ($\beta = .51, p = .010$).

Regarding specific purposes of feedback, intervention teachers provided marginally more expansions in spring than they had in fall ($t(10) = 2.06, p = .066$), whereas control teachers did not change over time ($t(8) = 1.50$, $p = .170$). Control teachers provided less information over time, ($t(8) = 2.98$, $p = .018$) whereas intervention teachers were unchanged ($t(10) = 1.15$, $p = .276$). Other codes (e.g., clarify, correct) rarely emerged. Multiple regressions showed that the intervention was linked to increases in expansions ($\beta = .54$, $p = .004$) but not in providing information ($\beta = .18$, $p = .390$). The intervention was not linked to differences in decontextualized language ($p = .289$), and vocabulary feedback remained too rare to test.

In sum, comparison of fall and spring teacher discourse showed that the intervention increased the frequency of conversation and the volume of feedback to children, especially around expanding language.

Data reduction

Given the rarity with which some codes were observed, as well as the significant and meaningful correlations among variables of interest, we opted to focus on several variables going forward: number of back-and-forth conversations, total number of teacher feedback remarks (with subanalyses exploring total amount of extensions and providing information where possible), and ratio of child-to-teacher conversational turns.

Question 3: Correlations with CLASS

Analytic strategy

Complete results are presented in Tables 3 through 5. Bivariate correlations of all 20 teachers are together in fall but separated by condition in spring because the intervention could, in theory, create more intentional, higher-quality conversations for which higher frequency would be related to higher quality. In contrast, if control condition conversations were less intentional, higher frequency might be less connected to higher classroom quality. As mentioned previously, we included the CLASS Emotional Support and Classroom Organization domains as composites, as well as the overall Instructional Support domain and its three unique components: Concept Development, Quality of Feedback, and Language Modeling.

Fall correlations

As noted in Table 3, back-and-forth conversations were moderately and significantly related to all aspects of the CLASS (r values between .46 and .58, $p < .05$ for all). Total feedback was correlated only with Concept Development ($r = .46$, $p = .043$). Neither expansions nor providing information was

Table 3. Fall correlations

	1	2	3	4	5	6	7	8	9
1. Emotional support	1								
2. Classroom organization	0.89***	1							
3. Instructional support	0.64***	0.67***	1						
4. Concept development	0.49**	0.55**	0.82***	1					
5. Quality of feedback	0.66***	0.64***	0.92***	0.60***	1				
6. Language modeling	0.62***	0.63***	0.94***	0.65***	0.83***	1			
7. Back-and-forth conversations	0.59**	0.55*	0.57**	0.51*	0.59**	0.46*	1		
8. Total feedback	0.36	0.23	0.42∼	0.46*	0.36	0.36	0.66**	1	
9. Child–teacher turn ratio	0.39∼	0.22	0.32	0.19	0.35	0.35	0.19	0.46*	1

Note. ***$p < .001$. **$p < .10$. *$p < .05$. ∼$p < .10$.

correlated with any aspect of CLASS ($p > .08$ for all). Ratio of child-to-teacher remarks was uncorrelated with any aspect of CLASS ($p > .09$ for all).

Spring correlations

In the BAU control condition (see Table 4), spring back-and-forth conversation count was not related to any aspect of the CLASS ($p > .149$ for all), nor was total feedback ($p > .380$) or either expansions or providing information specifically. Ratio of child-to-teacher turns also was uncorrelated with any aspect of CLASS ($p > .370$ for all).

In the intervention condition (see Table 4), spring back-and-forth conversation count was correlated with classroom organization ($r = .64$, $p = .033$) and instructional support ($r = .61$, $p = .045$), and specifically with the language modeling dimension ($r = .75$, $p = .008$). However, total feedback was not correlated with any aspect of CLASS

Table 4. Spring correlations

	1	2	3	4	5	6	7	8	9
1. Emotional support	1	0.83***	0.87***	0.73***	0.82***	0.70**	0.58∼	0.53∼	−0.16
2. Classroom organization	0.88***	1	0.76***	0.76***	0.77***	0.74***	0.64*	0.46	0.05
3. Instructional support	0.71**	0.80**	1	0.88***	0.88***	0.90***	0.61*	0.43	−0.18
4. Concept development	0.50∼	0.61*	0.86***	1	0.85***	0.88***	0.49	0.26	0.02
5. Quality of feedback	0.68**	0.82***	0.97***	0.82***	1	0.85***	0.52∼	0.46	−0.26
6. Language modeling	0.77**	0.74**	0.88***	0.57*	0.83***	1	0.75**	0.55∼	−0.24
7. Back-and-forth conversations	0.27	0.13	0.40	0.25	0.37	0.52	1	0.67*	−0.26
8. Total feedback	0.30	0.23	0.33	0.31	0.31	0.26	0.42	1	−0.08
9. Child–teacher turn ratio	−0.34	−0.35	−0.08	−0.08	−0.06	−0.11	0.02	−0.63∼	1

Note. Intervention condition above diagonal; control condition below diagonal.
***$p < .001$. **$p < .01$. *$p < .05$. ∼$p < .10$.

(p values $> .08$), nor were frequency of expanding child language or providing information, and ratio of teacher-to-child turns was also independent of the CLASS ($p > .44$ for all).

In sum, the findings suggest that, particularly when teachers have training on how to initiate and sustain intentional conversations, more conversations are linked to higher overall quality, but also that measuring feedback at the level of the teacher remark extends beyond what is measured by the CLASS.

Question 4: Predictors of child outcomes

Analytic strategy

We constructed two sets of models. The first analyzed receptive vocabulary using growth score values from the PPVT. The second analyzed expressive vocabulary using the EOWPVT, which does not include a growth score value. Because standardized scores can mask growth, we used raw scores and accounted for child's age for the EOWPVT analyses. Because prior analyses of these data show an effect of the intervention on children's outcomes (Wasik & Hindman, 2020b), and the analyses mentioned previously reveal differences in the frequency of feedback across conditions, we analyzed intervention and control classrooms separately. Thus, we ran four total parallel types of models; two (one for receptive vocabulary, one for expressive vocabulary) in the intervention classrooms and two (again, one for receptive vocabulary, one for expressive vocabulary) in the control classrooms.

Because children are nested within classrooms, we explored the need for hierarchical linear modeling (HLM) with robust standard errors (Raudenbush & Bryk, 2002). We found clustering effects for the receptive outcome. In intervention classrooms, the intraclass correlation (ICC) for receptive vocabulary was 9% ($p < .001$), and for control classrooms, the ICC for receptive vocabulary was 9% ($p = .025$). Consequently, given Raudenbush and Bryk's emphasis on the importance of accounting for clustering even with small sample sizes at Level 2, we used HLM for all outcomes, and all variables were grand mean centered. We used the restricted maximum likelihood setting, recommended for smaller sample sizes (Raudenbush & Bryk, 2002, p. 284).

However, for expressive vocabulary, we did not find statistically significant clustering. Specifically, the ICC was 4% in intervention classrooms ($p = .128$) and 2% in control classrooms ($p = .231$). Although some evidence suggests that all instances of clustering should be modeled, other work suggests that samples with nonsignificant ICCs are most appropriately modeled through ordinary least squares (OLS) regression (see the study by Niehaus et al., 2014, for a discussion of these disparate views). Thus, for expressive vocabulary, we used HLM and also conducted sensitivity analyses using OLS regressions as well.

In analyses, we regressed spring child outcomes on fall child outcomes, all at Level 1. At Level 2, we had three variables of interest in each model: total back-and-forth conversations, total amount of feedback (and, if significant, exploring total expanding language and providing information feedback), and child–teacher talk ratio. Given the small number of Level 2 units, we tested all variables together as well as separately. We also included overall classroom CLASS Instructional Support quality at Level 2. Finally, initial models also included background variables at the child (gender and dual language status) and teacher (education, years of experience, and minority ethnicity) levels, but because none of these variables significantly contributed to any models, we trimmed them to better accommodate the small number of Level 2 units. Key findings are summarized in Table 5.

Intervention classrooms

In the intervention condition, beyond the effects of global classroom Instruction Support quality and children's fall vocabulary skills, total number of back-and-forth conversations was not predictive of receptive

Table 5. Summary of child outcome models

	Intervention		Control	
	Receptive *B* (*p*)	**Expressive *B* (*p*)**	**Receptive *B* (*p*)**	**Expressive *B* (*p*)**
Back-and-forth conversations	0.17 ($p = .257$)	0.10 ($p = .915$)	−0.15 ($p = .612$)	0.20 ($p = .248$)
Total feedback	0.14* ($p = .039$)	0.06~ ($p = .087$)	−0.01 ($p = .633$)	0.11*** ($p < .001$)
Child–teacher turn ratio	−6.33 ($p = .660$)	−11.72~ ($p = .057$)	−5.52 ($p = .186$)	−14.31 ($p = .142$)

Note. ***$p < .001$. **$p < .10$. *$p < .05$. ~$p < .10$.

vocabulary learning ($B = 0.17$, $p = .257$), nor was ratio of child-to-teacher turns ($B = -6.33$, $p = .660$). However, total amount of feedback during teacher–child conversations predicted higher receptive vocabulary in spring ($B = 0.14$, $p = .036$). In fact, when tested individually, both expansions ($B = 0.21$, $p = .049$) and providing information ($B = 0.23$, $p = .038$) uniquely predicted vocabulary learning, beyond the effects of classroom Instruction Support quality.

For expressive vocabulary, HLM analyses found only null or marginal associations. Specifically, back-and-forth conversations were not related to growth ($B = 0.01$, $p = .915$). Fewer child–to-teacher turns was marginally, although inversely, predictive of expressive vocabulary ($B = -11.72$, $p = .057$). Total feedback was marginally predictive ($B = 0.06$, $p = .087$), but neither expansions nor providing information was individually predictive. Sensitivity analyses with OLS showed very similar findings: neither total number of back-and-forth conversations ($\beta = .06$, $p = .996$) nor ratio of child-to-teacher turns was linked to expressive vocabulary ($\beta = -.08$, $p = .073$). More teacher feedback was not linked to vocabulary learning ($\beta = .072$, $p = .123$), nor was expansion ($\beta = .02$, $p = .687$) or providing information ($\beta = .05$, $p = .233$).

Control classrooms

For receptive vocabulary, in the BAU control condition, accounting for global Instructional Support quality and children's fall vocabulary skills, total back-and-forth conversations were not related to spring outcomes ($B = 0.15$, $p = .614$). Similarly, total amount of feedback was not predictive ($B = -0.01$, $p = .641$). Finally, ratio of child-to-teacher turns was not predictive ($B = -5.52$, $p = .186$).

However, for expressive vocabulary, results were similar to patterns for receptive vocabulary in the intervention classrooms. Total back-and-forth conversations were not predictive of spring outcomes ($B = -0.20$, $p = .277$), nor was ratio of child-to-teacher turns ($B = -15.58$, $p = .140$). However, more total feedback was predictive of expressive vocabulary in the control context ($B = 0.12$, $p < .001$). Specifically, when tested, more provision of information was linked to higher scores ($B = 0.10$, $p = .003$), with a similar but nonsignificant trend for more expansions ($B = 0.42$, $p = .052$). An OLS sensitivity analysis mirrored the HLM findings. More total feedback was the sole teacher-level predictor ($\beta = 1.45$, $p = .009$), with provision of information again significantly predicting expressive vocabulary growth ($\beta = .12$, $p = .042$) but no association emerging for expansions ($\beta = .06$, $p = .307$).

In sum, after Story Talk training, intervention teacher feedback was linked to receptive vocabulary learning beyond the effects of global classroom quality, with evidence that both expansions and providing information supported learning. In classrooms without Story Talk training, teacher feedback was linked to expressive vocabulary learning,

with teachers' efforts to provide information through feedback playing a unique role.

DISCUSSION

This study explored the nature of preschool teachers' conversations with children throughout interactive book reading, with a particular focus on the amount and purpose of the feedback teachers provided to children and the contributions of this feedback to child vocabulary outcomes. We analyzed data from the recent Story Talk PD intervention (Wasik & Hindman, 2020a) targeting enhanced teacher–child interaction around language and vocabulary, which has been shown to improve teacher instructional quality and children's acquisition of taught vocabulary and performance on standardized receptive and expressive vocabulary measures. A novel coding scheme to capture and quantify the frequency and purposes of teacher feedback showed that, before any intervention, teachers offered children about 11 conversations during reading, most of which included no more than three turns (teacher–child–teacher). Within these conversations, most feedback involved providing information, with a modest amount of feedback exclusively focused on language expansion, and occasional occurrences of other strategies including confirming or correcting children, asking children to talk about their thinking, and praising children. Over the year, the Story Talk intervention increased the frequency of back-and-forth conversation and volume of feedback, particularly regarding expanding child language. Only after PD in intervention classrooms were conversations reflective of higher quality using the CLASS instrument; however, the specific frequency of teacher feedback was not captured by the CLASS. Finally, accounting for classroom quality, teacher feedback was a unique predictor of children's outcomes, with child language expansions and providing information types linked to stronger receptive vocabulary in the intervention and providing information supportive of stronger expressive vocabulary in the control condition.

Overall, teacher conversations during book reading and teacher feedback on child talk were relatively limited, even within a language-focused intervention, but feedback meaningfully contributed to children's vocabulary learning during the essential preschool year.

Exploring the role of extended exchanges and feedback in book reading

One important finding from these data is that, out of book readings lasting approximately 15–18 min, children experienced an average of 11 conversations in fall, most of which were three turns only. Although three conversational turns resemble the Initiate-Response-Evaluate model of teacher talk, our data show that teachers often do little more than simply evaluate ("Good job!"). Children experienced a relatively minimal amount of back-and-forth linguistic interaction during readings, as noted in prior research (e.g., Cabell et al., 2015). Story Talk teachers ended the year with, on average, 16 conversations per reading, five of which were extended, suggesting that the intervention moves teachers in the right direction, but that multiple-turn conversations still did not dominate the book reading experience.

These findings raise questions regarding how much conversation is feasible or desirable during whole-group interactive book reading with young children. Although much celebrated as a rich instructional context (Wasik et al., 2016), whole-group book reading is, in some ways, a challenging context for teacher–child back-and-forth conversations. Reading requires teachers to dedicate time to sharing the text, offering stand-alone explanatory remarks, and potentially reminding children of behavioral expectations. In contrast, Gest et al. (2006) investigated a variety of classroom contexts, finding unique patterns of talk in play-based activities (e.g., more pretend talk) and mealtimes (e.g., more decontextualized talk), consistent with

earlier work from the Harvard Home-School Study (Dickinson & Tabors, 2001). There is also evidence that *small-group* book reading may create a valuable setting for fostering conversation (Milburn et al., 2014; Zucker, Carlo et al., 2021). Thus, a frontier for the field may involve determining the extent to which more exchanges are better during whole-group reading, balancing the conceptual heft of book reading discussions (Hadley, Barnes, Wiernik et al., 2022) and the importance of contingent exchanges for children's development (Rowe & Snow, 2020) with the logistical challenges of whole-group instruction.

A related question arises from the findings of Cabell et al. (2015), who found that, given the same number of conversational turns, in-depth conversation with one child may be more beneficial for classroom language learning than extended conversation spanning interactions with multiple children. Their work was specifically situated within small-group play settings. Future work might intentionally explore how many extended conversations with one and/or multiple children are feasible in book readings, taking into consideration different genres of texts. Perhaps more intriguing, future work can also tease apart how extended conversations might be feasible in other contexts with more small-group or one-on-one organizational features, which could potentially become sites for expanding at length on exchanges that began during book reading.

Finding productive complements to global observation tools

Another key finding from the current study was that the frequency of teachers' feedback, a relatively objective, observable indicator of conversational give and take, was generally not correlated with gold standard measures of quality (specifically, the CLASS), yet it did predict children's vocabulary outcomes. The CLASS has tremendously advanced the field by creating a feasible, standardized, and reliable tool to capture multiple aspects of conceptual and affective quality in classrooms across grades. The Quality of Feedback dimension (Pianta & Hamre, 2009) offers particular insight into the extent to which teachers create productive feedback loops with children. However, particularly for teachers who struggle on this dimension, there may be value in also using observational tools (such as the coding scheme developed in this study) that elucidate the specific language expansions and provisions of information offered to children. This approach would provide fine-grained, utterance-level data about teachers' conversational moves, perhaps facilitating rich self-reflection and PD opportunities to consider why they do what they do, how effectively these moves invite child language, and what new strategies for feedback they could try in the future. There is evidence in the implementation science field that such practical feedback may be more readily useful for teachers and potentially more straightforward for coaches to examine and offer support (Zucker, Jacobs, et al., 2021).

Both language expansion and providing information can support vocabulary learning

This study was unique (to our knowledge) in teasing apart the amount of feedback in its varied forms, the frequency of back-and-forth exchanges, and the ratio of teacher–child turns, all three of which are central features of conversations, in order to understand how what teachers say in response to children might be particularly linked to child outcomes. One foundational finding in the current study was that, of these three aspects of conversations, only teacher feedback was predictive of children's vocabulary learning, accounting for global classroom quality. We hypothesize that perhaps the most essential ingredient in learning new words is hearing those words used by expert speakers around you. Teacher feedback may provide more directly meaningful information about new words than do opportunities for children to talk alone.

However, a related implication is that, because explicit focus on teaching vocabulary through feedback was relatively rare (and did not increase over time in either condition), children's word learning from feedback may be largely implicit. Teachers' feedback offered exposure to new words but did not, in general, deliberately teach these new words. This finding is consistent with language development literature noting that most word learning is implicit (Clements-Stephens et al., 2012). However, there also is ample evidence that explicit instruction can be incredibly beneficial (Beck et al., 2013), particularly for children with special needs, and this study suggests that there may be considerable room to encourage teachers to use feedback to explicitly target new vocabulary words.

Regarding the two types of feedback examined in depth in this study, teachers who used more of one type (e.g., language expansion) generally used more of the other (e.g., providing information). In the intervention condition, where conversation was potentially more intentionally linked to instruction (hence the correlation with global quality), both types of feedback were connected to gains in preschoolers' standardized receptive vocabulary. Although this finding is broadly consistent with prior evidence that teacher feedback supports child vocabulary learning (Deshmukh et al., 2022), the mechanisms through which these associations operate are uncertain. One hypothesis is that, by nature, information-building feedback may present children with new words and ideas, developing (perhaps most often implicitly) vocabulary. However, language-expanding feedback may also implicitly reinforce vocabulary by restating essential vocabulary children have used. Moreover, it is worth noting that, in the whole-group setting, feedback that is language-building for one child might actually introduce or even implicitly define new words for another child who also is listening, resulting in vocabulary gains related to both types of talk across the class. In the context of the Story Talk intervention, where open-ended prompts from the Story Maps were designed to use and invite the child's use of target vocabulary, teacher feedback of both types may have drawn children's attention to the target Map words, thus facilitating gains. In the control condition, however, only providing information was linked to vocabulary gains. This finding may reflect the fact that, as mentioned previously, providing information is, by nature, more likely to introduce new words, especially without the support of a vocabulary-fostering tool such as the Story Maps.

As a final point, the finding that links only from feedback to receptive gains emerged in the Story Talk condition is somewhat puzzling, given evidence from the overall intervention (see the study by Wasik & Hindman, 2020b) that Story Talk children grew in both areas. Also uncertain is why feedback in the control condition was, conversely, linked only to expressive vocabulary. Receptive and expressive vocabulary are highly correlated (indeed, r values $>.80$ in fall and spring in the current dataset), and although children are likely to demonstrate receptive knowledge of a new word before expressive knowledge of the same word (Hoff, 2014), the book reading intervention literature has not uncommonly found effects on the latter (e.g., Neuman et al., 2021; Whitehurst et al., 1994), suggesting that one type of assessment is not necessarily uniformly more sensitive than the other. Future work, including with the current dataset, may need to carefully explore differences in other features of the classroom, including child talk, to fully understand these relations.

LIMITATIONS

There are several limitations within the current study. First, as discussed in the literature review, decisions regarding the minimum number of turns that comprise a conversation have substantial impacts on the number and type of remarks that are coded as evidence of those conversations. In this work, in keeping with other recent research, we selected three turns as our minimum, but

this excludes two-turn exchanges where children asked a question and teachers answered it (see the study by Kurkul et al., 2022). This decision was grounded in the challenge of understanding child talk in our recorded videos, and anecdotally, we only very rarely encountered examples of child-initiated conversations in our videos. However, future work might employ individual child microphones or multiple cameras per classroom to better track child talk and be able to include two-turn, child-initiated conversations.

Second, we collected data on children's vocabulary, but it would be very useful to explore other child outcomes related to language (e.g., mean length of utterance, syntactic complexity, use of target vocabulary) and conceptual understanding. In some ways, these outcomes would be more closely aligned to the types of feedback being provided and are, like vocabulary, highly relevant for children's long-term academic success.

Finally, and perhaps most important, the current study is limited by a relatively small number of classrooms ($n = 20$) and consequently offers relatively low statistical power. Collecting and analyzing classroom data, particularly in the context of a coaching-intensive intervention, is a resource-laden undertaking, meaning that relatively few teachers can be supported and observed over the course of a single school year. Larger samples of teachers and children would be needed to secure adequate statistical power to test all variables of interest in the same model, as well as to explore possible patterns of mediation or moderation (e.g., teacher feedback may contribute to child skills in concert with children's own prior language competence and/or attention). Future work could pursue larger samples, perhaps through scale-up studies or through strategically combining datasets from smaller interventions or studies.

CONCLUSION

Although teachers' questioning practices are a significant focus of research attention, far less is known about how teachers address children's responses to those questions through their feedback. Overall, this study indicated that during preschool teacher–child conversations during interactive book readings, teacher feedback on child talk was relatively limited, even within a language-focused intervention. Even so, feedback meaningfully contributed to children's vocabulary learning during the essential preschool year in both the intervention and control conditions. Teacher feedback represents an important but understudied aspect of the puzzle of the classroom language environment, and the novel coding scheme piloted in this work may be one tool to facilitate productive future research.

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