Opportunities and participation in conversations: The roles of teacher's approaches to dialogic reading and child's story comprehension

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ABSTRACT: The role of teacher–child interaction and opportunities provided by the teacher to encourage all children's active participation in conversation about story ideas are important. In the present study, we report results from the last two years of a three-year long coaching project on teachers' dialogic reading. The model of 7-minutes-to-stories (Orvasto & Levola, 2010) was used as the pedagogical context. Video-based coaching along with scripted stories were used to increase conversation in story groups. First, we analyzed the developmental changes in story groups such as teachers' and children's responsiveness to dialogic reading. Second, we examined the development of verbal participation in children with low, average and high story comprehension. Third, we used State Space Grids (SSGs) (Hollenstein, 2013) to model the formation of children's participation patterns within four story groups. Eight story groups participated during coaching year 2 and six story groups during year 3. Altogether 47 children from two consecutive cohorts participated. Results highlighted teachers' and children's responsiveness to dialogic reading. Children with high story comprehension outperformed children with average and low story comprehension in the total durations of verbal participation. SSGs showed that children with high story comprehension did not take up all the answering opportunities, and also children with lower story comprehension participated

actively in some groups. We discuss the benefits of long-term coaching for supporting changes in story group interaction and children's participation.

Introduction

Shared book reading in which an adult reads a story aloud has long been noted as a potential learning environment in preschool to facilitate children's language development and interest in literature (Andersson, 2015; Grolig et al., 2020). Previous studies have emphasized teacher–child interactivity and the role of the teacher in encouraging children's active participation in conversation. A teacher can do this, for instance, with the help of evocative, open-ended questions connected to the child's life (Zevenbergen & Whitehurst, 2003), providing more time for children to respond, listening and extending children's responses (McKeown & Beck, 2006), and monitoring the equality of participatory opportunities within story group (Hadley et al., 2020).

Interestingly, studies with business-as-usual approaches (Hindman et al., 2019; Mascareño, 2014), as well as studies where teachers are instructed to read with children by following dialogic reading principles (Girolametto et al., 2003; Mol et al., 2009; Zevenbergen & Whitehurst, 2003) have both noted variability in early education professionals' implementation of recommended practices. Moreover, studies suggest that teachers may struggle in creating more opportunities for children to talk (Kajamies et al., 2019; Pianta et al., 2008). Also, the study by Salminen (2013) showed that preschool teachers differ in their attitude and practice of creating opportunities for children's participation in classrooms. For this reason, it is important to study changes in teachers' approaches during long-term coaching on dialogic reading.

One major goal in dialogic reading is to encourage children's engagement in conversation about the story events. This pedagogy echoes the shift from the view of reading as "sit quietly and listen -activity" to focus on sharing story ideas through participation in conversation. This shift underlines the central role of a child's own activity in his/her growth. Verbal participation matters for older and younger children. For instance, a study by Sedova et al. (2019) showed that student's frequency and quality of talk in middle school classrooms were shown to contribute to literacy learning. Likewise, Hindman et al. (2019) showed that the more 3- to 4-year-old children talked during story book reading the better their vocabulary learning. The positive role of children's active participation, such as on-task behavior, has been noted in the growth of preschoolers' story comprehension (Lepola et al., 2020) and in understanding story vocabulary (Suggate et

al., 2021). Also story comprehension skills have been shown to predict children's on-task behavior from age 4 to age 9 (Lepola et al., 2016). Interestingly, the role of children's story comprehension to the development of verbal participation in conversation is less studied.

The first purpose of the present study was to observe the developmental changes in story groups guided by teachers who participated in coaching on dialogic reading. Our second purpose was to examine the role of children's story comprehension to the development of their verbal participation. Finally, we provide examples of the individual story groups to better understand the dynamics of the child's comprehension skill and the teacher's questioning in the formation of verbal participation patterns.

Dynamic systems approach to dialogic reading and participation

The present study follows the theoretical notions of the Transactional Model of Development (Sameroff, 2009) and the Dynamic Systems approach to teacher–child interaction (Hollenstein, 2013; Vauras et al., 2013). Drawing from these notions, both children's and teachers' behaviours in dialogic reading can be better understood from the bi-directional point of view. This is to say that it is not only the prompt made by the teacher (e.g., initiative to talk, question) nor the resources of the child (e.g., talk, story comprehension skills) that determine teacher-child interaction, but rather the interplay and the transactions between the teacher and children that are important. This principle is also central in the Vygotskian approach to child development stressing the importance of social interaction in teaching and learning language (Vygotsky, 1978).

For this purpose, we adopted the model (Hollenstein, 2013) of State Space Grids (SSGs) to codify and explain stability and change within the four story group patterns. In an SSG, the term *attractor*, represents an interaction pattern of high responding. In other words, interactions with a child who verbally participates most in the sequence of questions and answers. In contrast, the term *repellor*, illustrates an interaction pattern of limited responding in which a child rarely or never verbally participates in the presence of opportunities given by teacher (in detail, see Data analysis plan).

Professional development and the changes in shared book reading practices

Likewise observed in primary classrooms already from 1970s' (Mercer & Dawes, 2014), teachers talk clearly more than children during preschool book reading sessions (Dickinson et al., 2011; Zucker et al., 2010). Teacher domination suggests the missed opportunities of teacher-child dialogue. As a response, professional development programs have been developed to facilitate teacher-child interaction and engaging

children in talking more about the story (Dickinson et al., 2011; McKeown & Beck, 2006; Wasik & Hindman, 2011).

Dickinson and colleagues (2011) evaluated the effectiveness of a curriculum-based Opening the World of Learning (OWL) intervention on teaching practices and children's language development. OWL placed emphasis on vocabulary instruction and teachers' conversation with children in different settings such as book reading. As in the present study and other interventions (Mattinen et al., 2013) book readings were scripted and coaching was provided to help teachers to use recommended practices. Variability in the fidelity ratings for book reading was found. In general, teacher talk dominated during book reading and this is in line with other studies (Gest et al., 2010; Hindman et al., 2008), which have found that a relatively little time is left for children's active participation.

Wasik and Hindman (2011) developed a model of professional development (ExCELL: Exceptional Coaching for Early Language and Literacy) that lasts over two years and supports teachers' learning in implementing high-quality interaction. One-on-one coaching and group workshops were systematically used to scaffold teachers' behaviour: asking more open-ended questions, prompting children to make predictions and encouraging them to explain word meanings. This long-term and multifaceted coaching produced significant effects on children's vocabulary. The benefits were also observed among participating teachers who showed stronger instructional quality (i.e., more systematic language modeling, such as descriptive talk and using of variety of words, as well as higher quality of feedback expanding child's understanding) as compared to the control teachers. Children's vocabulary learning was found to be varied with the teachers' fidelity of the intervention contents. The findings from the ExCELL model raise the question of whether changes in story groups can be achieved by less intensive coaching.

One potential solution can be found in a study by Girolametto and colleagues (2003) who examined the effects of a 14-week in-service training on teachers' language facilitation strategies in book reading and play settings. Eight preschool teachers participated in intervention sessions that included center-activities, lectures, and reflections of interactions through video segments. Results showed that participating teachers were responsive to the intervention. Teachers' talkativeness and children's talkativeness to adults and peers increased. The study showed that experimental teachers maintained these changes over the 9-month follow-up, but data also revealed variability in teachers' change and tendency to implement only some strategies.

Children's participation: The roles of child's abilities and teacher questions

Bunny Stories (BS) (Mattinen et al., 2014) and 7-Minutes-to-Stories (Orvasto & Levola, 2010) are examples of Finnish preschool and kindergarten models that support children's active listening and story comprehension. Regarding children's participation, task-focused behaviors have been found to increase during 7-Minutes-to-Stories (Lepola et al., 2012) and BS interventions (Laitinen et al., 2013). Also interactive elaborative storytelling (IES) approach, a shared-reading method developed by Vaahtoranta et al. (2019) has shown to support five-year-old children's engagement in stories as compared to reading-aloud, which did not include explicit word learning techniques and scaffolding of children's retelling. These findings are, however, based mainly on teacher or experimenter ratings, that is, indirect evaluations of children's behaviour. Although BS and IES have supported story comprehension skills and engagement among the four- and five-year-olds who represent minority home languages (Suggate et al., 2021) or had weaknesses in listening comprehension (Mattinen et al., 2013), further investigation in children with heterogeneous story comprehension skills is warranted. Thus, it is important to examine whether children who already have stronger story comprehension participate more in teacher-led conversation than do children with weaker story comprehension. Thus, it is possible that the Matthew effect, that is, "The rich get richer and the poor get poorer" applies to children with different comprehension resources (Hindman, Erhart, & Wasik, 2012).

Open-ended and closed-ended questions are essential for dialogic reading, because questions give opportunities for children to participate in conversations (McGinty et al., 2012). Open questions refer to less constrained answering possibilities, support for a child's multi-word responses, and also a higher demand for thinking (de Rivera et al., 2005). Closed questions invite with a response of just one or few words and responses which are more predetermined by the teacher or the material in view. Research suggests that a teacher's use of open questions is linked to a more cognitively challenging, sustained dialogue and better story comprehension (Mascareño, 2014; Massey et al., 2008; McKeown & Beck, 2006). Hindman et al. (2019) showed that few open prompts (i.e., questions) were observed in Head Start teachers' shared book reading. Open questions may not be optimal for children with weaker language skills (Zucker et al., 2010), who seem to benefit more from closed questions and literal talk (Hindman, Wasik, & Erhart, 2012). Like other studies, we supported teachers' flexible use of both open and closed questions.

Of interest was the responsiveness to dialogic reading by all of the professionals who participated in the coaching, including teachers and one assistant teacher. This is important because teachers' education is shown to be positively related to the quality of

teacher talk (Sembiante et al., 2018), but also teachers with less advanced educational background may excel in dialogic reading (Dickinson et al., 2011, p. 351). Moreover, in prior work (Kajamies, et al., 2019), teacher interviews have revealed that teachers' uptake of the importance of social interaction and talking more with children as a result of training. However, we lack direct observation about the time teachers devote to reading the story, the time they discuss with children, as well as, the number and the type of questions they ask, and how these story group factors unfold during long-term coaching.

Research questions and hypothesis

The following research questions were addressed:

1. To what extent do teachers and children in their story groups show responsiveness to dialogic reading practices?

2. How does verbal participation develop in children with low, average and high story comprehension skills?

3. What kind of children's participation patterns can be observed in individual story groups?

Based on the reviewed studies (e.g., McKeown & Beck, 2006; Wasik & Hindman, 2011) and our goal to increase time to talk and engage children in conversation about stories, we assumed an increase in dialogic reading practices across two coaching years, observed, for instance, as more conversation with children and asking more open-ended questions. We also hypothesized variability in story group practices and potential challenges for teachers to engage all children in conversation (Girolametto et al., 2003; Kajamies et al., 2019). Regarding children's responsiveness in the context of 7-Minutes-to-Stories, we assumed an increasing trend of children's verbal participation from fall to spring story sessions (Laitinen et al., 2013; Vaahtoranta et al., 2019). Because we invited all five-year-old to participate in the story groups and stressed the participation of all children, we did not set specific hypotheses for the development of verbal participation in children with low, average and high story comprehension. Because of the more exploratory nature of children's participation patterns in individual story groups, we did not formulate hypothesis about interaction patterns (*attractors* and *repellors*).

Method

Participants

The teachers and children who participated in the 7-Minutes-to-Story during the second and third year of coaching were included. Year 1 was not included because children's story comprehension skills were assessed only during year 2 and year 3. In addition, it took several coaching sessions during year 1 to achieve a shared idea among teachers and the first author (i.e., coach) about the main goals of 7-Minutes-to-Stories, that is, supporting children's active participation and story comprehension.

Participants were teachers for whom we had video data, including eight teachers' story groups (7 teachers, 1 assistant teacher) from year 2 and six story groups (5 teachers, 1 assistant teacher) from year 3. Two teachers did not participate during year 3 because the one did not have a story group, and the other moved to a new job. Of note is that all teachers who took part in year 3 had been participating since year 1. The teachers for whom we had video data available had working experience in day care from 4 to more than 20 years. They were from six day care centers located in a small town in southwestern Finland.

Altogether 87 children took part in 7-Minutes-to-Story groups and their narrative story comprehension skills were evaluated in October. Video data from the fall and the spring story groups were available for 47 children (19 girls, 28 boys). Reasons for the missing video data from 40 children were that four story groups whose teachers were participating in the 7-Minutes-to Stories program declined to be videotaped (n = 24 children) and other participating children missed story sessions in the fall (n = 6) or spring (n = 10) due to relocation to another school or absence on the days the teacher videotaped her story session. *T*-test for independent groups (participating children, n = 47 vs children with missing data, n = 40), showed that there were no significant difference in terms of fall story comprehension skills, $t(85) = 0.56$, $p = 0.58$. At the beginning of the story groups, the mean age of the children was 63.5 months (range = 57–69 months). Of the children, 25 were from the year 2 cohort and 22 were from the year 3 cohort. There were 3 to 7 children in each story group. A written consent was granted from the parents of all participating children.

Pedagogical model: 7-Minutes-to-Stories

7-Minutes-to-Stories (Orvasto & Levola, 2010) is a pedagogical model to increase time to read with children and discuss about the story. The model was originally developed to supplement the limited materials available for early educators and parents to collaborate

and to facilitate children's story comprehension. The 7-Minutes-to-Stories includes a different main story each week for 29 weeks (1 story/week). The characters in each story were Pyry (Snowstorm) who is the first grader and Pouta (Sunshine), who has just started kindergarten. The children have their own secret, a marionette (called Mario Netti), found at the grandparents' summer cottage. The puppet, who turns out to be real storyteller, is a brave globetrotter, but prefers the silence by the sea than noises in the city. The stories follow the lives of the children, marionette, parents, and grandparents from the fall until the next summer.

The same stories were used during coaching year 2 and 3 to analyze the children's and teachers' behavior, but stories differed from fall to spring. The fall-story included 304 words and the spring-story included 351 words. Both fall and spring stories included pictures depicting the theme of the story. There were six hints in the fall story and eight hints and in the spring story for teachers to increase conversation with children.

To analyze the children's and teachers' behaviour, we focused on the first three phases of which were sequential in a single reading session. First, teachers were instructed by the scripted examples (see Appendix) to discuss with the children the previous story before reading the new one. Thus, the aim was not just to orient children to new story but also supporting children to recall the events of previous story. Second, they were asked to read a new story and scaffold children's story comprehension by using embedded questions. The third phase referred to discussion with the children after reading aloud.

The content of coaching

The first author worked as a coach and met all teachers in one day care center four times (October, January, February and April) during each year. Group-based coaching was based on the reciprocal co-operation between researcher and early childhood professionals. Consequently, the coach acted as a "critical friend" to support the practitioners to revise and develop their approaches to story reading (Fenstermacher & Richardson, 1993). The coach had prior experience about the implementation of 7-Minutes-to-Stories among kindergartners. He had been working with early education professionals over 15 years.

In addition to video-based on-site coaching, the scripted stories (Appendix) with pictorial support were used to help teachers to scaffold children's story comprehension and participation. The aim was to increase conversation with children before, during and after reading-aloud, as well as linking the picture to story content. The importance of child's prior experiences as a key to participation was stressed. Even if the child's response did not seem to make sense, teachers were instructed to view children's talk as an

opportunity for participation. Teachers were asked to read a story expressively, that is, using soft, positive and character-specific tone of voice. This was not a challenge for experienced early educators. The scripted examples aim to promote teachers use of more open-ended questions. In other words, teachers were asked to discuss more about the sequence of story events and the relationship between how characters think, how they feel and how they act (see Appendix). The examples also helped teachers to discuss the meaning of one to two words in each story. To help teachers understand the value of actively listening to the child's response and continuing the conversation, the coach used video-based examples to demonstrate ways to encourage and elaborate upon the child's answer by adding new information.

Coaching also included discussion about the roles of language, vocabulary, and inference-making skills in story comprehension. The first author stimulated teachers' awareness of the story structure (i.e., beginning, middle and ending, as well as causal and temporal sequence of story events), pedagogical structure (how teacher can link the sequence of story events by using dialogic reading style), and what the child learns through listening and participation (i.e., mental representation). In year 2 and in particular during year 3 the conception of the two landscapes of a story (Feldman et al., 1990) was introduced to grasp the link between story events and characters' thoughts, feelings, and story theme.

Data collection and study variables

Data were collected from the story groups and from children's story comprehension assessment. Participating teachers were asked to video-record their story group in September and March during year 2 and year 3. Videos captured the children's and teachers' activities before, during and after reading-alouds.

Coding story groups' and teachers' behavior. The first author used the ELAN-annotation program (Lausberg & Sloetjes, 2009) to code the following five story group variables.

Length of reading session was the analyzed time in minutes (time before, during and after story reading).

Reading aloud the text was the percentage of time teachers devoted to reading aloud the narrative out of total time.

Conversation in the story group was the percentage of time teachers used for questioning and conversation about the story out of total time. Conversation episodes began when teacher started the session and asked what happened in the story or when the teacher stopped reading-aloud and made a question. The conversation episode ended

as the teacher returned to reading the narrative or dealt with management issues (e.g., directing children's attention to listening). This variable included not only teacher utterances but also children's verbal contributions.

Open and closed questions. The frequency and type of questions teachers made were coded using closed and open categories. *Open questions* where those whose answer was not constrained by the teacher, required multiple-word responses or more than one correct answer (e.g., What happened in the last story?). All questions about the meaning of a word, as well as Why-questions that ask for reasoning or causal connection were coded open (Collins, 2016). We also coded open those demanding inference of character's feelings ("How did the uncle now feel?). *Closed questions* where those whose answers were predetermined by the teacher, for instance, in relation to story content or the picture in view, such as requesting an object or labeling a character or place in picture (e.g., Who (character) said, please come in? From where did they take the treasure map? Who else is there besides Marionette?). Also those questions which required just one or a few words in response were considered closed (e.g., yes/no). Emotion-related questions in which answering was constrained by the teacher were coded as closed as well ("was Marionette happy or sad?") (Collins, 2016; Hindman et al., 2019). We double-coded 268 teachers' questions (32% out of total questions) during eight story sessions. Reliability was coded with ELAN transcriptions. The agreement was 90.3% (Cohen's Kappa .81).

Children's verbal participation. Every utterance the child made in response to a teacher's question about the story as well as his/her spontaneous initiatives or comments related to narrative were counted as verbal participation and started a new verbal participation turn. ELAN-software was used to code the frequency, total durations (i.e., seconds) and mean length of each child's verbal participation turns during story group. Frequency was the total number of the child's participation turns during story session.

Children's comprehension skills. Children's story comprehension skills were assessed from September to October in year 2 and year 3 by listening comprehension test (Vauras et al., 1995) and wordless picture book comprehension test (in detail, see Paris & Paris, 2003; Lepola et al., 2020). Two trained students and the first author evaluated the participating children in one-on-one setting in the child's day care. We used a 91 word-long narrative "Misi Cat Goes Hunting" (Vauras & Friedrich, 1994) in listening comprehension. The experimenter read the text aloud twice without stressing any of the main story events, and then evaluated children's listening comprehension by recalling task and six prompted questions. The mean agreements of two independent raters across recalling and prompted questions and were 97% (κ = .94) and 95% (κ = .91), respectively. The recalling and the prompted questions scores were summed to get a narrative listening comprehension composite.

The *Robot-Bot-Bot* picture book with 18 pages by Krahn (1979) was used to evaluate children's picture book comprehension skills. We used a recalling task, and 10 prompted questions to evaluate children's picture book comprehension (in detail, see Lepola et al., 2020). The maximum score was 20. Inter-rater reliability was 92% (κ = .83) for the recall of the story elements and 94% (κ = .91) for comprehension questions. The recalling and the prompted questions scores were summed to obtain picture book comprehension composite score. Our final metric used in analyses was an overall story comprehension composite, in which we standardized the listening comprehension and picture book comprehension scores and computed the mean of the standardized scores.

Data analysis plan

To answer the first research question of teachers' responsiveness, descriptive statistics about the changes in proportions of reading-aloud and conversation as well as in frequency of teachers' questions are reported. Descriptive statistics are used to delineate trends and variation in story group measures from all story groups (i.e., pooled data from year 2 and 3), as well as changes observed in story groups during coaching year 2 and year 3. Children's responsiveness was analyzed with repeated measures ANOVA (using SPSS Version 26) with time as within-subject and coaching year as between subject-factor.

To answer the second question we, first, identified children with low (below the 25th percentile), average, and high (above the 75th percentile) story comprehension. Second, we applied repeated measures ANOVA with time (i.e., from fall to spring) as within-subject and story comprehension group as between subject-factor to examine the role of story comprehension in the development of verbal participation. Tukey post hoc test was used for pairwise comparison. Effect sizes and 95% confidence intervals are reported. The alpha level of p = .05 was set for identifying statistical significance. This modest level was used because of the low number of participants, which limits the statistical power.

To answer the third question regarding children's participation patterns, we utilized *State space grids (SSGs)* (Hollenstein, 2013*)* in four story groups. SSGs are developed to visually represent a synchronous ordinal or categorical time series data on a two-dimensional grid. In this study, each grid represents all possible combinations of teacher questioning and the comprehension status of the child who is answering. The type of question teacher ask (open vs. closed) is plotted on the x-axis, and story comprehension level of the child in story group is plotted on y-axis. In the four story groups analyzed, the number of children varied from four to six. Thus, 2 x 4 and 2 x 6 grids were plotted. Each cell on the grid illustrates the intersection of teacher's question type and the level of the participant's comprehension. The child who first answers the teacher question is described as a single

event node, that is, an interaction pair. The data for interaction pairs (i.e., codes for teacher question type and the child who answers) were based on ELAN analysis, and then exported from Excel to Gridware program, which generate SSGs. Attractors and repellors describe the children's distinctive patterns of verbal participation. We also report dispersion values for each story group. Dispersion is based on the sum of the squared events across all cells corrected for the number of cells and inverted so that values range from 0 (no dispersion at all, i.e., all interactions in one cell) to 1 (maximum dispersion).

Results

Teachers' and children's responsiveness to dialogic reading

Table 1 displays descriptive results about teachers' approaches and children's participation in story groups during coaching years 2 and 3. The length of reading session, the time teachers used to reading-aloud and conversation in story group, and the number of questions were the indicators for the change in dialogic reading. The changes in the frequency and total durations of verbal participation reflect children's responsiveness to dialogic reading.

To analyze whether the length of reading sessions varied from fall to spring and from year 2 to year 3, a two-way analysis of variance (2 (from fall to spring) x 2 (year 2 and 3)) was computed for the total time (i.e., minutes) analyzed. The main effect for time from fall to spring across year 2 and 3 was not significant. However, a statistically significant increase, $F(1, 12) = 7.03$, $p = .021$, $\eta_p^2 = 0.37$, was found in total time of analyzed reading session from year 2 to year 3 (Table 1). This increase in time suggests more opportunities for interaction and talk during year 3 as compared to year 2.

As our story group data in Table 1 show, on average, two-thirds of time was devoted to conversation both in the fall and in the spring stories. Based on the combined data of 14 story groups, on average, one-third of the time was spent reading-aloud the narrative. Interestingly, and in line with our goals, those six teachers who continued with coaching through year 3 were descriptively observed to decrease their time to reading-aloud and increase time to conversation. In fact, the range in time for conversation was 60% to 76% in the last story session (Table 1). These descriptive changes in the proportions of reading and conversation reflect the changes observed in story group interaction, thus also including children's verbal participation.

Descriptively teacher change was observed from year 2 to year 3 also in terms of the number of questions. Of interest was also the type of questions teachers asked. The

combined data (year 2 + 3) of 14 story groups showed that, both in the fall and spring, closed questions predominate open questions. Importantly, the mean number of open questions increased at every time point (from 9.24 to 20.67). These results suggest that teachers' responsiveness was not yet fully seen during the second but was more clearly observed in the third year. What is more, variability in most of the indicators for dialogic reading decreased from year 2 to year 3. Also noteworthy was that variability remained among the story groups. For instance, the relative time to conversation and the number of questions ranged from 28% to 76% and from 5 to 68, respectively (Table 1).

Regarding changes in children's verbal participation, a two-way ANOVA (2 (from fall to spring) x 2 (year 2, and 3)) was computed separately for the frequencies, the total durations and for mean length of participation turns. The interaction of time and coaching year was not significant for the frequencies, the total durations and for mean length of participation turns. The main effect for time, that is, from fall to spring, was statistically significant both for frequencies, ($F(1, 45) = 6.63$, $p = .013$, $\eta_p^2 = 0.13$) and total durations, ($F(1, 45) = 6.88$, $p = .012$, $\eta_p^2 = 13$). The main effect for coaching year was not significant in none of the computed ANOVAs suggesting that children's verbal participation was comparable among the two cohorts of children.

TABLE 1   Descriptive results of teachers' approaches and children's participation during coaching year 2 and 3

Elan codes, variables	Coaching year	Fall story		Spring story	
		M (SD)	Min/Max	M (SD)	Min/Max
Teachers					
Length of reading session	Year 2[1]	11.00(3.17)	6.2/14.2	12.96(4.19)	6.6/20.3
(min)	Year 3[2]	15.11(3.41)	9.5/18.8	16.86(2.83)	13.3/19.4
	Year 2 + 3[3]	12.76(3.79)	6.2/18.8	14.63(4.07)	6.6/20.3
Reading aloud text (%)	Year 2	36.15(14.6)	23/65	31.78(10.9)	19/53
	Year 3	26.04(4.3)	19/31	23.95(5.4)	19/35
Conversation in story group	Year 2 + 3	31.82(12.1)	20/65	28.42(9.5)	19/53
(%)	Year 2	54.08(15.0)	28/69	55.95(15.2)	28/75
	Year 3	66.25(4.8)	59/73	68.77(7.1)	60/76
Number of questions (f)	Year 2 + 3	59.29(13.0)	28/73	61.44(13.7)	28/76
	Year 2	24.13(13.3)	5/38	27.25(11.2)	12/43
Closed questions f)	Year 3	33.66(7.6)	25/44	43.17(13.7)	28/68
	Year 2 + 3	28.21(11.9)	5/44	34.07(14.4)	12/68
	Year 2	14.87(11.2)	1/29	13.63(5.1)	8/23
Open questions (f)	Year 3	16.33(4.6)	10/24	22.50(10.4)	13/42
	Year 2 + 3	15.50(8.7)	1/29	17.43(8.8)	8/42
	Year 2	9.25(4.1)	4/16	13.62(7.3)	3/25
	Year 3	17.33(7.2)	10/29	20.67(5.2)	15/26
	Year 2 + 3	12.71(6.8)	4/29	16.64(7.2)	3/26
Children					
Verbal participation (*f*)	Year 2[4]	12.48(9.90)	1/34	16.32(11.36)	1/36
	Year 3[5]	13.59(7.76)	2/25	17.77(12.16)	3/49
Verbal participation	Year 2	42.19(41.60)	1.59/187	58.51(47.98)	2.46/187
(seconds)	Year 3	43.09(32.79)	5.76/105	62.89(56.08)	4.72/188
Verbal participation	Year 2	3.09(0.97)	1.59/5.69	3.51(1.15)	1.96/5.93
(MLT)[6]	Year 3	2.91(0.96)	1.63/5.28	3.18(1.63)	1.58/8.56

Note. [1] n = 8, story groups/teachers; [2] n = 6, story groups/teachers; [3] n = 14, year 2 + year 3 story groups/teachers; [4] n = 25, children from year 2 cohort; [5] n = 22, children from year 3 cohort; [6] MLT = mean length of turns (=total duration/frequency).

Children's story comprehension and verbal participation

To answer the second research question about the role of children's story comprehension to the development of their verbal participation in story group interaction, we computed repeated measures ANOVA (2 timepoints (from fall to spring) x (3 story comprehension groups)) separately for frequencies, the total durations of talk (i.e., seconds) and mean length of children's participation. Based on story comprehension composite in fall, we identified 9 children with low, 26 children with average, and 12 children with high in story comprehension.

Regarding frequencies, the interaction of story comprehension group and time was not significant. However, a significant main effect of time was found, $F(1, 44) = 6.99$, $p = 0.011$, $\eta_p^2 = 0.14$, whereas the main effect of story comprehension group approached statistical significance, $F(1, 44) = 3.20$, $p = 0.051$, $\eta_p^2 = 0.13$. These findings suggest that the rates of verbal participation increased from fall to spring and those were marginally higher among children with high story comprehension than among children with low story comprehension (Tukey HSD, $p = .046$) (see Figure 1).

A similar two-way ANOVA for the total durations showed that the interaction of comprehension group and time was not significant. In addition, ANOVA revealed a significant main effect of time, $F(1, 44) = 8.55$, $p = 0.005$ $\eta_p^2 = 0.16$. Also a statistically significant effect of story comprehension group was also found, $F(1, 44) = 4.80$, $p = 0.012$, $\eta_p^2 = 0.18$. Regarding differences between comprehension groups across time, post hoc test (Tukey HSD) showed that the total durations of verbal participation were significantly longer for children with high story comprehension than in children with average ($p = .023$) or low story comprehension ($p = .024$) (Figure 2). These findings indicate that the total time of children's verbal participation increased, and overall, children with high story comprehension talked more during story group sessions than children with average or low story comprehension (see Figure 2).

Moreover, we analyzed the changes in mean length of children's participation turns from fall to spring. Repeated measures ANOVA showed no significant interaction of comprehension group and time, but yielded a significant main effect of time, $F(1, 44) = 6.18$, $p = 0.017$ $\eta_p^2 = 0.12$, and a significant main effect of story comprehension group, , $F(1, 44) = 3.33$, $p = 0.045$ $\eta_p^2 = 0.13$. Interestingly, post hoc test (Tukey HSD) showed that low story comprehenders ($M = 3.0$, $SE = .32$) did not differ from the two other groups, but the mean length of participation turns were significantly longer ($p = .042$) for high story comprehenders ($M = 3.80$, $SE = .29$) than for average story comprehenders ($M = 2.96$, $SE = .19$).
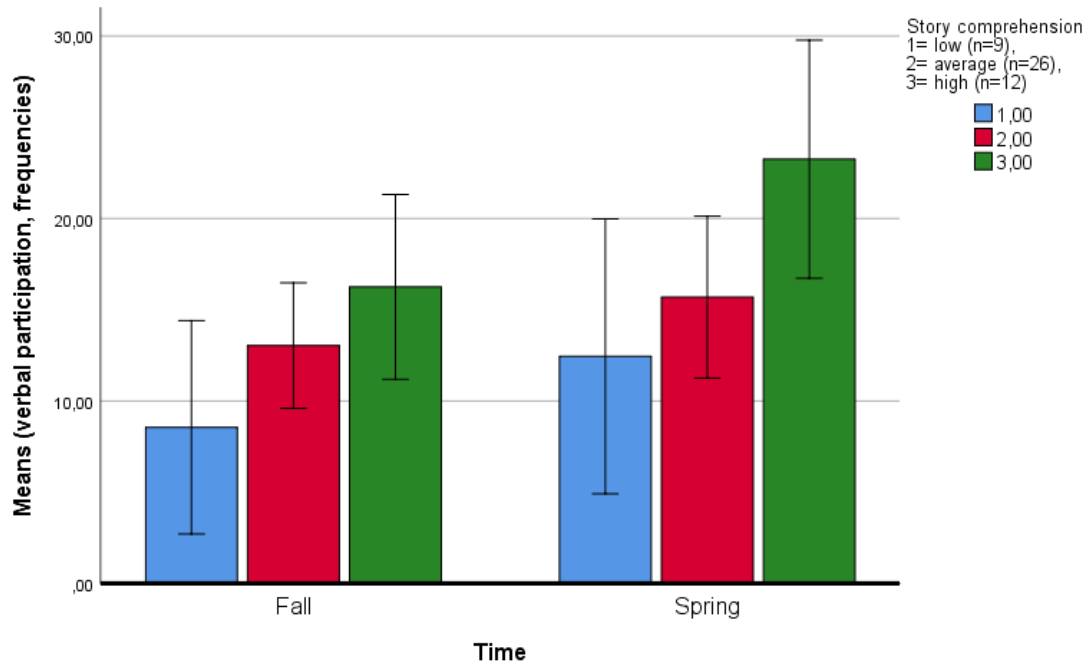
FIGURE 1   The development of children's verbal participation (mean **frequencies** with 95% confidence   intervals)   as   a   function   of   fall   story   comprehension   status
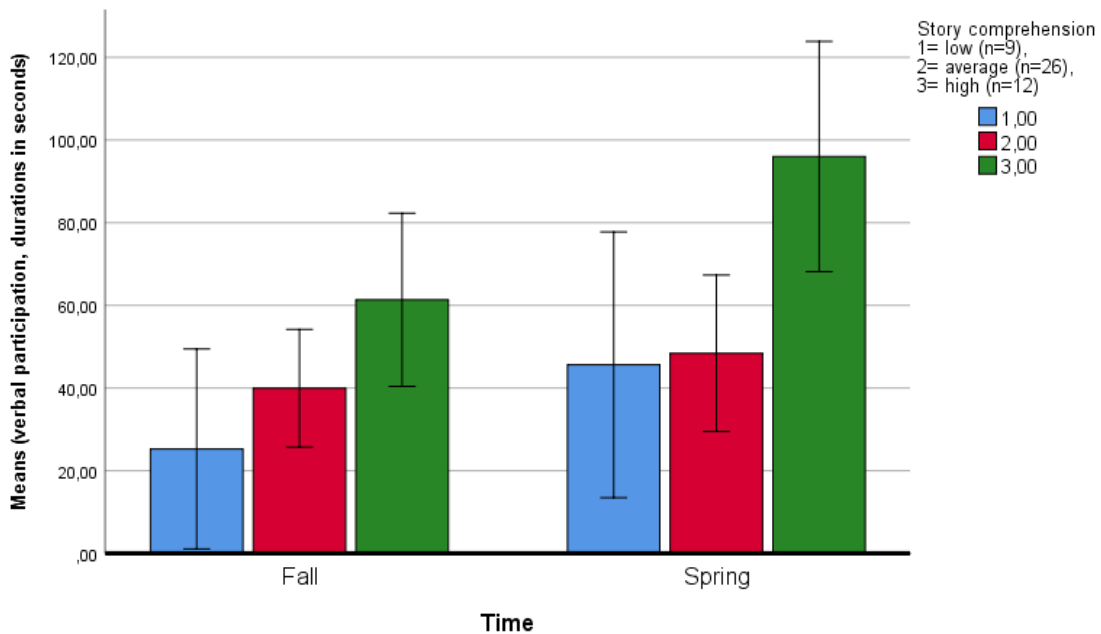

FIGURE 2   The development of children's verbal participation (mean **total durations** with 95% confidence intervals) as a function of fall story comprehension status

State space grid examples of teachers' questioning and child's participation

Finally, to illustrate the interplay between teachers' questioning and child's story comprehension level we zoom into story group interaction guided by two teachers (case examples). *Laura and Pirjo* (pseudonyms) were selected out of eight teachers, first, because they both were motivated to participate through the three years. Second, they were responsive to the goals of coaching (i.e., increasing time to conversation and questions), enabling us to examine the patterns of teacher questioning and child's comprehension level. Also both showed stability and change in their approaches to dialogic reading. Third, they represented a different position and experience: Laura had worked five years in day care as teacher and had a bachelor degree, whereas Pirjo's working experience in day care was over 20 years and she had a vocational qualification as assistant teacher.

State space grids (SSGs) (Hollenstein, 2013) were constructed to visualize the relationship between the number and type of teacher's questioning and each child's verbal participation in their story group. An interaction with a child who first answered to teacher's question, that is, an event node, was marked by blue circle (see Figures 3-4). We first focus on the story groups from year 2 (spring) and then show examples from year 3 (spring).

SSGs analysis from *Pirjo's* story group with four children (year 2) showed that the child with the highest story comprehension in the group and the child with the second lowest comprehension were clear attractors, that is, the children who most typically answered teacher's questions (39% and 33% of interaction, altogether 72% of interaction) (see Figure 3, left panel). Children 2 and 4, that is, the second highest and the lowest story comprehenders in the group, seldom answered questions (11% and 17% of interaction). The children 2 and 4 participated altogether to 28% of all possible interactions and thus were more repellors. The nodes in Figure 3 also showed that the children 1 and 3 tend to answer more typically to open than to closed questions.
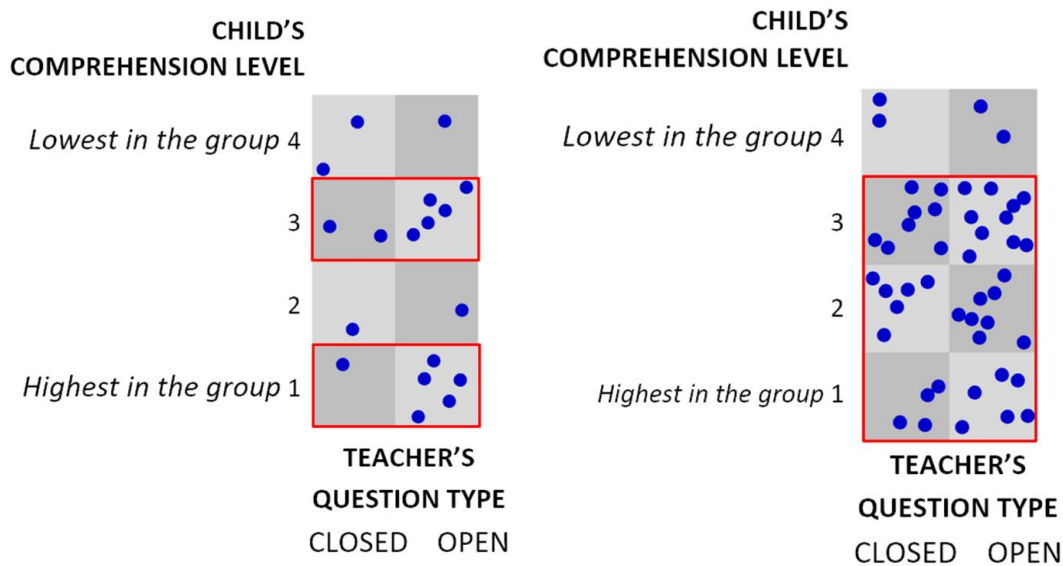
FIGURE 3   Questioning-answering interaction in Pirjo's story-group (left panel) and *Laura's* story group (right panel), **year 2 spring**. Each event node (= blue circle) describes the child who first answers to teacher's question. Red squares illustrate attractor states

SSG from *Laura's* story group with four children (year 2) revealed that the child 3, 2 and 1 were those who most typically answered teacher's questions (39%, 30%, 22% of interaction). As the nodes in Figure 3 (right panel) shows, all these three children were attractors, and altogether they participated 91 % of all questioning-answering interaction. The analysis also showed that the child with the lowest story comprehension seldom answered teacher's question (9% of all interaction), and thus illustrate repellor. Likewise in Pirjo's story group above, the attractor children answered more typically to open than to closed questions.

Figure 4 displays the results of SSGs for year 3 story groups. As Figure 4 about Pirjo's group (left panel) with six children shows the child with the highest story comprehension skills in this group was a clear attractor. In fact, the child answered most typically to questions (44% of all interaction). The child 3 with an average story comprehension never answered first, and the two children with the lowest story comprehension skills answered seldom to questions (13 % of all interaction). Thus, these three children can be characterized as repellors. What was more, the children 1, 4 and 5 answered more typically to open questions than to closed questions, whereas the child with the second highest and the child with lowest story comprehension answered more typically to closed questions than to open questions.

As Figure 4 (right panel) about Laura's group from year 3 shows the child with the second highest story comprehension was an attractor answering most typically questions (i.e.,

63% of all interaction). Not only the child 3 with the second lowest comprehension but also the child 1 with the highest comprehension were found to be repellors in this story group. Interestingly, child 4 with the lowest story comprehension answered almost one fourth of the questions (23% of interaction). Again, the children with varying story comprehension skills (i.e., 1, 2 and 4) answered more typically to open questions than to closed questions.
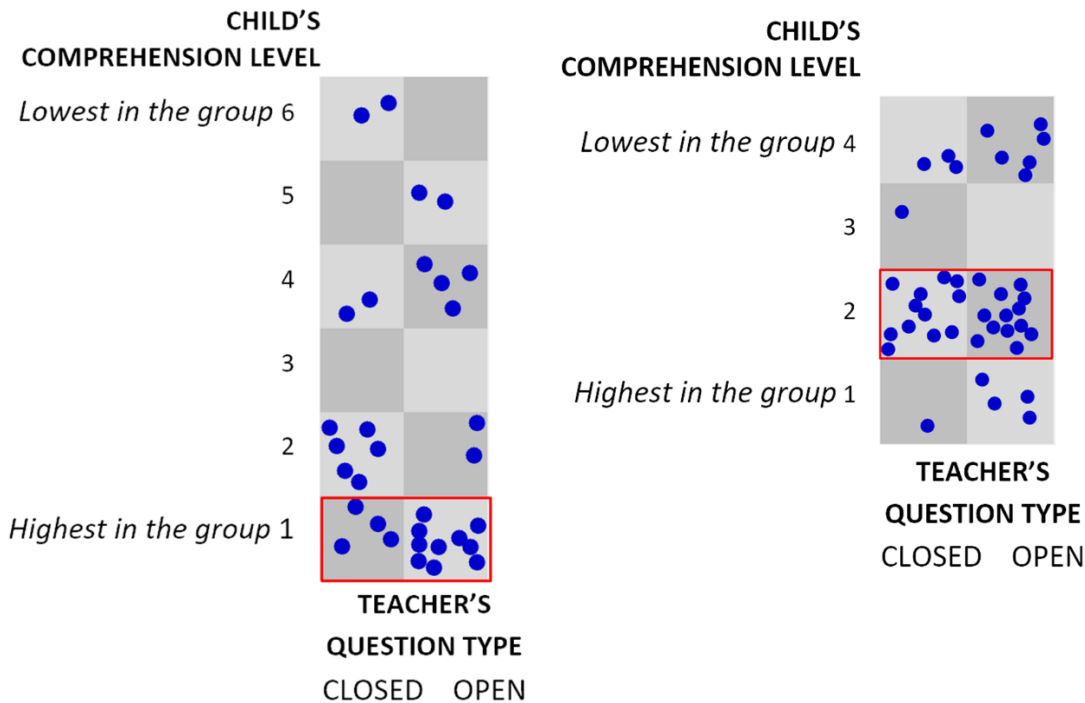

FIGURE 4   Questioning-answering interaction in Pirjo's story-group (left panel) and in Laura's story-group (right panel), **year 3, spring**

To further clarify the changes in participation patterns between year 2 and year 3 story groups, we computed dispersion measures. Dispersion for Pirjo's (0.924) and Laura's (0.968) story groups in year 2 reflect that there was more than one attractor child. However, this pattern changed somewhat during year 3 when one child tended to dominate in Pirjo's and Laura's story groups (dispersion 0.895 and 0.874, respectively). Since there were significantly more open than closed questions in those four SSGs (X^2 (132), p =0.024), we inspected the percentages of answered questions. Both children with higher (open = 60 %, closed = 40 %) lower (open = 59 %, closed = 41 %) comprehension level responded more to open than to closed questions.

Discussion

The present study was conducted in the context of 3-year long coaching on dialogic reading. The pedagogical model of 7-Minutes-to-Stories was further developed, and video-based group coaching along with scripted stories were used to support conversation before, during and after reading aloud. We examined developmental changes in story group practices, such as teachers' approaches and children's verbal participation. We also investigated the role of five-year-old children's story comprehension in the development of their verbal participation. Finally, we described the formation of children's participation patterns (i.e., attractor or repellor states) within four story groups led by two case teachers.

Our results lend support for the teachers' and children's responsiveness to dialogic reading and thus were in line with the hypothesis. In addition, as assumed, variability was also observed among the story groups in terms of giving opportunities for children's verbal participation. The total durations of verbal participation were longer for children with initially high story comprehension than for children with average or low story comprehension. State Space Grids (SSGs) analysis showed that children with higher story comprehension were attractors but not in all story groups. Children with the lowest story comprehension in group tend to be repellors in three out of four groups, that is, they participated less in conversations. These findings, especially those based on SSGs, are new in shared reading research on children with diverse story comprehension. The findings relate, on the one hand, to the challenge teachers face in narrowing the gap between children with higher and lower story comprehension (Hindman, Erhart, & Wasik, 2012). On the other hand, SSGs examples showed that also children with lower story comprehension can actively participate in conversation about the story. This was evidenced as their take up of both closed and open-ended questions. These findings also align with other intervention studies among preschoolers (Bianco et al., 2010; Wasik & Hindman, 2011) and older students (Kajamies, 2017; Turner et al., 2014). These studies point to the lesson learned from the present study, that is, the importance of long-term support for teachers in integrating new teaching practices into their own pedagogical approach to scaffold children's learning.

Responsiveness, development and variability of the story groups

Our results showed that, on average, two-thirds of time in story groups was spent on conversation with the children, whereas about one-third was used for reading aloud. Although, the change in teachers' questions was less evident across all story groups from fall to spring, the positive change in teachers' questions was observed in story groups

from year 2 to year 3. Hindman et al. (2019) observed teachers' storybook reading as they normally do in Head Start classrooms and reported slightly lower figures in teacher-initiated questions in sessions on average 10 min in length. In addition, their study showed that open questions were rare. Our results suggested that coaching and scripted examples supported teachers to use closed and open-ended questions. Other hypothesized indicator of teachers' and children's responsiveness was the time devoted to conversation with children. The results showed that it increased. The decreased variability in the time used for conversation indicates a more uniform approach to dialogic reading. But this trend was observed not until during year 3 among the five teachers and one assistant teacher. All of them participated in coaching across three years. Our findings suggest that changes in story groups were driven not only by the use of scripted stories and on-site video-based coaching, but also by children's increased participation in conversation.

Our findings about the teachers' change are partly in line with Pence et al. (2008) showing that preschool teachers are able to implement new practices with rather low amount of training given that they are concrete and scripted (e.g., open-ended questions). But our results add to this, because it took more than two years to achieve a more uniform reading interaction. Improving pedagogical processes in day care takes time because it presupposes changes not only in the opportunities given by teachers but also in the way teacher managed to support children's participation in conversation. The other factors that may also have supported the changes in story groups were the sustainability allowing to build trust in coach-teacher partnership and relational support from colleague teachers (Melasalmi & Husu, 2019). This kind of approach in which teachers themselves take the leading role in the reflection paves the way for change of their professional practices (Fenstermacher & Richardson, 1993). The implication regarding teacher education is that long-term, multifaceted and collegial or peer support are important to achieve sustainable dialogic orientation.

As assumed, we also noted variability in between the story groups and challenge to engage children in conversation. Namely, in one story group from year 2, the clear decrease in conversation happened because instead of inquiring children's perspectives the teacher guided the children to color the picture throughout the reading session. Why? This approach was based on the persistent peer interaction problems blocking children's ability to listen, as well as teacher's decreasing self-efficacy in promoting conversation. The teacher's reaction, coloring, fit well with literature on teaching (Kennedy, 2005): good intentions may be overridden by other more important concerns, such as well-being and maintaining the flow in activities. The challenges in peer relationships in this story group may reflect the importance of socio-emotional competence in reading interaction, such as allowing peers to answer, showing ability to wait and listen, and showing low

distractibility. From the teacher's point of view, a more positive emotional support would also have been needed because of its key role in encouraging young children's participation (Kajamies et al., 2016). Overall, observed variability between story groups is in line with the findings of comprehensive (Dickinson et al., 2011) and small-scale interventions (Girolametto et al., 2003). Also a large-scale study by Johander et al. (2020) on KiVa® antibullying program showed that some teachers may partially implement the intervention or use their own adaptations.

Children's story comprehension, verbal participation and teachers' questions

The results about significant increase of children's verbal participation, measured as frequencies, total durations and mean length of participation turns, were in line with our prediction. In addition, children with high initial story comprehension outperformed the children with average and low story comprehension in total duration of verbal participation. The results also showed that verbal participation turns were longer among high story comprehenders as compared to average story comprehenders. It should be noted that the children with low story comprehension were descriptively able to increase their verbal engagement when more opportunities were offered. These findings give indirect evidence about the growth of children's language production and story comprehension. Further studies however, are, needed to analyze whether longer verbal participation at the part of the children is also linked to a better narrative comprehension. This is important since Hindman et al. (2019) showed that the more children talked during reading-alouds the more their vocabulary developed. Also Collins (2016) showed the benefits of discussion, particularly those with high-cognitive demand, to preschoolers' story comprehension.

State space grids (SSGs) portrayed differences in verbal participation patterns, and more importantly the way child's story comprehension and teacher's questioning type shaped these participation patterns in four story groups guided by teacher or assistant teacher. Results indicated that verbal participation was less evenly distributed in year 3 story groups than in year 2 story groups. The attractors, that is, those who participated most, in the two story groups from year 3, were children with higher story comprehension. As an example, also reflecting Matthew effects in dialogic reading, was the story group by Pirjo from year 3. Unequal verbal participation did not hold for all four story groups. For instance, in Laura's story group, there was more than one attractor child. Additionally, one child with the lowest comprehension score participated in almost one-quarter of all question-answering interaction. The findings of children's verbal participation and SSGs analyses contribute to the previous research on dialogic reading in inclusive settings. Our findings indicate, on one hand, the benefits of increased opportunities to talk, but on the

other, the risk of widening the participation gap among children with low and high story comprehension. Further research is needed as, for instance, group size is likely to have an influence on children's responding rates. Also, further analysis about teachers' controlling and/or balancing strategies, such as calling on less active children to respond, is needed. Nevertheless, teacher's sensitive listening, emotionally supportive encouragement, and other hints, such as using pictures, may work as important scaffolds for participation among those children who fall behind more verbally proficient peers.

Finally, an interesting finding of the SSG analysis was that all children, regardless of story comprehension skill, answered more open-ended questions than closed. Thus, supporting professionals to ask more open-ended questions did not constrain verbal participation among children with lower story comprehension. This contrasts somewhat to findings which point that open questions may be not optimal for children with low language skills (Hindman et al., 2012; Zucker et al., 2010). This has also practical implications for teacher training. Teachers should learn sensitivity and flexibility when using different, also more challenging open-ended questions to scaffold children's story comprehension.

Limitations

The first set of limitations of this study is that our sample did neither include business-as-usual story groups nor a clear baseline observation before the start of coaching. Rather than evaluate the specific impact of 7-Minutes-of-Stories, the primary motive was to develop this model – together with teachers – to involve more conversation with children. Although results showed clear trend of increasing conversation with the children and the growth of children's verbal participation, attributing these changes only to coaching and materials used is not warranted. Because of low number of children and teachers our finding about teachers' and children's change should be interpreted with caution. A larger sample would also be needed to increase statistical power and to better explore the nested structure of the interaction patterns.

Second, we found changes in story reading practices and children's verbal participation, but we did not examine teachers' follow-up strategies, such as feedback and expanding the child's utterances. This is an important direction for future research among children with diverse story comprehension, as such positive feedback could impact children's story comprehension and contribute to the warmth and supportiveness of the environment. Third, our analysis of children's participation focused only on verbal participation and thus neglected children's ability to participate by listening or other meaningful ways, such as by thumps up, nodding, playing story events together or drawing. Finally, we did not take account for the role of the parental support in children's verbal participation. This is important since vocabulary is key in verbal participation and

inferential talk within dialogic reading by parents, especially when they are taught to refer both the plot of the story and its socio-cognitive themes, contribute to children's vocabulary and deeper story comprehension (Aram et al., 2013; Hindman et al., 2008; Collins, 2016).

Conclusions

The findings of the present study suggest that those early education teachers who were motivated to reflect on their shared book reading practices through video-assisted coaching and in that way collaboratively developed the 7-Minutes-to-Stories model over the three years were the ones who were successful in increasing conversation, open-ended questions and in promoting children's verbal participation. The findings also suggest that the diversity in teacher's education and experience, as well as in story groups are important when evaluating the implementation of a new working model. In fact, progress in conversation with children was seen not only in the story groups guided by teachers but also in the group guided by assistant teacher with long work experience but less formal education. This has implications for the beneficial role of teachers' and student teachers' prior experience in internalizing and implementing dialogical orientation in shared reading. Regarding verbal participation, our findings showed that the children with low and high initial comprehension skills benefited from the systematic use of a dialogic reading approach. Consequently, the results supported for the applicability of the 7-Minutes-to-Stories model in heterogeneous story groups. Finally, the state space grids showed how different patterns of children's verbal participation are not developed in a social or cognitive vacuum but rather interactively within each story group. Therefore, teachers and student teachers should be coached to pay attention on the complex teacher-child and peer interactions taking place in shared reading.

Acknowledgements

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Appendix: Example of the scripted-story

Before reading the 24th story**,** please, discuss the events of the previous story (the story about New Year's Eve and how the story ended. Mario Netti didn't get any sleep in the city, but *Pyry* came up with… **What *did Pyry* come up with**? (the idea that they should make a ski trip to the isle. Taking *Mario Netti* to the summer cottage to continue her hibernation.)

24th   story "In which there is a ski trip to the isle"

The picture of the story can be carefully examined at the start because there is an error in the beginning of the story when we look at the picture. **Listen carefully, what is said at the beginning is not true when looking at the picture.**

The story begins. From the shore, there was a road to the ice covering the sea. But Grandpa said we are going to leave the car on the shore anyway. It's always safer by skis. Grandma, Grandpa and Pyry skied. Pouta sat in the sled that Grandpa was pulling…

STOP HERE: giving the children time --- ***So as you look at the picture, what is not true?*** Possibly read again "Grandma, Grandpa… Pouta sat…"

Pyry had learnt to ski the winter before. But now he had to ski very carefully

(Why? Pyry had to ski carefully --- *give time for children's comments, give supportive recognition of children's comments)…*

Pyry had a bag on his back. In his bag was Mario Netti. That's why Pyry had to ski carefully.

Story continues. Luckily, it was a sunny day and there was no wind. The journey that felt long by boat was quite short by skiing. On the ice covering the sea, there was snow and a ski track lead straight to the isle.

Someone has skied here, Pyry thought.

(how did Pyry thought or inferred like this?)

"If telling the truth, I already skied here yesterday", Grandpa said, "I made sure that the ice is strong enough".

Grandpa had tied the string of the sled on his waist

(What does "on his waist" mean? *Here – show the children what "on his waist" means)*

Grandma had tucked Pouta under the blankets so that only her nose and eyes could be seen. "Are you sure we have Mario Netti with us?", Pouta asked Pyry.

Story continues…