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Research Paper

Development of teacher-child conversations during three years of teacher coaching in dialogic approach to reading☆

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ABSTRACT

This study examined the development of teacher–child conversations in the context of a three-year-long professional development on dialogic reading. Five early education teachers and their story groups, comprising three to six five-year-old Finnish-speaking children from three different cohorts, participated in the study. Thirty reading aloud sessions, 10 from each cohort, were video-recorded in the fall and spring semesters. The dynamics of teacher–child conversations were analyzed using the initiation–response–follow-up framework. We explored the development of teachers' initiations and follow-ups, and the within-cohort changes in children's responses. Sequential relationships between teachers' initiations and follow-ups and the different types of children's responses, as well as conversational lengths, were examined. The results showed an upward trend in the number of teachers' initiations and follow-ups during each cohort period. Children's literal responses were the most prevalent. Positive within-cohort improvement was found in children's inferential responses, along with a small but meaningful dose of creative type of talk. Sequential analysis showed that teachers' closed questions strongly determined children's literal responses, and the probability of children's inferential responses to teachers' open-ended questions increased. Lengthier conversations were linked to teachers' open-ended questions and the use of explorative questions. We discuss the theoretical and practical underpinnings of teacher change in relation to dialogic reading practices.

Shared book reading has been found to support children's verbal participation, language, and comprehension for many reasons. One important ingredient in meaning building in reading is frequent, extended, and analytical talk with children (Dickinson & Porche, 2011). A teacher can use various discursive moves (Mehan, 1979), thought-provoking strategies (Collins, 2022), and communication-facilitation behaviors (Justice et al., 2018) to elicit and extend children's verbal participation in reading aloud. Previous studies have shown that asking open-ended questions (Zevenbergen & Whitehurst, 2003), showing sensitivity in listening to and elaborating children's responses (Cabell et al., 2015), providing all children with opportunities to talk (Hadley et al., 2020), and having fun with children (Whitehurst et al., 1994) are crucial for engaging children in talking more about a story, which, in turn, supports preschoolers' vocabulary and story comprehension (Hindman et al., 2019; Lepola et al., 2023). Story comprehension matters in preschool because it is foundational for later reading comprehension in school (Kendeou et al., 2009). In the present study, our dialogic approach to reading refers to teacher support of the children's talk about story events before, during and after reading aloud. Dialogic reading techniques, such as asking more open-ended questions, using story pictures to support verbal participation and taking account for children's own experiences while scaffolding of story comprehension, were discussed with the teachers across the three years.

As a means of promoting changes in Early Childhood Education and Care (ECEC) teachers' behaviors in teacher–child conversations, a number of professional development (PD) programs with teacher coaching have been developed, and the implementation of the target practices has been evaluated (Milburn et al., 2014; Rezzonico et al., 2015; Wasik & Hindman, 2020). The meta-analysis by Markussen et al. (2017) showed that the intensity, duration, and number of PD components were all positively related to teacher changes in teacher–child interaction. However, as noted by Wasik and Hindman (2011, p. 334),

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changing how teachers talk to children is a challenge. Although teachers value the importance of creating more opportunities for children to talk, the transformation of teaching practices takes time and may tax teachers' as well as children's resilience (Kajamies et al., 2019).

Theoretically, we follow the notions of the transactional model of development (Sameroff, 2009) and the multidirectional point of view to understand changes in teachers' and children's behaviors. We theorize that the interplay between teacher, narrative, and every children in the story group is crucial for the deliberate practice of meaning making that engenders changes in conversational patterns. Consequently, sharing story ideas with children presupposes changes not only in the opportunities provided by the teacher (e.g., questions to initiate discussion on a new topic) but also in the way in which the teacher extends (e.g., follow-ups) and motivates children to continue conversation. Thus, the way in which the teacher scaffolds children's contributions (Desmukh et al., 2022) makes a difference in the development of conversation. Teachers' and children's behaviors are transactionally connected. That is, mutual exchanges (Fogel, 2009) with participating children may not only lead to a change in children's responses but also trigger changes in teacher's dialogic approach to reading.

Regarding early story comprehension, both longer-term (Bianco et al., 2010) and shorter-term (Collins, 2016; Paris & Paris, 2007) interventions have proven effective in supporting children's story comprehension skills. There are, however, fewer studies that employ a micro-analytic approach to explore the sequential links between teacher behaviors and children's verbal responses as they grasp the literal and inferential meanings of the story and beyond (Mascareño et al., 2017). Our knowledge is also limited regarding the potential cascading or cumulative effects of professional experience on ECEC teachers' dialogic reading practices across new, consecutive cohorts of preschool-aged children. The purpose of the present three-year-long PD and collaboration study with early education teachers was three-fold. First, to examine the potential changes observed in teachers' conversational behaviors, such as initiations and follow-ups and in the length of teacher-child conversations. Second, to analyze changes in the types of children's verbal responses about story meanings, and third, to examine the extent to which these teacher behaviors and child comprehension-related responses were interrelated.

1. PD and changes in teacher-led book reading practices

A number of PD studies (Hindman & Wasik, 2023) have promoted changes in book-reading practices. PD studies involving more (Cabell et al., 2015; Milburn et al., 2014) and less (Wasik & Hindman, 2020) resource-intensive coaching reported that intervention teachers were responsive to intervention: that is, they gradually became more able to ask open-ended questions and provide extended feedback or responsive strategies as compared to teachers in control groups. These positive teacher changes have been linked to increased children's participation, as shown by studies reporting the increased length of book-related conversations. For instance, Milburn et al. (2014) reported an increase in the mean length of conversation from 7.3 to 9.2 turns over six months, while Recconico et al. (2015) reported a mean length of conversation of about 10 turns at the posttest. They reasoned that both children's experiences (i.e., maturation) and teacher workshops accounted for the increase in conversational turns. It is important to note that these changes in teachers' and children's behaviors are usually observed over one kindergarten year and within one cohort of children. The present study adds to this line of research by analyzing the extent to which a three-year-long collaboration with the same teachers yields changes in teachers' conversational behaviors.

Although the teacher initiation–child response–teacher follow-up (I–R–F) pattern (Cullen, 2002; Howe & Abedin, 2013) has been extensively studied and identified as the dominant script across different school cultures (Howe & Abedin, 2013), there is less work that has used this framework to evaluate long-term changes in teacher-child conversation. One obvious reason is that the three-part dialogue (IRE by Mehan, 1979; Sinclair & Coulthard, 1975) has been conceived constraining rather than generative in nature (Muhonen et al., 2016; Van der Wilt et al., 2022). However, as Wells (1999,) has argued "Triadic dialogue is neither good nor bad; rather, its merits – or demerits – depend upon the purposes it is used to serve on particular occasions, and upon the larger goals…" (p. 169), such as "co-construction of knowledge on the basis of ideas and experiences contributed by the students as well as the teacher" (p. 206). In fact, teacher initiations and contingent follow-ups are keys when aiming to the Strive for Five (Dickinson, 2003). This approach advocates a joint and cumulative teacher–child discussion of a topic, comprising more than five turns in length. Consequently, various teacher prompts are deemed important in dialogic reading approach to help the children comprehend a story by engaging the children in the roles of listener and narrator. Thus, the I-R-F framework enables us to examine both shorter (I-R) and longer (I-R-F-R-F…) moment-by-moment interactions as well as a sequence in which another child continues talk instead of the teacher ($I\text{-}R_1\text{-}F\text{-}R_1\text{-}R_2$…).

2. The roles of teacher initiations and follow-ups in teacher-child conversation

Drawing on Mascareño et al. (2017), teacher initiations, in this study, refer to the closed and open-ended questions of a new topic, whereas teacher follow-ups refer not only to evaluative and elaborative functions to extend the children's responses but also explorative follow-up questions (Mercer & Littleton, 2007) to facilitate the child's meaning making and continue conversation. These teacher behaviors also overlap with the interactive and responsive talk practices identified important in support of children's oral language (Hadley et al., 2023).

Deshmukh et al. (2019) showed the somewhat missed opportunities of the teacher initiations in promoting children's language and story comprehension. More precisely, more than half of the questions were of a yes/no type, and higher-level questions (e.g., why and how questions, and feeling questions) comprised less than 4 % of the questions, even though most of the higher-level questions were linked to children's multiword responses. Mascareño et al. (2017) revealed less-alarming results about the demands of teacher questions when using I–R–F framework to examine the quality of conversations among Chilean kindergarten-aged children from low socio-economic backgrounds. Mascareño and colleagues found that there were more teacher initiations at the inferential (52 %) than the literal (48 %; see also Zucker et al., 2010) level. Notably, 78 % of the closed questions were literal in nature, whereas 94 % of the open-ended questions were inferential. This illustrates the strong link between the question type and the cognitive challenge.

Open questions, which involve multiple answering possibilities, have been shown to support children's multi-word and inferential responses (de Rivera et al., 2005; Zucker et al., 2010), while closed questions are more predetermined by the teacher or the narrative and usually have only one correct answer (Hindman et al., 2019). Open-ended questions have also been shown to be positively related to the amount of children's verbal participation (Desmukh et al., 2019), the quality of children's responses, and—indirectly via children's talk—better story comprehension (Lepola et al., 2023; Van der Wilt et al., 2022). The findings by Lepola et al. and Van der Wilt et al. were, however, based on correlations instead of micro-analytic approach. What is more, changes in teacher initiations and follow-ups and their links to children's responses have been less studied in the context of multi-year PD study.

Studies have shown that teachers' questions per se, without contingent follow-ups, are not enough to promote children's participation in conversation (Cabell et al., 2015). Regarding the continuity of a conversation, it is the content of the teacher follow-up has been found to be important (Cabell et al., 2015; Deshmukh et al., 2022; Hadley et al., 2020). Mascareño (2014) reported that two-thirds of the teacher

follow-ups were evaluative, such as explicit feedback on correctness or repeating the child's response in a confirmatory tone. Elaborative follow-ups in which the teacher extended the conversation topic were rare (only one-fifth of all follow-ups). This led Mascareño et al. (2017, p. 147) to conclude that follow-ups were "not being systematically used by teachers as a tool for helping children think further", a point that is examined longitudinally in this study.

Deshmukh et al. (2022) examined the *landscape* of conversation by looking at the sequential associations between the accuracy of prekindergarten and kindergarten-aged children's responses and teachers' subsequent cognitive scaffolding. The findings reflected teachers' responsiveness to continuing conversations with children. Children's accurate responses were more often followed by upward scaffolding (e.g., factual follow-up questions or extensions), whereas inaccurate responses were followed by downward scaffolding (e.g., corrective feedback, repeating the question, or support with word meanings). Deshmukh et al. (2022) also reported a large variability in conversation length, with an average of nine turns. Interestingly, conversation length was not related to the accuracy/inaccuracy of children's responses, and the link between teacher scaffolding (follow-ups) and conversation length was not examined.

2.1. Supporting children's literal, inferential and creative talk about stories

Cognitively challenging talk, characterized by a teacher's flexible use of closed- and open-ended questions and different follow-ups, is important because it creates opportunities for children to practice story comprehension skills. According to the multicomponent model of text comprehension (Oakhill & Cain, 2007), the processing of both literal (i.e., information presented in the text) and inferential (i.e., information interpretable from the text or from previous knowledge) information is needed for a child to construct a coherent, meaning-based representation of a narrative (Florit et al., 2011; Paris & Paris, 2003). Four-to-six-year-olds more easily understand literal information than inferential, implicit information in narrative texts (Florit et al., 2011), and the ability to grasp both types of information increases with age (Kendeou et al., 2008; Paris & Paris, 2003). What is more, spoken words work as key means of communicating meanings, therefore vocabulary knowledge has an important role in story comprehension and is causally related to reading comprehension (Kim, 2016; Silva & Cain, 2015).

Previous studies have shown how the complexity of teachers' questions triggers children's high-level comprehension responses. For example, Zucker et al. (2010) reported a strong positive association between inferential teacher questions and the level of abstraction in children's responses, and literal questions were unlikely to elicit inferential (i.e., abstract) or longer (i.e., more words) child responses. Mascareño et al. (2017) showed that teachers' literal questions yielded children's literal responses, with a probability of 0.96, whereas the link between inferential initiations and children's inferential responses was slightly weaker (0.72). This is in line with Deshmukh et al. (2019), who also employed sequential analyses to study teacher–child conversation. In this study, we draw on Mascareño's (2014) conceptualization to code children's responses. Thus, we used literal and inferential talk categories. The literal level refers to the child's ability to describe perceptually available information (e.g., story characters), recall aspects of a story event, and describe illustrations. The inferential level refers to the child's reasoning about perception, such as interpretation an event or picture in relation to a story, integrating information across events, expressing the child's own point of view, defining word meanings, and talking about non-perceptional qualities (e.g., characters' thinking, feelings, and desires).

However, not all children's responses to teacher prompts fall into the literal–inferential distinction. Children may also chat about other things not related to the story, or their responses to teachers' questions may be incorrect or unclear. Furthermore, Hadley and Dickinson (2019) reported that open-ended questions were negatively related to children's vocabulary development, carrying the risk of being conceptually too challenging to respond to (Hadley et al., 2020). Both matches and non-matches are plausible in verbal interaction. Thus, instead of creating opportunities together, teacher initiations and follow-ups may be too challenging for children to understand. Importantly, children may also go beyond teacher-set level of comprehension (Kajamies, 2017). This kind of positive non-match was found by McKeown and Beck (2003) among kindergarten–Grade 2 children, who were gradually able to construct more reasoning responses to teachers' closed questions as a function of a *text talk* approach to story comprehension.

Drawing on the potential of the children as tellers of the story (Whitehurst et al., 1994) and studies focusing on shared reading, exploratory discussion, and play (Kohm et al., 2016; Moedt & Holmes, 2020), we conceptualize an additional talk category beyond literal and inferential responses, *creative responses*, which reflect children's ability to expand upon a storyline by adding new, adventurous perspective to the discussion. As Walsh and Hodge (2018) and Hindman et al. (2019) have noted, little is known about children's responses in shared reading, and to our knowledge, no empirical studies have examined the within-cohort changes of children's responses guided by teachers who were exposed to cumulative year-long experiences of dialogic reading.

3. The present study

This study examines teacher–child conversations across three cohorts of five-year-old children guided by the same early education teachers who participated in a PD program over the three years. The teachers implemented the Seven-Minutes-to-Stories model (Orvasto & Levola, 2010) each year, including 29 stories that they read aloud. The model was developed collaboratively with the participating teachers across the three years to increase teacher–child conversation and support children's story comprehension. Our design enabled us to evaluate potential cascading effects of the teachers' professional experience on teacher–child conversation and to examine the associations among the verbal interaction between the teachers and children. The following research questions were formulated:

RQ1. To what extent do the amount and type of teachers' initiations and follow-ups as well as the length of conversations change within and between the three coaching years? The first RQ relates to teachers' responsiveness to the goals of PD, that is their ability to employ different questions and follow-ups in conversation with the children.

RQ2. To what extent do the amount and types of children's responses to teachers' conversational behaviors change within the three cohorts? The second RQ focuses on the growth in children's verbal participation and the type of their talk such as literal, inferential and creative responses.

RQ3. How strong is the sequential relationship between teachers' initiations and follow-ups and the type of children's verbal responses? We analyze sequential relationships across the three years as well as the within-year changes in the strength of the sequential links between teacher initiations and children's responses. The roles of teacher initiations and follow-ups in terms of the length of conversation are examined.

4. Material and methods

4.1. Teachers and children in story groups

This study followed five teachers across 3 years of coaching. Different groups of children—the three distinct cohorts—participated from fall to spring with each teacher across the 3 years of the study. During the academic years (2014–2017), seven to eight early education teachers per year took part in a PD program following the Seven-Minutes-to-Stories model. A sample of five teachers was included in this study because of the available video data for their story groups, and

they all participated in coaching starting in the fall of 2014. Each ECEC teacher read aloud stories to one story group each year. Altogether, 15 story groups were video-recorded in the fall and spring terms.

The ECEC teachers were from four daycare centers located in a small town in southwestern Finland. The participating teachers had diverse educational backgrounds and work positions. Two teachers had bachelor's degrees in early education; one of them had at least 4 years of experience, while the other had 20 years. One teacher worked as special early education teacher, having a bachelor's degree, and had been working in daycare for more than 20 years. The remaining two teachers had been working in day care for at least 10 years, and they both had a vocational qualification.

Each reading group consisted of three to six five-year-old children. The mean age of children in Cohorts 2 and 3 at the beginning of the follow-up was 63.5 months (ranging from 57 to 69 months). Information regarding the age of children in Cohort I was not gathered, but they all turned five during 2014. All except one child were native Finnish-speaking children, and the language of instruction was Finnish. Written consent was obtained from the head of the city's early education administration to implement the Seven-Minutes-to-Story model. All five participating teachers provided permission to video-record their story group. Written consent was granted by parents of all children participating in this study.

The composition of children's language levels in reading groups was not controlled. We followed the practice of the local day care, and the participating teachers assumed responsibility for a new cohort of 5-year-olds each fall. The listening comprehension skills of the Cohort 1 children were not evaluated. However, we measured the narrative listening comprehension of Cohort 2 and 3 children using a listening comprehension test (Vauras et al., 1995) in the fall and spring. Independent samples *t-test* showed that Cohort 2 ($M = 9.21$, $SD = 3.36$) had significantly higher listening comprehension than Cohort 3 ($M = 7.15$, $SD = 3.74$) in the fall of Year 2, $t(48) = 2.04$, $p = .046$, but no significant difference was observed between Cohort 2 ($M = 10.29$, $SD = 3.70$) and Cohort 3 ($M = 8.62$, $SD = 4.50$) in the spring of Year 3, $t(48) = 1.43$, $p = .08$.

Stories and Developing the Pedagogical Approach. In the present study, the Seven-Minutes-to-Stories model (Orvasto & Levola, 2010) was implemented among five-year-old children and developed collaboratively with the participating teachers to facilitate children's talk about stories. The same book, including 29 follow-up stories, was used in each year. The stories for the fall and spring video observations were based on various episodes in the lives of the three main characters (Pyry, Pouta, and Marionette). The fall story included 304 words, whereas there were 351 words in the spring story.

Coaching themes and scripted stories. Through coaching and scripted stories, the Seven-Minutes-to-Stories sought to support all children's active participation by providing them with more opportunities to talk about the story. The teachers video-recorded one or two reading alouds in September and February–March. Video clips of the participating teachers' interactions were viewed and discussed to give opportunities for the teachers to reflect on their reading approaches. The first author worked as a coach and met with the teachers four times each year: in October, January, February, and April. After the first video-recorded reading aloud in September, teacher–child conversations were promoted through scripted stories and video-based coaching involving all teachers. The main coaching themes along with examples of a scripted story are shown in Supplementary material, Table S1.

In the first coaching session with the teachers (Cohort 1, fall) the objectives and practices were introduced for teachers, that is to have more conversation before and during reading and supporting children's meaning making about a story. Apart from some individual discussions, the coaching themes were same for all five teachers. First, they included recalling what happened in the previous story, linking pictures to story events and the value of children's prior experience as key to verbal participation. Second, videos were used in coaching to give examples on how to encourage and elaborate upon the children's answers. The scripted examples in stories aimed to promote teachers' use of open-ended questions, elicit children's talk and discussion about the meaning of words.

The procedure of dialogical approach to reading was slightly revised after the first coaching year to provide more opportunities for talk after the reading aloud. In Years 2 and 3, the talk about characters' thinking, feelings, and behaviors were re-emphasized in coaching meetings. Also, some scripted examples were revised in Years 2 and 3 to support children's inference making (see Supplementary material, Table S1). There were six scripted examples in the fall-story and eight and in the spring-story to increase conversation with children. One overarching theme, emphasized more in the coaching for Year 2 onward, was to see all kinds of children's talk (i.e., including talk not central to the story) as an opportunity to promote verbal participation.

Coaching also included themes about the roles of children's vocabulary and inference making in story comprehension. The first author talked about the teachers' awareness of story structure (beginning, middle, and end, as well as the causal and temporal sequences of the story events), pedagogical structure (how the teacher can help the child to link the events by using dialogic approach), and what the child is able to learn through active listening and participation (mental representation; Olkinuora et al., 1984). The concept of two landscapes of a story (Feldman et al., 1990) was introduced during the coaching in Year 2 to help teachers see how children could grasp the link between the story events and characters' thoughts and feelings.

Reciprocal cooperation characterized the coach–teacher relationship, meaning that the coach attempted to act as a *critical friend* (Fenstermacher & Richardson, 1993) to support the teachers in developing their approaches so that they supported children's participation. The coach had prior experience in studying the implementation of the Seven-Minutes-to-Stories approach among kindergartners and had been working with early education professionals for 15 years.

4.2. Video data

One video including teacher–story group conversation was selected from each of six time points. The video analysis was based on three phases: conversation before reading aloud, conversation during the reading aloud, and conversation after the reading aloud. Some videos of Cohort 1 from the fall included identifying children's names and other talk, such as picture-coloring before and after reading aloud. These were not included. One video from Teacher 5 was missing, and one from Teacher 1 was incomplete, including only discussion before reading aloud. The duration of the 28 sessions ranged from 4 min. 20 s to 23 min. 30 s (Table 1).

4.3. Dynamic coding of teacher–child conversations

Before coding the I–R–F interaction, teacher and child extratextual talk was transcribed by one research assistant and the first author. Based on careful watching of each video, the teacher's and each child's utterances (i.e., verbal turns) were written down in a Word document with

Table 1
The durations (min) of reading aloud sessions as a function of cohort and teacher.

	Cohort 1		Cohort 2		Cohort 3	
	Fall	Spring	Fall	Spring	Fall	Spring
T1	2.42[1]	15.0	14.08	20.33	17.92	16.16
T2	11.0	17.16	14.16	16.50	18.0	23.50
T3	4.33	12.16	6.33	12.30	13.16	13.66
T4	6.0	15.0	8.33	14.25	15.16	18.50
T5	6.16	#	9.50	8.0	9.50	13.0

Note. T1 = teacher 1. [1]An incomplete video including only conversation before reading aloud. # = missing video.

numbered rows. Our coding scheme was based on a moment-by-moment approach, drawing on work by Mascareño et al. (2017) and others (e.g., Cabell et al., 2015; Cullen, 2002; Deshmukh et al., 2022).

Table 2 describes our dynamic approach to analyzing adjacent pairs of teacher–children talk. The pairs refer to teacher turns followed by a contingent child response. Teacher turns were coded according to the extended I–R–F–R–F conversation sequence. Thus, each initiation by a teacher referred to the types of questions (i.e., closed or open-ended; in detail, see Table 3 in Coding section) that the teachers asked to invite a response from children and to start a new conversation. Teacher follow-up, that is a response to child's contribution, referred to different functions such as confirmation (i.e., evaluation) followed by further questioning on the same topic (i.e., explorative; see Cabell et al., 2015). Our analysis also included the I–R and F–R pairs with no child response (Table 2). This code bifurcated further into no response by the child to the teacher's question or no response by the child because there was no space to respond to the teacher's consecutive follow-ups (e.g., evaluation or elaboration). In addition, pairs with no teacher initiation/follow-up code were included (see Codes for Teachers' and Children's Talk).

Length of Conversation. Conversation length referred to the number of changes between teacher's and children's talk turns, which were semantically linked to each other and were related to the narrative. Teacher initiations, that is the questions of a new topic, started a conversation (Table 2). Short motivating talk (e.g., introducing participating children) was included in the length of conversation. Talk that was unintelligible or included several behavioral management turns was not included. The minimum length to be coded as a conversation was one change in the speaker, also taking into account for child-to-child changes (Table 2). Thus, we included these partial I–R cycles as conversation length. This deviated from the conversation criterion with the sequence of two changes, I–R–F (Cabell et al., 2015). Of all the coded conversations ($f = 318$), 5.3 % involved a single change. Successive talk turns of the same child did not add to the length.

4.4. Codes for teachers' and children's talk

Initiations. To code the teacher initiations, we used mutually exclusive codes for closed and open questions. The description for the closed and open-ended question codes are given in Table 3 (in detail, see Lepola et al., 2023). We double-coded the teacher questions from eight story sessions to evaluate reliability. The percentage agreement was 90.3 %, and Cohen's kappa was 0.81.

Follow-Ups. For the teacher follow-up, different categories and functions were codified (Table 3). We adhered to Mascareño et al. (2017) in coding categories that tapped evaluative and elaborative functions. As shown in Table 3, we added a third category, explorative question, which reflected sustaining and developing a dialogue (Cullen, 2002) between the teacher and the children, as well as the teacher's active role in building on previous talk, that is asking children to say more about the story (cf. Mercer & Littleton, 2007 and the I–R probe of Kennedy, 2005). The difference in an explorative question compared to evaluative or elaborative follow-ups was that the teacher *kicked the ball back to the children/child* and, in that way, nurtured children's engagement with and talk about the story.

No initiation/follow-up. As Table 3 and the dynamic I-R-F coding in Table 2 show, also no teacher initiation/follow-up code was used. No initiation/follow-up referred to (a) child-to-child talk turns concerning a topic with no verbal follow-up intrusion by the teacher and (b) a new initiation posed by the child that related to or was irrelevant to the story.

Table 2
Examples of Dynamic I–R–F Coding and the Length of Conversation.

	Teacher	Child		
Pairs	Initiation/Follow-up[1]	Level of response[1]	Change of speaker	Length of conversation
1	Closed (initiation)	literal (Child 1)	1	
2	Follow-up evaluative	no response	1	
3	Follow-up explorative	literal (Child 2)	1	
4	Follow-up explorative	literal (Child 3)	1+1	
5	No init./follow-up	inferential (Child 3)	0	
6	Follow-up evaluative	no response	1	
7	Follow-up elaborative	no response	0	
	End of topic			6
1	Open-ended (initiation)	inferential (Child 1)	1	
2	Follow-up evaluative	no response	1	
3	Follow-up elaborative	no response	0	
	End of topic			2

Note. [1] In detail, see section on Coding of Teachers' and Children's Talk and Supplemental material.

Table 3
Codes for Teachers' Conversational Behaviors and Children's Responses.

Codes for teachers' conversational behaviors	
Teacher's initiations	
Closed questions	The answers were predetermined by the T. in relation to the story content or a picture in view or requesting children to label a character or place. Questions required only one or a few words response (e.g. yes/no).
Open-ended questions	Questions for which the response was not constrained by the T., required multiple-word response or invited more than one correct answer (e.g., "What happened in the last story?"). All the prompts regarding the meaning of words and why-questions.
Teacher's follow-ups	
Evaluative	Confirmation: Repeating the child's answer or saying "yes" or more implicit but positive "hmm". Falsification: T. suggests explicitly or implicitly that the child's response is incorrect. Praising the child(ren). T. provides positive feedback for the child(ren) response. Aswering. T. gives a correct answer to a question. Repeats the question after no child response, false or unclear response.
Elaborative	T. offers additional information regarding the story events or the meanings of words T. provides a summary based on the story and/or teacher-child conversation. T. gives a hint or reframes the previous question to which the children were not responded or the answer was wrong or unclear.
Explorative	Topic-continuation question to all children. Question addressed to all children to think, say more about the topic of questions/conversation. In terms of cognitive demand, this follow-up question can be either literal or inferential. Addressing a specific child by name. T. is calling an individual child by name to continue or add to the conversation
Other follow-ups	Organization and management of reading aloud. Re-directing child's off-task behavior. Peer help. The peer help the teacher and clarifies what the other child was saying. T. does not notice the child's initiative.
No teacher initiation or follow-up	No teacher initiation/follow-up referred to (a) child-to-child talk turns of a topic with no verbal follow-up intrusion by the teacher or (b) a new initiation posed by the child that related to or was irrelevant to the story. In the latter, there is no preceding teacher initiative, but talk about the topic unfolds, which differentiates it from above 'not noticing the child's initiative'.
Codes for children's responses	
No verbal response	No child verbal response to the teacher's question or follow-up.
Response(s) irrelevant to the story	Irrelevant responses refer to child talk not semantically linked to the question or story.
Incorrect and *I don't know* responses	Responses contradicted, for example, the content of the story or the meaning of the word that was asked about.
Literal response	The children's utterances were coded as literal when they referred to characters' names, an event in the story, the naming of perceptually available information in the picture or text, or the recalling of some aspect of information from the previous story.
Inferential response	Inferential response referred to the reflections on a story event, linking information in the picture and text or linking the children's own experiences to the story. Defining word meanings, predictions and explanations about why something happened were coded as inferential. Responses that correctly referred to characters' thinking or feelings were also coded as inferential.
Creative response	Child's adventurous contributions that added a new perspective for thinking about the situation. This kind of verbal input reflected fun, imaginative, and open-minded features.

Note. T. = teacher.

To have a deeper understanding of the number and the roles of different follow-ups in unfolding talk, the follow-ups were not coded mutually exclusively. For a detailed description and examples of the follow-up codes, see Table 3 and Supplemental material S2.

The first author and one research assistant coded 43 % of all teacher follow-ups. The kappa coefficient for the different follow-up types was 0.75, and kappa for the three functions (evaluative, elaborative, and explorative) was 0.83. This level of agreement was achieved following two coding rounds after some changes were made to the initial coding criteria.

Child Responses. Children's verbal responses to teacher initiations and follow-ups were coded using the following six mutually exclusive categories: 1) no verbal response to the teacher's question or follow-up, 2) response irrelevant to the story, 3) unclear or incorrect answer, 4) literal response, 5) inferential response, and 6) creative and new perspective (Table 3) (for a detailed description and examples of irrelevant, incorrect, literal, and inferential responses, see Lepola et al., 2023, Appendix). The creative category was included to better acknowledge children's adventurous contributions that added a new perspective for thinking about the situation. This type of verbal input reflected fun, imaginative, and open-minded features. The following transcript is a part of a long teacher-children conversation with 41 changes. Conversation is about Pyry an d Pouta who are shooting rockets on New Year's Eve and it illustrates children's inferential and creative responses to teacher follow-ups:

Teacher: not shooting rockets at least as much as in the town [elaboration]

Child 3: I would like to be, like to be there in the back of rocket as those are shooting [to the she sky] [creative]

Teacher: So, you would like to fly to the sky or hmm [elaboration]

Child 3: but then it, the rocket would blow up [inference]

Teacher: but riding with this kind of rocket is a bit impossible [evaluation]

Child 2: I could jump from it [creative]

A conversation unfolds about how to get down to Earth…

Child 2: well – jumping with a parachute [creative]

Child 4: it can be bad if there is no parachute [inference]

Child 2: but with a parachute you can land in the sea [creative]

Teacher: Well – yes you can! Great ideas, but can you really ride with the rocket? Are you so tiny that you can go with it? [evaluation + explorative question]

All children: No! [unison, literal]

To assess the inter-rater agreement of the level of children's responses, the first and fourth authors coded 38 % of the children's turns. Cohen's kappa coefficient for the five meaning-focused categories was 0.76. To achieve this level of agreement, two rounds of coding followed by a discussion of the disagreements and changes of coding and criteria were run.

5. Results

5.1. To what extent do the length of conversation, teachers' initiations and follow-ups change within and between coaching years?

As Table 4 shows a total of 318 conversations were identified, with an average length of 8.63 turns (SD = 7.97, range = 1–54). Descriptive statistics showed variability, with 29 % lasting more than 10 turns and 8 % lasting more than 20 turns. Shorter back-and-forth interactions with fewer than four turns comprised 27 %. A two-way ANOVA (between the three years x within year: fall–spring) was computed to analyze developmental changes in conversation length. There was no statistically significant main effect of coaching year, $F(1, 318) = 2.07$, $p = .13$, within year, $F(1, 318) = 0.11$, $p = 0.73$, or coaching year x within year interaction, $F(1, 318) = 1.80$, $p = .17$, for conversation length. Even though the number of conversations increased in each year and within each cohort (Table 4), there was no measurable changes on the length of

Table 4
Developmental changes in the mean lengths and frequencies of conversations.

	Coaching year 1		Coaching year 2		Coaching year 3		
	Fall	Spring	Fall	Spring	Fall	Spring	Total
Mean lenght (SD)	6.06(6.9)	8.59(6.6)	11.05(10.3)	8.79(8.9)	7.58(6.3)	8.69(8.0)	8.60(7.98)
Frequencies	17 (25[1])	52 (65[1])	39	66	67	77	318(339[1])

Note. [1] Estimated number based on raw data plus imputed values of the missing video data.

conversations.

Table 5 displays descriptive statistics of the initiations and follow-ups for the five teachers across the three years. Of the teacher initiations that were targeted in the coaching and scripted stories, open-ended questions dominated across coaching Years 1 and 2, and the teachers used open-ended questions as much as closed ones across Year 3. The improvement in the number of open-ended questions was clear in Year 1, and the increase was also seen for Year 2 (from 23 to 35), with a steady pattern for Year 3. Regarding follow-ups, the most recurrent function was evaluative (27.9 %). Explorative questions, asking for more information about the story, were used slightly less (23.4 %), and the elaborative type, (i.e., extending children's contributions) was observed in 18.9 % of all coded teacher conversational behaviors across the three years.

Similar to initiations, the number of all types of teacher follow-ups increased during each year period. The most progression was observed in Year 1, in which elaborative and explorative types increased by a factor of five. As shown, for Year 1, the total number of different teacher initiations and follow-ups increased by a factor of 3.4 from fall (136) to spring (458). The same increasing trend in the number of teachers' conversational behaviors from fall to spring were observed for coaching years 2 and 3, even though the amount in the fall for Year 2 and Year 3 was close to or higher than at the end of Year 1.

We ran an independent samples proportions test to analyze differences in teacher initiations and follow-ups between coaching years. 95 % confidence intervals along with Cohen's *h* effect size are reported. No teacher initiation/follow-ups that were linked to child talk irrelevant to story were excluded from the analysis. The between-year comparisons revealed a statistically significant difference in no teacher initiation/follow-ups, with proportionally more no teacher responses in Year 2 (17.9 %) as compared to Year 1 (12.1 %) ($z = 2.73$, $p = .006$, 95 % CI [0.097, 0.017], $h = 0.163$) and Year 3 (9.3 %) ($z = 5.31$, $p < 0.001$, 95 % CI [0.054, 0.119], $h = 0.254$). The teachers asked relatively more closed questions for Year 3 as compared to Year 1 ($z = 2.32$, $p = .020$, 95 % CI [0.053, 0.005], $h = 0.137$) and Year 2 ($z = 2.08$, $p = .037$, 95 % CI [0.001, 0.044], $h = 0.101$). In addition, a statistically significant difference, with a small effect size, was observed in explorative questions in favor of Year 3 (26.8 %) as compared to Year 1 (21.3 %) ($z = 2.18$, $p = .029$, 95 % CI [0.006, 0.098], $h = 0.125$).

The within-year analysis showed a statistically significant increase in no teacher initiation/follow-ups and a significant decrease in evaluative follow-ups from fall to spring. These findings with small effect sizes were due to the changes observed for Year 2 in no teacher initiation/follow-up responses ($z = 2.65$, $p = .01$, $h = 0.197$) and evaluative follow-ups ($z = 2.24$, $p = .03$, $h = 0.163$; Table 3). Thus, the proportional patterns of other initiations and follow-ups were stable from fall to spring. These findings suggested that for Year 2, an increase took place in those exchanges in which another child co-contributed to the peers' response without an intervening talk by the teacher or the children themselves initiated a new topic. An increasing trend was also observed in explorative questions within Years 1 and 3.

We also examined teacher differences in their discursive behaviors across all cohorts. There were no statistically significant differences between teachers in the proportions of closed and open-ended questions. One pair of teachers differed statistically significantly in terms of evaluative ($p < .05$, 35 % vs. 26 %) and elaborative ($p < .05$, 21 % vs. 11 %) follow-ups. In explorative questions, the proportions of two teachers were significantly higher than of one teacher ($p <. 05$, 29 % and 26 % vs. 18 %). Although this does not rule out teacher differences in the development of teacher–child conversation, the teacher differences in terms of the proportions were modest.

5.2. To what extent do children's responses change within each cohorts?

Table 6 displays the development of the types of children's verbal responses. As shown, the children's literal responses (56 %) were the most typical response type across the three cohorts. Almost every third (28.8 %) response was inferential, while there were fewer incorrect answers and unclear responses (7.9 %). Overall, lower proportions of irrelevant (4.3 %) and creative (3.1 %) responses were observed. The number of no verbal responses increased within each cohort. Because teachers' evaluative and elaborative follow-ups did not include an active prompt for children to reflect on the story, the increase of no verbal response codes was mostly attributed to these situations.

From the developmental change point of view, the total number children's responses increased within each cohort, and most progression was observed for Cohort 1, with a factor above three (i.e., from 89 to 311). For Cohorts 2 and 3, children's responses increased by a factor of 1.2. This suggested children's responsiveness, that is their verbal engagement and participation in conversation about stories changed in line with the goal of dialogic reading (i.e., giving children more space for talking). The within-Cohort 1 analysis revealed that the proportion of

Table 5
Development of the amount and proportions of teachers' conversational codes across the three coaching years.

	Year 1		Year 2		Year 3		
Teacher codes	Fall *f* (%)	Spring *f* (%)	Fall *f* (%)	Spring *f* (%)	Fall *f* (%)	Spring *f* (%)	All cohorts
No Init/F-up	22[1] (16.2)	58[1] (12.6)	47 (14.2)	98 (21.1)	37 (8.6)	60 (11.1)	322 (13.7)
Closed question	9 (6.6)	15 (3.3)	13 (3.9)	22 (4.7)	32 (7.4)	33 (6.1)	124 (5.3)
Open-ended q.	15 (11.0)	43 (9.4)	23 (6.9)	35 (7.5)	32 (7.4)	36 (6.6)	184 (7.9)
Evaluative follow-up	37 (27.2)	125 (27.3)	100 (30.1)	107 (23.2)	138 (31.9)	147 (27.1)	654 (27.9)
Elaborative follow-up	21 (15.4)	98 (21.4)	61 (18.4)	83 (17.9)	79 (18.3)	100 (18.5)	442 (18.9)
Explorative follow-up	22 (16.2)	96 (21.0)	80 (24.1)	97 (20.9)	106 (24.5)	148 (27.3)	549 (23.4)
Other	10 (7.4)	23 (5.0)	8 (2.4)	22 (4.7)	8 (1.9)	18 (3.3)	69 (2.9)
Total	136[1] (92[2])	458[1] (315[2])	332	464	432	542	2344[1]

Note. [1] Estimated total number based on the raw data plus imputed values of one partial recording (Year 1, fall) and one missing recording (Year 1, spring). [2] Total number based on raw data.

Table 6
The Within -Cohorts Changes in the Amount and Proportions of Children's Responses.

	Cohort 1		Cohort 2		Cohort 3		
The type of child response	Fall *f* (%)	Spring *f* (%)	Fall *f* (%)	Spring *f* (%)	Fall *f* (%)	Spring *f* (%)	All cohorts *f* (%)
Irrelevant	5[1] (5.6)	14[1] (4.5)	5 (2.1)	14 (4)	15 (5.1)	18 (4.8)	71 (4.3)
Incorrect, unclear	17 (19.1)	29 (9.3)	16 (6.7)	28 (8)	20 (6.8)	21 (5.6)	131 (7.9)
Literal	58 (65.2)	167 (53.7)	143 (59.6)	182 (52.1)	165 (56.5)	213 (56.5)	928 (56.0)
Inferential	9 (10.1)	98 (31.5)	67 (27.9)	111 (31.8)	76 (26)	116 (30.8)	477 (28.8)
Creative	0	3 (1.0)	9 (3.8)	14 (4)	16 (5.5)	9 (2.4)	51 (3.1)
Total	89[1]	311[1]	240	350	292	377	1658
No response	47	141	92	114	140	165	699

Note. [1] The estimated total numbers for Cohort 1 were based on the raw data plus imputed values for one missing and one partial recording.

children's incorrect responses decreased ($z = 2.51$, $p = .01$, 95 % CI [0.014, 0156], $h = 0.254$), while inferential responses statistically significantly increased from fall to spring with a medium effect size ($z = 3.58$, $p < .001$, 95 % CI [0.207, 0077], $h = 0.451$). Although Fig. 1 displays a positive trend for children's inferential responses from fall to spring, the changes in the proportions of children's responses were not statistically significant within Cohort 2 or Cohort 3.

5.3. How strong is the sequential relationship between teachers' initiations/follow-ups and children's responses?

From the point of view of supporting children's story comprehension, we examined how teachers' initiations and follow-ups were related to the different types of children's responses and how these sequential associations changed within each cohort of children. Table 7 shows the lag-1 transition matrix of teacher–child talk across the three cohorts of children and five teachers.

Sequential analyses showed that when conversations started with a closed question, the probability of the child's response being literal was 0.78. Closed questions rarely attracted children's inferential responses. As Table 7 shows, teachers' open-ended questions, emphasized in the scripted stories and coaching, triggered more variability in children's responses. Importantly, the highest probability was seen between open-ended questions and inferential responses (0.47). However, children's literal responses were observed in one-third of all initiation–response sequences to open-ended question, and 16 % of teachers' open-ended initiations yielded an incorrect or unclear child response (i.e., a situation of non-match). Teacher initiations were never directly followed by children's creative talk. However, as Table 7 shows, children's creative talk turns were linked with a variety of follow-ups, as well as being observed in more children-led take ups with no preceding teacher behavior. Overall, the sequential association based on a two (teacher initiations) x four (children's responses without creative and irrelevant codes) matrix was significant, with a medium effect size, $\chi 2(3) = 67.02$, $p < .001$, $\varphi = 0.49$).

The sequential association between teacher follow-ups and children's story-related responses (without irrelevant talk and no response codes) was significant, with a small effect size, $\chi 2(6) = 33.52$, $p < .001$, $\varphi = 0.19$. The strongest transitional probability was observed between teachers' explorative questions and children's literal responses (0.59), while the probability of the child's turn being inferential was lower (0.23).

The probability of observing no child responses after evaluative or elaborative follow-ups was high (i.e., 0.58 and 0.48, respectively), whereas it was clearly lower (0.06) after an explorative, topic-continuing inquiry. The figures underscored the significance of explorative questions in encouraging children to engage in and contribute to discussion. Lag-1 frequencies also showed that children's literal and inferential responses followed from no teacher initiation/follow-ups, with the same probability as after explorative questions. This suggested an active role of children in continuing the dialogue.

Fig. 2 shows the within-cohort related changes in the sequential associations between teachers' initiations and children's literal or inferential responses. Apart from teacher–child conversation patterns in the fall for Cohort 2 (with a 0.23 probability of a closed-inferential link), this positive non-match was rarely observed. Descriptively, the probability

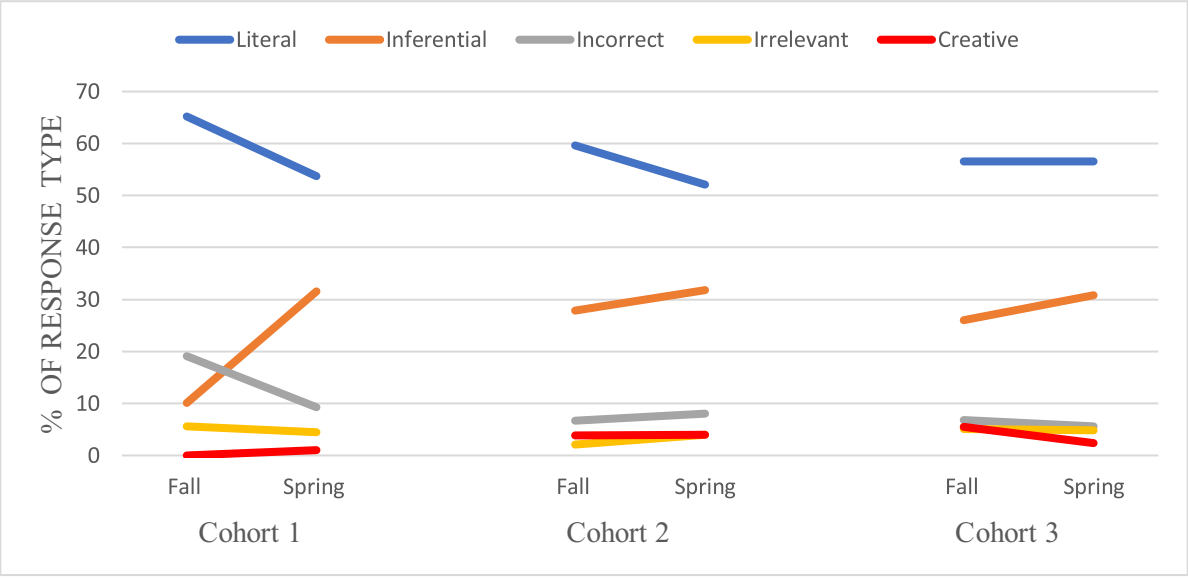

Fig. 1. Within-cohort changes in the proportions of children's response types.

Table 7
Sequential Associations Between Conversational Codes and the Types of Child Responses Across all Cohorts: lag-1 Frequencies and (Transitional Probabilities).

Teacher codes	The types of children's responses						
	Literal	Inferential	Creative	Incorrect, unclear	Irrelevant talk	No child response	Total *f*
Closed questions	90 (.78[1])	9 (.08)	0	9 (.07)	1 (.01)	7 (.06)	116
Open-ended q	54 (.32)	78 (.47)	0	27 (.16)	3 (.02)	5 (.03)	167
F-up: Evaluative	138 (.22)	82 (.13)	12(.02)	10 (.02)	17 (.02)	364 (.59)	623
F-up: Elaborative	100 (.24)	78 (.19)	12(.03)	13 (.03)	12 (.03)	200 (.48)	415
F-up: Explorative	310 (.59)	123 (.23)	8 (.01)	51 (.10)	3 (.01)	33 (.06)	528
No init/f-up[2]	174 (.572)	77 (.253)	18 (.059)	9 (.03)	26 (.086)	–	304

Note. [1]Transitional probability (e.g., *P* = Child literal 90/ Teacher closed 116). [2]no teacher initiation or follow-up.

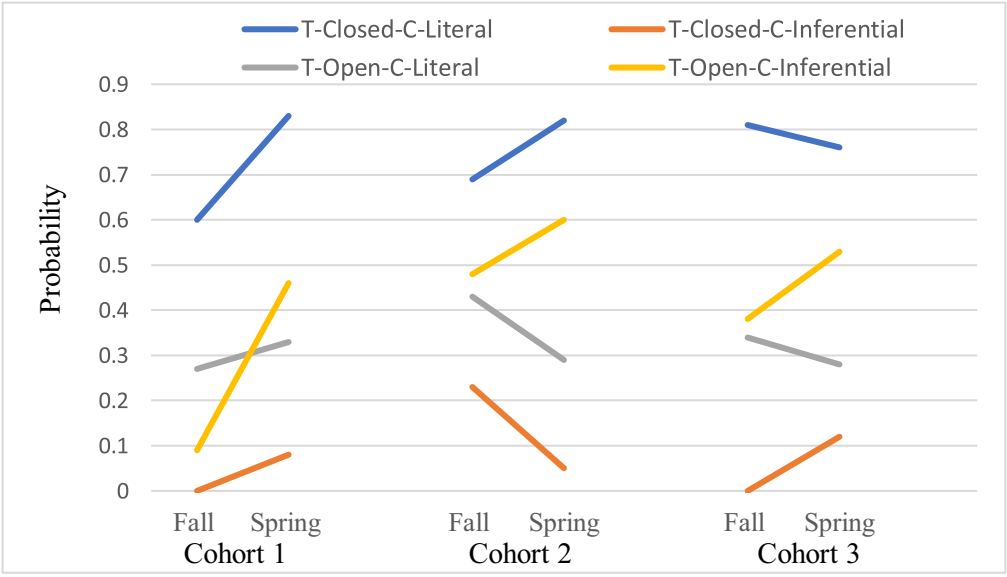

Fig. 2. Within-cohort changes in the transitional probabilities between teachers' closed and open questions and child literal and inferential responses.

of open-inferential patterns increased from fall to spring within all three cohorts. The probability of closed-literal patterns increased within Cohorts 1 and 2, while a more stable trend was observed within Cohort 3

Since the goal of dialogic reading was to promote the teachers' use of open-ended questions to facilitate children's participation in discussion, we computed a *t-test* to evaluate the role of teacher initiations (closed vs. open-ended questions) in terms of the length of conversations across all cohorts. Open-ended questions were followed by statistically significantly longer conversations ($M = 10.27$, $SD = 9.13$), with a small effect size, compared to what followed from closed questions ($M = 7.41$, $SD = 6.38$), $t(281) = 2.91$, $p = .004$, Cohen's $d = 0.35$.

Finally, using variables aggregated to teacher level ($N = 27$), we examined the relation between the follow-ups and conversation length. The correlation analysis showed that the more the teachers used explorative questions, the lengthier the conversations in the story groups ($r_s = 0.51$, $p = .006$). The amount of elaborative follow-ups was positively but not significantly related to conversation length ($r_s = 0.35$, ns.), whereas no linear association emerged between evaluative follow-ups and conversation length ($r_s = 0.04$).

6. Discussion

This three-year-long PD supporting dialogic reading practices among three successive and different cohorts of five-year-old children revealed important findings. First, the study displayed upward trends in teachers' conversational behaviors. Second, it demonstrated within-cohort growth in the amount of children's verbal responses and positive changes in different types of responses reflecting story comprehension. Third, it showed the extent to which the teacher–child conversational behaviors were related to one another. Our findings also underscored how both teachers' initiations and follow-ups were shaping conversation length in story groups. Overall, this study makes a unique contribution to existing reading research by examining teacher–child conversation amongst five ECEC teachers over three years.

6.1. *Length of conversation and developmental changes in teachers' conversational behavior*

The first set of findings related to conversational length. In contrast to other PD studies (Cabell et al., 2015; Milburn et al., 2014; Rezzonico et al., 2015) reporting positive effects of PD on conversation length, we found that the lengths of conversations were stable across all three cohorts, with an average of 8.63 turns. This was, however, well above the recommended five back-and-forth turns (Hadley et al., 2020). In addition, our findings showed a systematic increase in the number of conversations within each coaching year.

Teacher conversation codes included the types of questions used to initiate children's talk and the follow-ups employed to maintain and extend children's verbal participation. Regarding teachers' responsiveness to dialogic principles, such as gently pushing children through questions and expansions (Whitehurst et al., 1994), our findings showed an upward trend in the number of teachers' initiations and follow-ups during each coaching year. A clear increase was observed in teachers' open-ended questions during Years 1 and 2, and it reached a plateau during Year 3. Other PD studies, including those using control groups, have also shown the responsiveness of early education teachers using more open questions as well as responsive statements and specific feedback on children's language use (Girolametto et al., 2003; Milburn

et al., 2014; Wasik & Hindman, 2020).

Partly in line with Mascareño et al. (2017), we observed that the most typical teacher follow-up was evaluative, confirming the child's correct response, whereas elaborative follow-ups were used less. However, we extended previous research by also coding explorative follow-up questions (i.e., challenging children's meaning making of a story). In fact, we found a clear increase (five times more) in explorative questions from fall to spring in coaching Year 1 and a statistically significant change in the proportions of explorative questions from Year 1 to Year 3. Furthermore, we found between- and within-year differences in no teacher initiation/follow-up, a category derived from our dynamic analysis of the codes depicting teacher-child talk. No teacher initiation/follow-up codes increased significantly with a small effect size during Year 2. This suggested an active role of Cohort 2 children in verbally adding to their peers' responses to the prompt posed by the teacher. This finding may also reflect changes in the teachers' routines so that they followed the children's lead and gave more space for children to participate (Cabell et al., 2015). The number of teachers' conversation-facilitating behaviors spurted during the first year, and was followed by a steady increase in, for instance, the proportion of explorative questions. These findings suggested that experienced early education teachers working in different positions underwent changes in their book-reading routines, structured by the scripted stories and our coaching meetings in which clips of the teacher's own videos were discussed.

6.2. Children's verbal participation

The second set of findings about the changes in children's verbal responses contributed to previous cross-sectional studies (Mascareño et al., 2017; Zucker et al., 2010). The amount of children's verbal responses increased, with the most conspicuous growth observed from fall to spring in Cohort 1. The proportion of inferential responses increased significantly with a medium effect size, which suggests a moderate change. Also, the proportion of incorrect responses decreased but with a small effect size in Cohort 1 children. This implied that our less-intensive coaching, with an emphasis on more talk about the events in the previous and new stories, picture–story relations, and characters' thinking and feelings, was beneficial in terms of raising the number and quality of children's talk. However, we also noted that children's verbal participation increased less in Cohorts 2 and 3. Still, these withing cohort trends should not be interpreted as indicating a point of diminishing returns. In fact, our descriptive results pointed to a systematic increase in children's literal and inferential types of responses from fall to spring in all three cohorts.

The highest prevalence of literal responses was in accordance with the findings of Mascareño et al. (2017; Table 4) and Zucker et al. (2010; Table 3), which showed that two-thirds or almost half of all child utterances were literal, respectively. Zucker et al. (2010) showed a higher proportion of *no level of abstraction* (27 %) as compared to our finding that only 5.5 % of all children's responses were unclear or incorrect. This difference may not be attributed to genre because our main story included 29 informational narratives. However, the children in our study were hearing from fall to spring stories about the lives and fictive endeavors of the same characters, and we used a different coding system that also included creative responses.

Although the overall proportion of children's creative responses was small (3.1 %), we found a meaningful amount of creative responses among the children in Cohorts 2 and 3. This is qualitatively a novel finding in early reading research and acknowledges preschoolers' ability to go beyond the explicit and implicit meanings of a story and construct new adventurous ideas. Thus, in addition to teacher-supported talk about literal and inferential meanings of a story, children's responses and imagination help to leverage the conversation. As our sequential analysis revealed, teachers' initiations were never followed by children's creative responses, but these were linked to conversation including different teacher follow-ups also including no teacher initiation/follow-up. These findings suggest an active role of teachers' scaffolding of children's talk and creative ideas and, at least to some extent aligns with goal by Whitehurst and colleagues (1994), that is teachers' ability to fade their own input, positioning the child as the teller of the story and assuming the role of a listener.

Similar to children's confusion or frustrations at overly long question–answer sequences, children's creative but surprising ideas may pose a challenge to the routine of a teacher controlling what children talk about. According to Kennedy (2005), learning to respond even to unexpected events is an essential part of learning to teach and dialogic orientation. Bearing this in mind, future studies might look at child–teacher exchanges and analyze how different types of pedagogical listening, such as empathic, supportive, and even self-reflective, cause changes in teacher talk and thinking (English et al., 2023).

6.3. The relationship between teachers' conversational behaviors and children's verbal responses

Our results showed significant sequential associations between teacher questions, follow-ups, and the different types of children's responses. In accordance with micro-analytic studies (Kucherenko et al., 2022; Mascareño et al., 2017; Zucker et al., 2010), teachers' closed questions strongly attracted children's literal-level responses. In addition, there was a stronger probability that open-ended questions were followed by children's inferential responses than literal ones, and the probability of children's inferential responses to teachers' open-ended questions increased in all cohorts. This latter finding, with a decreasing gap between the requirements of teachers' questions and the level of children's answers, suggested that children learned to tell more about the content of a narrative as teachers challenged their narrative representations through open-ended questions. It should be noted that the operationalization of closed- and open-ended questions in this study differed from those using the levels of abstraction (Blank et al. 1978; Zucker et al., 2010). Thus, not all open-ended questions tap a single type of cognitive demand such as inferential thinking. In addition, non-matches in a downward direction were observed, showing that teachers' open-ended initiations yielded more incorrect or unclear children's responses than closed questions. This finding has also been noted in other studies, especially when the prompt is too abstract and the information inquired is beyond children's memory and understanding (Deshmukh et al., 2019; Mascareño et al., 2017).

In regard to sequential associations, individual children's language skills may also moderate teacher behavior; that is, the teacher may ask questions and use follow-ups differently between children of varying comprehension skills. Our results indirectly support this viewpoint. Specifically, Year 3 teachers asked proportionally more closed questions than Year 2 teacher ($z = 2.03, p = .042$), and this pattern was in line with Cohort 3 showing lower initial listening comprehension than Cohort 2 children. However, this difference in closed questions may also reflect the increase in all teachers' conversational codes across the years and is an issue that merits further research.

Sequential analysis showed that teachers' explorative questions were related to children's literal and inferential responses. This was obvious, as teacher explorative questions were closed- or open-ended inquiries to continue narrative-related talk. The results also showed that open-ended questions triggered longer joint conversations on a topic than closed questions. Correlational analysis added to this, showing that teacher explorative questions were significantly associated with conversation length, whereas teachers' elaborative and evaluative follow-ups were not equally effective ingredients for continuing dialogue. Thus, teacher's active probing of children's narrative-related talk seemed to matter for a cumulative discussion. This contributes to findings by Van der Wilt et al. (2022) and Lepola et al. (2023), showing that the more the teachers asked open-ended questions, the longer the mean length of children's utterances and the more talk by individual children, which in turn

predicted success in listening comprehension.

Admittedly, not all longer conversations or more talk may scaffold story comprehension. For example, children's one-word responses one after another to the teacher's question "What kind of ice-cream do you like most?" may instead encourage children's participation (Sorariutta, personal communication, March 5, 2024). However, our findings of teacher open-ended and explorative questions being linked to children's inferential comprehension and longer discussions supported Milburn et al.'s (2014) study, which showed that longer conversations were associated with inferential-text conversation rather than with children's personal experiences.

6.4. Sources of change in dialogic reading practices

Practically, a quadratic rather than linear learning curve described teacher change in the improvement in initiations and follow-ups: that is, the initial spurt slowed during Year 2 of coaching and reached a plateau during Year 3. Gains in teachers' dialogic reading practices may be attributed to different scaffolds. One consisted of concrete examples of open-ended questions in scripted stories, introduced in the fall for Cohort 1 and then slightly revised for Cohort 2 to support more talk about characters' thinking and feelings and to notice the importance of all kinds of children's talk. Another consisted of the video episodes that were discussed together, which were first experienced as professionally stressful but perhaps later on seen more as supporting teachers' resilience in achieving changes. As suggested by Wasik and Hindman (2011), the coach–teacher partnership, may also matter in implementing dialogic practices. These changes in dialogic practices were observed with a rather low-dose coaching. This accords with Pence et al.'s (2008) suggestion that a low amount of training with concrete examples can engender teacher change. More recently, a cluster randomized controlled trial by Brunsek et al. (2023) showed how a brief PD (five hours) with individualized coaching improved educators' responsivity and interaction quality in toddler classrooms.

In line with transactional views of development (Sameroff, 2009), this pattern of teacher change also occurred through evocative impacts observed as children's narrative-related talk changes during each year. In other words, children played an important role in the flow and (dis) continuities of in this verbal interaction. By participating in turn taking, children not only contributed to their own comprehension resources, but they also enabled teachers to take up and extend the conversation (Donnelly et al., 2021; Nurmi & Kiuru, 2015).

6.5. Limitations

In addition to the above-mentioned limitations, our sample of five teachers and the children participating each year was not representative of Finnish preschool education with its multilingual groups, but it illustrated the pedagogical changes achieved during the implementation of the Seven-Minutes-to-Stories model in this particular city. Another limitation was that we did not have active control or business-as-usual groups. Therefore, the role of the coaching and scripted narratives in the change of teacher–child conversation should be interpreted with caution. A further limitation was that we did not examine variation among individual teachers in terms of the growth of their discursive behaviors. Thus, descriptive findings about the increase in dialogic practices might be accounted for by some teachers and story groups being more responsive than others. However, the three-year-long coaching with different cohorts of children painted a picture of systematic changes not only in the number but also in the quality of dialogic patterns, such as explorative follow-up questions. Moreover, prior study with the same data set (Lepola et al., 2022) showed a uniform profile of those teachers who participated in the three years of coaching. In addition, according to our coding, the teachers' initiations started a new conversation, even though previous studies have noted child-initiated dialogues (Muhonen et al., 2016). However, when the child made a story-related initiation of a new topic, the teacher behavior was coded as no teacher initiation/follow-up. In this way, no initiation/follow-up code also contained children's initiatives. Finally, because three groups of children participated, caution should be taken in drawing developmental conclusions beyond the within-year changes.

7. Conclusion

The findings of this study lend support to cumulative changes that can occur when experienced early education teachers participate in multi-year PD and are supported to create more opportunities for children's narrative meaning making. The transformation of teachers' approaches, such as using more closed and open-ended questions and a variety of follow-ups, was not temporary, as the fall observations showed that the patterns of teacher–child conversations were elevated after every coaching year and for each cohort of children. The changes in teachers would not have been feasible without the within-cohort growth in children's verbal participation, which was observed in children's efforts to contribute to discussion mostly through literal responses but also through inferential as well as creative talk. Although the teachers' open-ended questions attracted children's inferential responses, they also comprised a higher risk of children's failure to respond adequately, a situation that is challenging for a teacher's dialogic reading approach. Overall, the changes in teachers' conversational behaviors and children's talk within each cohort reflected changes in transactional processes over time (Brofenbrenner & Morris, 2006), that is, providing space and motivation to share children's interpretations.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used ChatGPT-4 in order to improve language. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

CRediT authorship contribution statement

Janne Lepola: Writing – original draft, Methodology, Investigation, Conceptualization. **Anu Kajamies:** Writing – review & editing. **Mikko Tiilikainen:** Writing – review & editing. **Tiia Lindfors:** Investigation.

Declaration of competing interest

There is no conflict of interest to disclose.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ecresq.2025.10.007.

Data availability

Data will be made available on request.

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