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Interactive book-reading to improve inferencing abilities in kindergarten classrooms: A clinical project

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Abstract

Inferencing abilities are crucial to development of reading comprehension. However, few studies addressed those abilities in interventions promoting early literacy skills, especially in kindergartners.

The aim of this study was to measure the efficacy of an interactive book-reading intervention targeting inferencing abilities, delivered by a school-based speech-language pathologist (SLP) in whole group kindergarten classes.

Two hundred and forty-nine 5-year-old kindergartners from low socio-economic settings were quasi-randomly assigned to either one of the experimental groups (EG1 and EG2) or an active control group (CG). EG1 received a seven-week interactive book-reading intervention followed by a seven-week period where it was up to the teachers to implement aspects of the intervention in their teaching or not. EG2 received the seven-week interactive book-reading intervention only and the active control group received an initial workshop only. Three subtests targeting 1- causal inferences during book-reading 2- causal and 3- referential inferences in a formal task were performed at pre- and post-intervention assessments.

There was a significant Time x Group interaction effect for the first subtest indicating an advantage for EG1 compared to CG over time. EG2 appeared as an intermediary group as its results were not different from EG1 and showing only a trend toward significance ($p = 0.064$) when compared to CG. There was no significant Time x Group interaction effect for the second subtest. A significant Time x Group interaction effect was present for the third subtest, EG1 and EG2 showing larger improvement than CG.

The results suggested that the interactive book-reading intervention enhanced the inferencing abilities of 5-year-old kindergarten children more than what was expected from those in kindergarten classes without intervention. These findings contribute to the evidence on SLP involvement in Tier 1 intervention

Introduction

Inferencing skills are crucial to reading comprehension (Cain & Oakhill, 1999). In young children, these skills are directly related to subsequent reading comprehension development (Oakhill & Cain, 2012). Inferencing refers 'to the situation in which a reader (or listener) goes beyond information that is directly provided in a text to fill information needed to understand the text or to elaborate on the information given' (van Kleeck, 2008, p. 628). Four-year-old children can already engage in deep, active analysis of a text that goes beyond the explicitly-stated information (Florit, Roch, & Levorato, 2011); however, there are achievement gaps present at this age, especially in at-risk children, for example, those who have a language disorder or are from a low socio-economic setting (van Kleeck, 2008). Interventions targeting inference comprehension, for example, asking questions that promote the development of inferencing or adding extratextual comments, should be included in activities that promote emergent literacy skills as early as the preschool years (Florit, Roch, & Levorato, 2011; van Kleeck, 2008). However, preschool teachers need guidance to recognise and support the development of inferencing as a skill (Scheiner & Gorsetman, 2009). For instance, when asked to generate questions for use during storybook reading time, teachers only submitted one out of four questions that required the children to make an inference, suggesting that teachers are not maximally utilising interactive storybook reading time as an opportunity to include inferential questions that would support the development of inferencing. Moreover, teachers seldom use the natural context of storybook reading to support inferencing; mostly, they simply read the words in the book, adding extra-textual comments that primarily address literal story elements or illustrations (Zucker et al., 2013).

Activities that promote inferencing in the preschool years could prevent the 'fourth-grade slump', which is a phenomenon whereby children who, despite having had a good start in the early school years, experience late-emerging reading difficulties, including reading comprehension difficulties (Leach, Scarborough, & Rescola, 2003). Waiting until Grade 3 to intervene with regard to inferencing would be too late to stave off this slump (van Kleeck, 2008). Given that Elleman's (2017) recent meta-analysis on inference instruction reported an absence of studies that were conducted with children under Grade 2, this article aims to fill a gap in the literature by reporting on a clinical project that aims to support inferencing development in 5-year-old kindergartners.

Inferential abilities

While several types of inference have been identified in theoretical pragmatics and linguistics (e.g. Ducrot, 1972), specific types of inferencing may be important to target in young children in order to facilitate sound reading comprehension. Text-based inferences ensure the internal coherence of a text (e.g. Van Dijk & Kintsch, 1983). Instead, a failure in their resolution will cause a comprehension breakdown. More specifically, causal inference – that is, understanding a causal link between two events, one being the cause and one being the effect – and referential inferences, which are also called anaphora and refer to understanding the link between a word, like a pronoun, or an expression and its referent, are essential processes for comprehending a text (Lefebvre, Bruneau, & Desmarais, 2012). By comparison, elaborative inferences (e.g. generating predictions) enrich comprehension but are not essential to it (Reder, 1980). For this reason, causal and referential inferences were targeted in this project. Preschoolers need to make these inferences in order to understand the causal chain of events in a story during reading

comprehension (van Kleeck, 2008). In the interactive book-reading context, van Kleeck (2008) suggested that the adult generates the inferencing that is needed to understand the story and engages the children in discussion about the text.

By the ages of 4 and 5, most children produce descriptive narratives without expressing the causal inferences that link a character's internal state to a cause or consequence (Veneziano & Hudelot, 2009); however, by 6 and 7 years of age, children are already demonstrating their ability to infer how a character's internal state can be either the cause or the consequence of that character's behaviour or of an event. Taken together, these results point to an important period in the development of inference comprehension between 5 and 6 years of age (Veneziano & Hudelot, 2009). Similarly, Filliatrault-Veuilleux et al. (2016) described children between 3 and 6 years old significantly improving the quality of their responses to inferential questions while reading a story. Children aged 5 and 6 years old differed from younger children in that regard, suggesting that some inference skill development takes place between 3 and 5 years old. This information about inferencing skill development suggests that around age 5 could be an optimal time to offer an intervention targeting these skills because, since children have enough comprehension to benefit from it, such an intervention could enhance this important inferencing skill development period and support children who are having difficulty.

Best practices for enhancing inferential abilities

In Elleman's (2017) meta-analysis on inference instructions, almost half of the studies used explicit teaching techniques, which are defined as 'a model for teaching in which the teacher directly models the skill, guides the students through the acquisition of

the new skill by providing decreasing level of support as they gain proficiency, and then encourages students to internalise the strategy through practicing the skills independently' (p. 766). Previous findings have stipulated that explicit instruction is more efficient in promoting emergent literacy skills – for example, phonological awareness, alphabet knowledge, and vocabulary – than implicit teaching (Bianco et al., 2010; Justice et al., 2003; Justice, Meier, & Walpole, 2005).

Interactive book-reading relies on the interaction between an adult and a child or a group of children while reading and aims to support abilities that promote reading development (Hawken, 2009). The interaction occurs when the adult invites the child or children to participate in a discussion based on the text by making comments or asking questions (Girolametto, Weitzman, Lefebvre, & Greenberg, 2007), hence the children assume a more active storytelling role rather than exclusively occupying the role of a passive listener (NELP, 2008). Interactive book-reading has been shown to exert a positive effect in terms of fostering emergent literacy skills, such as phonological awareness (Lefebvre, Trudeau, & Sutton, 2011) and vocabulary comprehension (e.g. Coyne, McCoach, Loftus, Zipoli, & Kapp, 2009; Gonzalez et al., 2014; Justice, Meier, & Walpole, 2005), creating a relevant context for supporting the development of causal inference-making in children (Maskidi & Boisclair, 2006). Van Kleeck's (2008) suggestion of using book-reading to embed questions that rely on inferencing corroborates the *embedded–explicit model of emergent literacy intervention* (Justice & Kadevarek, 2004), which supports the use of adult-led embedded–explicit instruction within naturalistic, highly-contextualised, meaningful exposure to print. The adult can 'think aloud', thus making

his/her inferencing process as an expert reader explicit (van Kleeck, 2008) by modelling it before questioning the children (Lefebvre, Bruneau, & Desmarais, 2012).

Scaffolding is also an effective means of enhancing narrative comprehension (Pesco & Gagné, 2017). It is a dynamic process that helps students accomplish tasks that they otherwise could not perform alone (Wood, Bruner, & Ross, 1976) and is characterised by the following three key components: 1) fine adjustment of the support level, contingent on student response; 2) a gradual fading away of support; and 3) a transfer of the responsibility for task achievement to the student (Van de Pol, Volman, & Benhuizen, 2010). Dialoguing with the children should occur, preferably, during rather than after reading, so that causal relationships can be made more explicit (Maskidi & Boisclair, 2006).

Taking the current knowledge on best practices and the constraints of clinical practice in educational settings into consideration, it seems that adopting a reason-based intervention approach would be a relevant strategy for optimising the implementation of language enhancement interventions (Archibald, 2017). A reason-based approach is indicated when theoretical links exist between practice- and research-based evidence, while direct evidence of this practice is lacking or absent (Stanovich & Stanovich, 2003). Dawes, Leitão, Claessen, and Kane (2019) reported evidence of improved inference comprehension in 5- and 6-year-olds with developmental language disorders following a book-sharing intervention that was delivered by speech language pathologists (SLPs) in a small group, language centre setting.

Speech-language pathologists' involvement in Tier 1 intervention

In models like *Response to Intervention* (RTI) (e.g. Murawski & Hugues, 2009), school-based SLPs are expected to be involved not only in the evaluation and treatment of students who are identified as having communication needs, but also to collaborate closely with teachers towards the overarching goal of offering high-quality teaching that meets all learners' needs (Ebbels et al., 2019; Horn & Banerjee, 2009). Unfortunately, SLPs' potential contribution to Tiers 1 and 2 is not as developed as it could be in the RTI literature (Sampson Graner, Faggella-Luby, & Fritschmann, 2005) and more research needs to be done to expand the research-based evidence on that matter (Ebbels et al., 2019; Law et al., 2012). Given their expertise in language development and the essential language skills that underlie reading proficiency, SLPs have an indispensable participatory role to play in all tiers of intervention towards the overarching goal of preventing reading difficulties (Justice & Kadevarek, 2004). In Tier 1 intervention in particular, one field that has to be developed is SLPs' involvement in training teachers to implement language-enhancing practices.

Recent work in teachers' professional development (PD) regarding emergent literacy supports the importance of including coaching, as its inclusion would be more effective for implementing changes in practices (Egert, Fukkink, & Eckhardt, 2018; Kraft, Blazar, Hogan, 2018; Markussen-Brown, Juhl, Piasta, Bleses, Højen, & Justice, 2017). However, Cunningham, Zibulsky, and Callahan (2009) raised the question of teachers' disciplinary knowledge (or lack thereof) with regard to the development of emergent literacy skills. They reported that teachers tend to overestimate what they know, possibly impeding their desire to develop new knowledge, like being engaged in a PD program. Based on this suggestion, modelling, where trainees observe an expert performing the target behaviour in an ecological context, by SLPs in classrooms could be an interesting,

non-threatening way for teachers to explore new pedagogical approaches. For instance, Korth, Sharp, and Culatta (2010) described how three teachers changed some aspects of their teaching regarding literacy after an SLP visited their classrooms to demonstrate an intensive, supplemental, classroom-based literacy programme.

Alongside modelling, other PD modalities should be provided. Markussen-Brown et al. (2017) suggested that PD programmes featuring many components would be more effective than those featuring fewer components. Coaching is one of the most frequently used PD modalities (Schachter, 2015) and, although its definition can vary from one study to another, its core component is a cycle in which an expert observes a trainee, with the expert providing feedback afterwards and setting goals for improvement. Neuman and Wright (2010) included modelling in the coaching offered in their study. However, self-reports from coaches indicated that few sessions were actually devoted to modelling new strategies, like in co-teaching activities or the modelling of new instructional strategies. Consequently, coaching was closer to the usual process, including goal setting with teachers and the enhancement of their reflection, as well as observing teachers in classrooms and providing feedback. Coaches seemed to guide the teachers rather than participating directly in classroom interaction. To the best of our knowledge, little evidence is available about the use of modelling as a stand-alone PD modality.

Thus far, PD programmes face a challenge with respect to helping teachers enrich their language development strategies (Girolametto, Weitzman, Lefebvre, & Greenberg, 2007; Milburn, Girolametto, Weitzman, & Greenberg, 2014; Piasta et al., 2012; Rezzonico et al., 2015). Further research is needed to explore how SLPs can support teachers in providing communicative- and language-rich environments that promote inferencing in

preschool children. In school settings, SLPs have more opportunities to support teachers by modelling language-enhancing practices as opposed to engaging in a time-consuming, expensive cycle of coaching. More information on the impact of modelling as a stand-alone PD modality – and not merely as an optional feature of coaching – would be clinically relevant to developing Tier 1 SLP interventions.

The present study

Given the limited information that is available in the literature concerning the efficacy of interventions targeting inferencing in young children, the present study aims to measure the impact of an interactive book-reading intervention using the key features highlighted in the literature (i.e. explicit instruction and scaffolding strategies). The present interactive book-reading intervention aims to improve causal and referential inference abilities in 5-year-old kindergarteners. The second goal is to estimate the added value of supporting preschool teachers with different PD modalities (e.g. SLP modelling in class and workshops). We measured the effect of this intervention on the following three groups of children:

1) The first group of children received a 7-week SLP-delivered interactive book-reading intervention, followed by 7 additional weeks of instruction from teachers who had been trained through different PD modalities.

2) The second group received 7 weeks of regular instruction from teachers who had participated only in an initial workshop on interactive book-reading, followed by an additional 7 weeks of an SLP-delivered interactive book-reading intervention.

3) The third group received 14 weeks of regular instruction from teachers who had participated only in an initial workshop on interactive book-reading.

Therefore, our research questions are as follows.

Will the effect of the three types of interventions be different in terms of their ability to improve:

a) causal inferencing on a proximal measure,

b) causal inferencing on a distal measure, and

c) referential inferencing on a distal measure.

We hypothesise that the effect on the three measures will be greatest for the group that received SLP-delivered interactive book-reading followed by instruction from trained teachers. It is expected that the effect would be weakened in the group that received regular instruction followed by an SLP-delivered interactive book-reading intervention, and weakest in the group that received regular instruction only.

Method

Context

This study originates from a clinical project in which four SLPs developed an interactive book-reading intervention. It was conducted during the period 2016–2017 at the Val-des-Cerfs School Service Centre in Québec, Canada subsequent to a governmental policy legislating additional resources to support reading and writing skills in children from low socio-economic settings. One SLP who was involved (the first author of this paper) sought approval from the school service centre and an ethics committee to pursue data analysis beyond the initial clinical scope of the project. The Ethics Committee of the Centre for Interdisciplinary Research in the Rehabilitation of Greater Montreal (CRIR) approved the project and the consent forms.

Participants

The clinical project took place in 12 schools, encompassing 36 kindergarten classes (in which all the children would be 5 years old by October 1st) and two junior kindergarten classes (in which all the children would be 4 years old by October 1st). The only inclusion criterion was that the child's parents had signed the school service centre's consent form allowing an SLP to meet with the child outside the classroom to conduct assessments. Although no other data were gathered about the children, some teachers spontaneously provided information at the pre-intervention assessment (see Table 1). All children were from schools with low socio-economic indexes according to the Québec provincial system; this classification is based on maternal education and the parental employment situation (Ministère de l'Éducation et de l'Enseignement Supérieur, 2018). As an indication of language background, 94% of the population in the area that the school service centre covers communicate using French as their first language (Statistique Canada, 2017).

Table 1 presents the participants. The Tier 1 SLP-delivered interactive book-reading intervention was offered to all children in all 38 classes, to a total of 667 children. Given the limited resources that were available for this clinical project, only a certain number of children could be tested in the appropriate timeframe. Thus, depending on the schools' logistics (e.g. schedule and the number of classes per school), 40% to 50% of the total number of children in each class was randomly selected for the assessment (n = 342) from among those whose parents had signed the school service centre's consent form. This proportion was chosen to allow for the possibility of drawing some general observations in each class to obtain specific information from each group and to ensure that a sufficient number of children would complete the post-intervention assessment in light of the

potential for absences and withdrawals. Due to a school closure because of a snowstorm, the children from one school (two classes) could not participate in the post-intervention assessment. Consequently, the clinical data consist of children from 36 classes distributed across 11 schools (i.e. 34 kindergarten classes and two junior kindergarten classes). Table 1 presents all the exclusionary data that pertain to the group, numbering 303 children, that was retained for the clinical project. Lastly, research consent forms were sent to the parents of the 303 children at the end of the schoolyear, seeking their permission to include their children's data in supplemental analyses for the research project. Two hundred and forty-nine consent forms were returned with approval, and these determined the final sample for the current study.

Table 1
Participants included in the study

Steps of the project	Number of children
Total children in the 38 classes deserved by the clinical project	**667**
Total of children assessed	**342**
Excluded:	
Incomplete assessment[1]	-10
Technical problem[2]	-5
Absent at the post-intervention assessment	-9
Schools closed because of a snowstorm forced the cancelation of post-intervention assessment.	-12
Did not master French sufficiently[3]	-2
Important visual impairment prevented looking at pictures[4]	-1
Research consent forms sent to the parents of the children included in the clinical project.	**303**
Consent form returned with an approval	**249**

[1]Because of one or more questions forgotten by the examiner
[2]Because the audio recording failed.
[3]Based on the information spontaneously provided by the teacher. An English-speaking child for whom the kindergarten class was the first exposition to French was excluded.
[4]Based on the information spontaneously provided by the teacher.

Design, group description, and procedures

An experimental design with an active control group (CG) and two experimental groups (EG1 and EG2) was used. The 12 schools were clustered in three groups according to their geographical location. Each cluster was randomly assigned to one of the three conditions. EG1 received a 7-week SLP-delivered whole-class interactive book-reading intervention from October to December, and EG2 received it from December to February. Each session lasted 30 minutes and took place at a frequency of three times per week.

Four SLPs assessed children from the three different groups (EG1, EG2, and the CG) during the pre-intervention phase in October, while two SLPs assessed the children during the post-intervention phase in February. The latter two SLPs were not the same SLPs who delivered the in-class intervention. The assessment was conducted in a quiet location, where no other children were present. It was audio-recorded, and the children's responses were transcribed verbatim. At the time of the post-test, the children in EG1 had received a 7-week SLP-delivered interactive book-reading intervention, followed by 7 weeks of instruction from trained teachers. Meanwhile, the children in EG2 had received 7 weeks of regular instruction, followed by a 7-week SLP-delivered interactive book-reading intervention. Finally, the children in the CG had received regular instruction only, and the interactive book-reading intervention was delivered by an SLP after the post-test. For EG1, the post-test measured the impact of the interactive book-reading intervention as well as the impact produced as a result of eventual changes in teachers' practices. For EG2, only the effect of the interactive book-reading intervention was measured, as any eventual changes in teachers' practices could only be implemented afterwards. Figure 1 presents the project timeline.

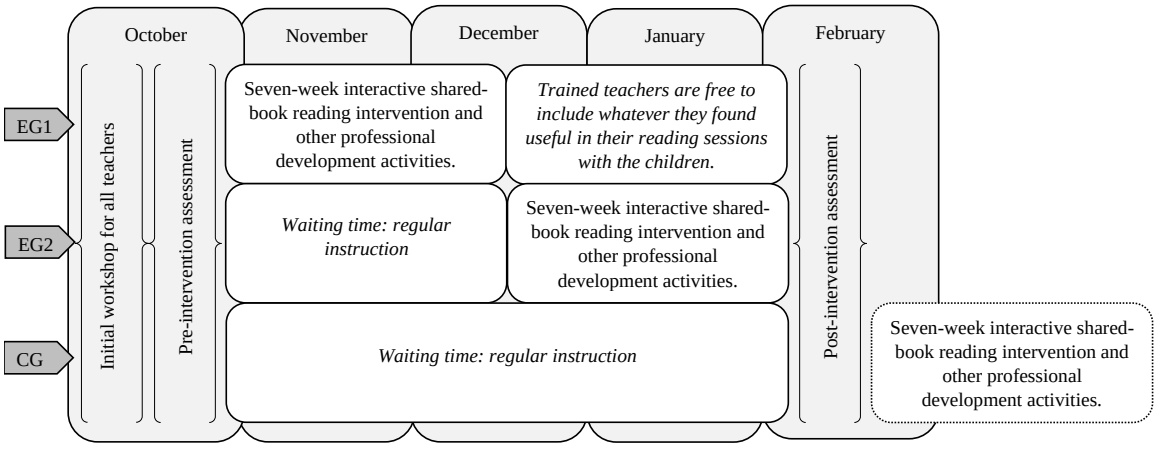

Figure 1. *Timeline of the project*

Table 2 presents the composition of the groups. No group differences were observed with respect to sex ($\chi^2(2) = 0.62$, $p = .970$) and age (T1: F (2,246) = 0.653, $p = .521$; T2: $F(2,246) = 1.081$, $p = .341$).

Table 2
Composition of each group

Characteristics	Experimental group 1	Experimental group 2	Control group
Total of children	89	101	59
Sex:			
Girl	42	49	29
Boy	47	52	30
Age in months at pre-intervention: *M (SD)*	65.57(4.16)	65.85(3.77)	66.36(4.48)
School grade:			
Kindergarten	86	101	57
Kindergarten for four-year-old children	3	0	2
Number of schools	4	3	4
Number of classrooms	12	12	12

Note: M : Mean; SD : Standard deviation.

Intervention

Two SLPs delivered the intervention. Both have worked as school-based SLPs since becoming certified 4 years prior to the project. They participated in a 2-day continuing education workshop on interactive book-reading, which covered possible language targets as focal points as well as explicit teaching strategies (Lefebvre, 2016). Their random assignment to classes in each condition controlled for the instructor effect. In order to further ensure that the SLPs delivered the intervention in the same manner, they coached each other while performing interactive book-reading sessions over 4 days (12 sessions each).

In each book, three causal inferences and one referential inference were targeted. In this project, causal inferences encompassed inferences in which the cause and the consequence are either two events or an event and a character's internal state. Only pronouns in the third-person singular (he/she, *il/elle*) or the third-person plural (they, *ils/elles*) were used for the referential inferences. Secondary targets consisted of one print-awareness concept and three novel vocabulary words. The time allocated for the session was therefore shared between reading the book and providing stimulation in line with the stated targets.

The interactive book-reading intervention was rooted in the best practices that were described in the Introduction. Multiple and progressive strategies were used, as proposed by Lefebvre, Bruneau, and Desmarais (2012). In the first reading of a book, the SLP modelled the targeted inferences. For example, in the book *Flora Veut un Chien (Flora Wants a Dog)* (Swerts & Van Lindenhiuzen, 2016), Flora finds a dog that she is allowed to keep until the owner shows up. Later in the story, she discovers posters of her dog in the

village. The posters consist of a picture of the dog, the caption 'Dog Found', and a phone number. Flora subsequently starts to draw on the posters, changing the digits of the phone number. The SLP could model a causal inference by commenting as follows: 'I think that Flora adds glasses to the picture of the dog on the posters her parents put in the village and she changes the digits in the phone number because she doesn't want the owner to recognise his dog and call her parents. She doesn't want the owner to come to her house and take back the dog. She wants to keep the dog for herself.' For a referential inference, the SLP could make this comment: '*She* is a little word that disguises itself in different characters. Like here: "*She discovers something hairy."* To know who "*she"* is, we have to listen to who we talked about just before. Let's listen together. Just before, we read "*Mom enters the room",* so we are talking about the mom. When we say, "*She discovers something hairy",* it is as though we said, "Mom discovers something hairy."'

In the second reading, the SLP made intentional mistakes for each target and asked the children to raise their hand if they noticed that she said something wrong. The following statements illustrate an example of the SLP's intentional mistakes, first for the causal inference and then for the referential inference: 'I think she is drawing on the posters because she wants to write birthday cards' and 'I think that "she", here, means the little mermaid'. In the third reading, each pupil 'read' the story with the SLP as a mini-teacher. She asked the children to explain modelled inferences ('Can you explain to your friends why Flora drew on the posters?' or 'Who is "she" here? How do you know that?') as well as non-modelled ones to get a sense of their learning generalisation.

The seven books that were read (see Appendix 1) were chosen for their lengths as well their vivid, attractive illustrations. Careful attention was paid to the potential for

inferences as well as to the vocabulary, so that the book would present an appropriate challenge for 5-year-olds. The books were available at the school service centre's central library, which meant that teachers could use them in subsequent years. The SLPs asked the teachers not to read those books in class until the start of the interactive book-reading intervention.

PD modalities

In October, all the teachers participated in an initial 3-hour workshop that was divided into three parts. During the first part, the SLPs presented on the definition of interactive book-reading and the project's targets. They also explained the rationale for using this approach in low socio-economic settings. The second part consisted of a demonstration featuring a book that would be used during the upcoming modelling phase. The SLPs provided examples of questions that the children would be asked. During the last part, each team from each school constructed its own schedule within the time slot that was attributed to their school for the year. Within this time slot, the SLPs acted as models for the teachers during the interactive book-reading sessions. No specific indication was given to the teachers with respect to how they should apply the workshop's content in their instruction; the SLPs neither advised the teachers to implement what they had learned right away nor did they specify that the teachers should wait until the SLPs visited their classes. How and when to implement the strategies learnt during the workshop was therefore left to the individual teachers' judgment. Note that the CG underwent the modelling phase after the post-intervention assessment (see Figure 1).

During the modelling phase, teachers from both EG1 and EG2 received support through diverse PD modalities. Around the fourth week of the intervention, the SLP offered

a 1-day (or, very rarely, a half-day) planning workshop for groups of three to eight teachers at a time. The first half of this workshop consisted of a review of the underlying theory of the approach, for example, regarding the different types of inferences and their importance to the subsequent development of reading comprehension skills. This information was linked to concrete examples from the interactive book-reading sessions in the teachers' classrooms, creating many opportunities for discussion among the teachers. The second part was dedicated to planning interactive book-reading sessions with the teachers. They brought their favourite books to read to their students and, either in pairs or alone, they planned one or two interactive book-reading sessions around those books. The SLP circulated among the pairs/individual teachers, offering support, for example, on how to recognise inferences and choose targets. The teachers would be free to use the books to implement interactive book-reading in their own teaching after the end of the intervention. In addition, the teachers gained access to an online practice community once the modelling phase started in their classes; they also had the benefit of short individual meetings with the SLP. These meetings took place on a daily or weekly basis, depending on the way the school was organised. Furthermore, meetings could be held at regular intervals or their frequency could decrease over the course of the intervention, depending on the teachers' needs. Finally, it is important to note that during the modelling phase, SLP book-reading replaced the book-readings that the teachers normally did. Moreover, after the modelling phase had been completed, the SLPs informed the teachers that they were free to implement anything they felt would be useful in their teaching; in other words, the SLPs made no specific 'prescription' for what should be implemented.

Outcome measures

At the beginning of the clinical project, there was no available outcome measurement tool that was appropriate for the context of the study; therefore, the SLPs adapted three subtests from the *Outil d'Evaluation de l'Habileté des Elèves du Préscolaire à Faire des Inférences* (free translation: *Evaluation Tools of Inference Abilities in Preschool Pupils*) (Dupin de Saint-André, Montésinos-Gelet, & Morin, 2008). The first subtest was based on the book *Le Monstre Poilu* (B-MP) (Bichonnier, 1982) in which five questions posed during book-reading require making causal inferences (the sixth question was removed because it required making a prediction). An example of a question in this subtest is 'Why did the monster tie up the king?' (free translation). Based on previous work by Filiatrault-Veilleux, Desmarais, Bouchard, Trudeau, and Leblond (2016, p. 153), the following four categories of answers were defined: *Expected*, 3 points: 'corresponding entirely to the target'; *Acceptable*, 2 points: 'logical but incomplete or lacking precision'; *Ambiguous*, 1 point: 'too vague or not directly related to what is expected'; and *Inadequate*, 0 points: 'lack of response or wrong answer'. A maximum of 15 points can be granted for this subtest. Based on Dupin de Saint-André's suggestions (personal communication, 2016), the book's text was adapted to the French that is spoken in Québec.

The second and third subtests, targeting causal (CI) and referential inferences (RI), respectively, consisted of ten questions, with an increasing level of difficulty, that are to be posed orally only and in riddle form. An example of a CI subtest question is 'Bob is afraid of the dark. His mother always leaves a lamp on in the hallway at night-time. Why does Bob's mother leave a lamp on?' (free translation). An example of an RI subtest question is

'Judy and Paul are playing on the street because the weather is very nice. They are having a lot of fun, but she needs to go home because it is getting late. Who needs to go home?' (free translation). Filiatrault-Veilleux et al.'s (2016) scoring system was adapted as follows to better suit these items. The responses were either *Expected* (1 point), *Incomplete* (0,5 points), or *Inadequate* (0 points). Since we wanted to keep the assessment short for each child, the examiners assessed the children by alternating between the odd- and even-numbered series of questions; therefore, each subtest consisted of five items, with a maximum of five points per subtest. Given that we could not confirm whether the series of questions were equivalent at the beginning of the project, each child answered the same series of questions in both the pre- and post-intervention assessments.

The answers provided in the test manual (n = 35) were automatically considered to be *expected* answers. All the other answers were submitted to a consensus procedure for rating. After having assessed half of the children in the pre-test, the responses that were not in the manual were transcribed and rated individually by four SLPs. If three (n = 51; 35%) or four (n = 67; 46%) of the SLPs agreed on the score, the score was deemed reliable. If only two out of the four SLPs agreed (n = 28; 19%), they all discussed how they had arrived at their respective scores and worked together to establish a final score. Afterwards, additional new responses (n = 105) were discussed between two SLPs who, based on the group coding session discussions, attributed a consensual score, thus completing the final grid of codification.

The B-MP subtest is a proximal measure, as it represents the closest context to the intervention. The CI and RI subtests are distal measures since they were performed in the oral modality only. The common guidelines established by the SLPs for task administration

were to avoid providing feedback on the child's performance, restrict comments to his/her participation, and encourage him/her to continue with the task. During the B-MP, the SLPs eschewed theatrical character voices for a neutral, albeit not monotonous, tone. Furthermore, the example questions that were provided for the RI and CI subtests, respectively, were administered to the children. In this case, if a child failed to respond correctly, the SLP provided the correct answer along with an explanation.

Inter-rater reliability.

A school-based SLP who was not involved in developing the measurement tools and was also blind to the time of the test as well as to the group condition rated the responses of 60 children (24% of the data) to each item of each subtest. The procedure yielded 90.33% agreement for the B-MP subtest, 89.67% agreement for the CI subtest, and 99.00% agreement for the RI subtest. Since the scoring was numerical, Pearson's R was computed for the three measures, indicating a strong correlation between the two coders (B-MP: $r = .946$, $p < .01$; CI: $r = .891$, $p < .001$; RI: $r = .968$, $p < .01$).

Analysis

The data were analysed using the mixed-effect methods. Models were fitted and assessed with the *lmerTest* package (Kuznetsova, Brockhoff, & Christensen, 2017), using R software (R Development Core Team, 2018). The *MuMIn* package (Barton, 2019) was used to compute conditional (considering only the fixed effects) and marginal (including random factors and fixed effects) coefficients of determination (pseudo-R^2) (Nakagawa & Schielzeth, 2013). Three linear models were fitted to assess the main effects of sex, age (measured in months at pre-intervention), group (i.e. EG1, EG2, and CG), and time (i.e. pre- and post-test) and the interaction between group and time on the three subtests. The

base models included the pre-test and the CG as the intercept. The first model analysed the results on the proximal subtest (B-MP). The second and third models analysed the CI and RI subtests. In the second and third models, the set of items (i.e. even vs. odd items) was included as a control fixed effect because some of the children responded to the even-numbered set of items from Dupin de Saint-André et al.'s (2008) original test, while the other half responded to the odd-numbered set of items. The participants and the schools were introduced into the model as random factors (a random intercept). For the sake of clarity, the results are summarised in ANOVA-like tables that were computed according to Satterthwaite's method (using the *lmerTest* package) (Kuznetsova et al., 2017).

The residuals of the three fitted models were analysed using the *ggplot 2* package (Wickham, 2016). In the three cases, the residuals appeared as homoscedastic and followed a normal distribution.

Results

Le Monstre Poilu book subtest

The best-fit model indicated a significant main effect of time (i.e. the post-test scores were higher than the pre-test scores) and a significant contribution of the time*group interaction (see Table 3). The participants constituted the only significant random effect (*Variance*: 5.77 (2.40), $p < .001$). The time*group interaction was significant when comparing EG1 with the CG (*Estimate* = 1.20 (0.48) $t(249) = 2.531$, $p = .012$); meanwhile, the difference between EG2 and the CG only approached the conventional level of statistical significance (*Estimate* = 0.86 (0.46), $t(249) = 1.857$, $p = .064$). The marginal pseudo-R^2 for the model was .01, while the conditional pseudo-R^2 was .63, indicating that the fixed factors exerted a small effect. As visualised in Figure 2, the EG2 children

exhibited a greater increase in their scores compared to their peers in the CG. Note that a score of 0 means that there were no changes between pre- and post-intervention. A subsequent model included EG1 and the pre-test, since the intercept indicated that there was no difference between EG1 and EG2. The scores at pre- and post-intervention are presented in Table 4.

Table 3

Type III Analyses of Variance with Satterthwaite's method

		Sum of Squares	Mean of Squares	Degrees of Freedom in the numerator	Degrees of Freedom in the denominator	F-value	p-value
Book Monstre Poilu							
	Group	7.5	3.75	2	249	0.939	0.392
	Time	407.3	407.3	1	249	101.928	<0.001
	Group: Time	26.17	13.09	2	249	3.275	0.039
Causal inferences							
	Set	25.5026	25.5026	1	249	63.7097	<0.001
	Group	3.7633	1.8816	2	249	4.7007	0.01
	Time	28.5677	28.5677	1	249	71.3667	<0.001
	Group: Time	0.0747	0.0373	2	249	0.0933	0.91098
Referential inferences							
	Set	17.32	17.32	1	249	21.8489	<0.001
	Group	8.906	4.453	2	249	5.6176	0.004
	Time	58.254	58.254	1	249	73.4883	<0.001
	Group: Time	12.389	6.194	2	249	7.8144	<0.001

Notes: Number of observations: 498, Participants: 249

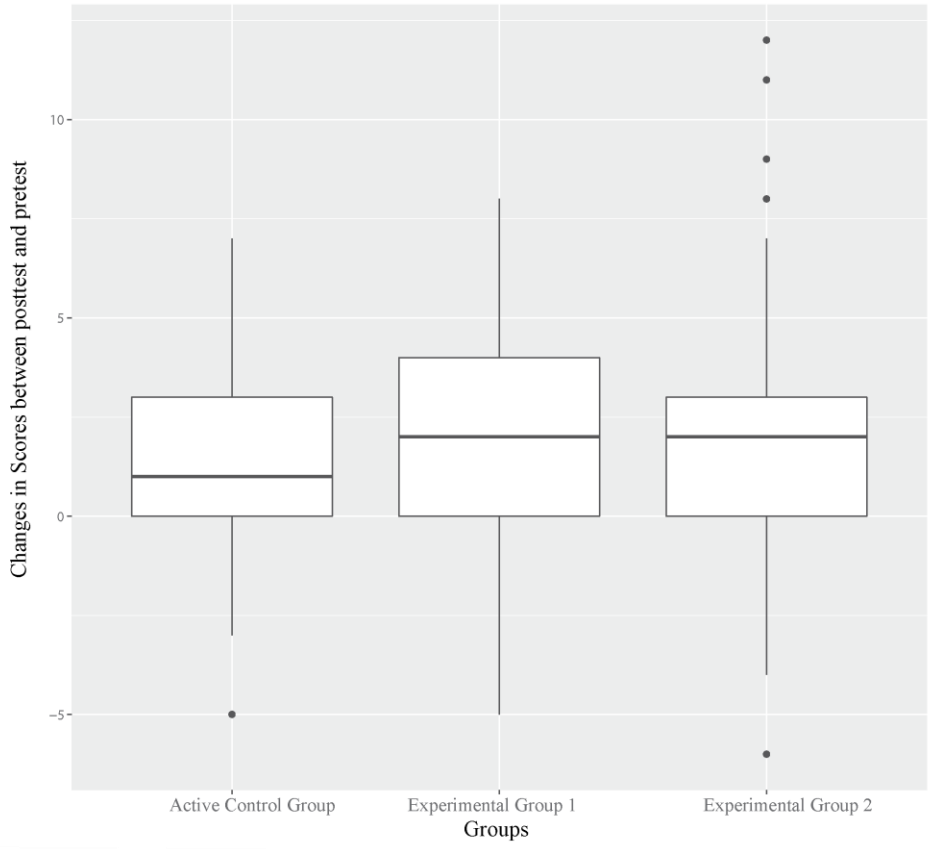

Figure 2. Boxplot representing the changes in scores between pre- and post-intervention assessment for the Book Monstre Poilu subtest
Legend: Score of 0 means there were no changes between pre- and post-intervention

Table 4
Scores to the subtests

	Pre-intervention		Post-intervention		Total	
	M	SD	M	SD	M	SD
Monstre Poilu subtest						
CG	1.22	1.18	1.45	1.19	1.33	1.19
EG1	1.14	1.16	1.61	1.18	1.38	1.19
EG2	1.25	1.17	1.66	1.16	1.45	1.18
Total	1.20	1.17	1.59	1.17	1.40	1.19
Causal inferences subtest						
CG	2.64	1.05	3.09	0.88	2.86	0.99
EG1	2.63	1.15	3.16	0.98	2.90	1.10
EG2	3.00	1.15	3.49	0.99	3.24	1.10
Odd items	3.27	1.00	3.67	0.96	3.47	1.00
Even items	2.32	1.06	2.90	0.83	2.61	1.00
Total	2.78	1.13	3.28	0.98	3.03	1.09
Referential inferences subtest						
CG	2.23	1.02	2.48	1.01	2.36	1.02
EG1	1.66	1.20	2.75	1.12	2.21	1.28
EG2	2.25	1.29	3.01	1.15	2.63	1.27
Odd items	1.73	1.05	2.55	0.99	2.14	1.10
Even items	2.32	1.31	3.03	1.19	2.68	1.30
Total	2.04	1.23	2.80	1.12	2.42	1.23

Note: M : Mean; SD : Standard deviation.

The causal inferences subtest

The best-fit indicated significant main effects of the set items (the scores on the odd-numbered items were higher than those on the even-numbered items), time (i.e. the post-test scores were higher than the pre-test scores), and group (i.e. EG2 started with a higher average score than the other two groups). The time*group interaction did not appear

to be a significant contributor (see Table 3). The participants constituted the only significant random effect (*Variance*: 0.50(0.70), $p < .001$). The marginal pseudo-R^2 for the model was .23, while the conditional pseudo-R^2 was .66, indicating that the fixed factors exerted a moderate effect. As visualised in Figure 3, the EG1 and EG2 children exhibited a similar increase in their causal inference subtest scores relative to their peers in the CG. The scores at pre- and post-intervention are presented in Table 4.

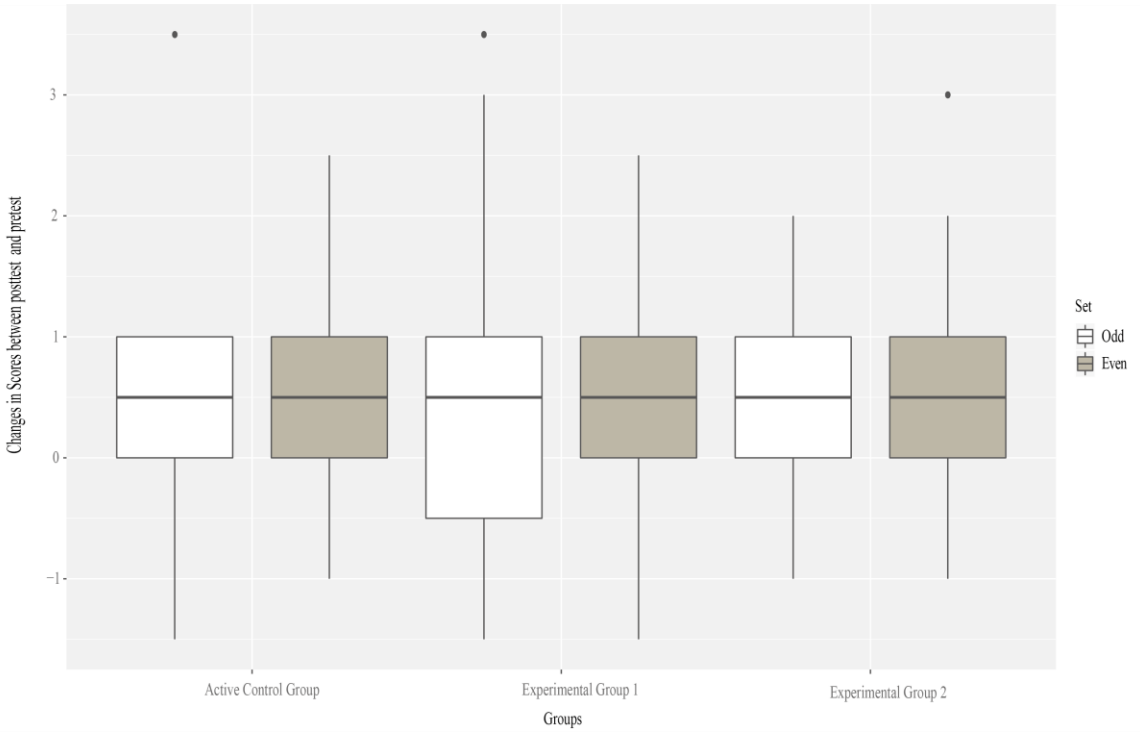

Figure 3. Boxplot representing the changes in scores between pre- and post-intervention assessment for the Causal inferences subtest
Legend: Score of 0 means there were no changes between pre- and post-intervention.

The referential inferences subtest. The best-fit model indicated significant main effects of the set of items (i.e. the scores on the even-numbered items were higher than those on the odd-numbered items), time (i.e. the post-test scores were higher than the pre-test scores), and group (i.e. EG1 started with lower pre-test scores relative to the other two groups) as well as a significant contribution of the time*group interaction (see Table 3).

The participants constituted the only significant random effect (*Variance*: 0.45(0.67), $p < .001$). The time*group interaction was significant when comparing the children in the CG with those in EG1 *(Estimate* =0.836 (0.21), $t(249) = 3.953$, $p < .001$) and EG2 (*Estimate* = 0.508 (.20), $t(249) = 2.463$, $p = .014$). The marginal pseudo-R^2 for the model was .18, while the conditional pseudo-R^2 was .48, indicating that the fixed factors exerted a moderate effect. As visualised in Figure 4, the EG1 and EG2 children exhibited a greater increase in their scores compared to their peers in the CG. A subsequent model, with the EG1 and pre-test set as the intercept, indicated that there was no difference between EG1 and EG2. The scores at pre- and post-intervention are presented in Table 4.

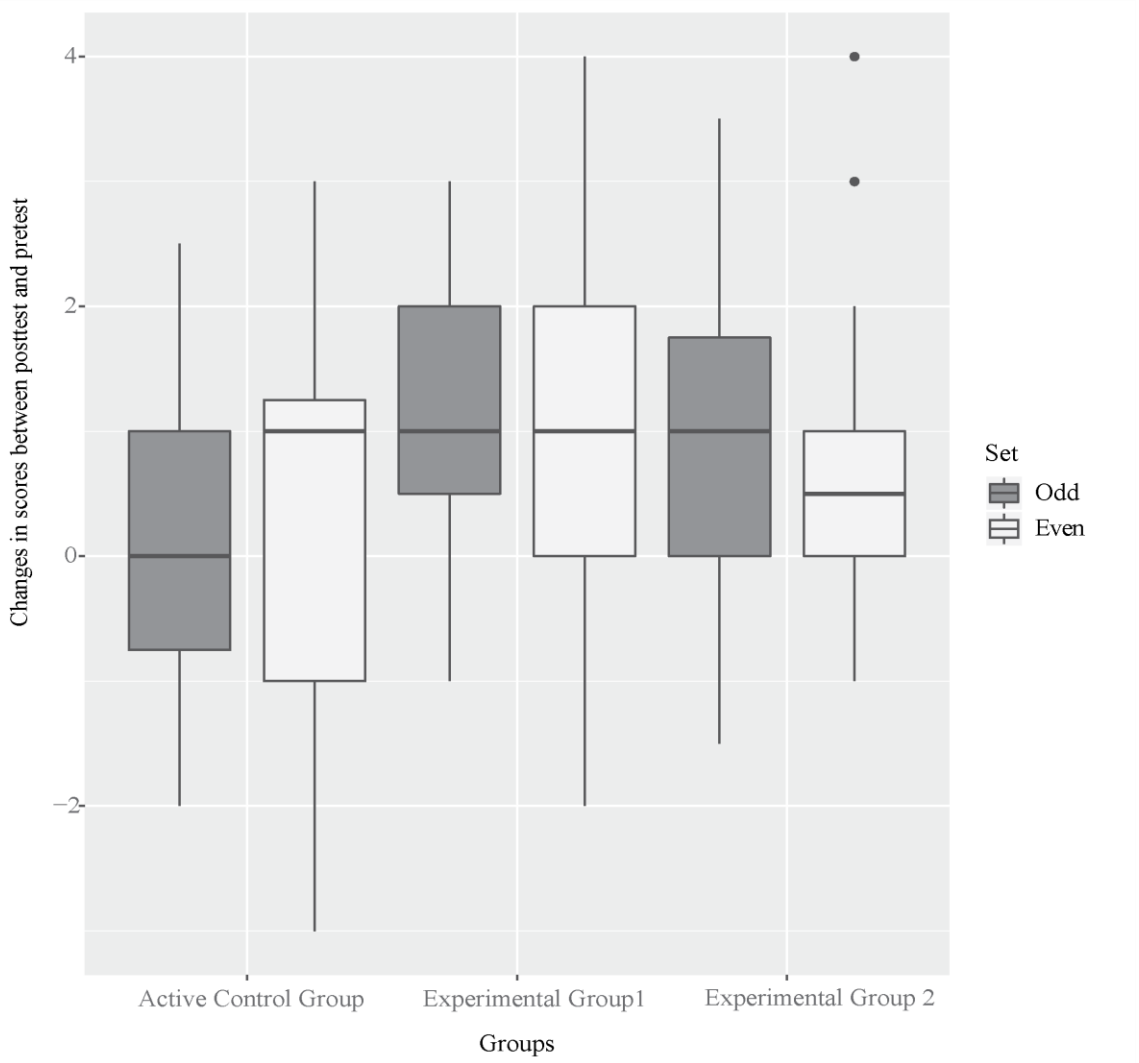

Figure 4. Boxplot representing the changes in scores between pre- and post-intervention assessment for the Referential inferences subtest
Legend: Score of 0 means there were no changes between pre- and post-intervention.

Sex and age at the time of the pre-test were not included in any final model, indicating that these variables did not influence how the children responded to the intervention.

Discussion

In this project, the SLPs delivered an interactive book-reading intervention to 5-year-old kindergartners from low-socio economic settings with the aim of enhancing their causal and referential inferencing abilities. The three groups were EG1, in which the children received an interactive book-reading intervention, followed by instruction from trained teachers; EG2, in which children received regular instruction from teachers who participated in the initial workshop, followed by an interactive book-reading intervention; and the CG, in which children received regular instruction from teachers who participated in the initial workshop only. The responses to our research questions are as follows:

a) Each of the three types of intervention produced a different effect in terms of improving the children's understanding of causal inferences in the proximal measure. EG1 produced the most improvement, followed by EG2, and finally by the CG. A significant effect was found between EG1 and the CG.

b) There were no significant differences in terms of improvement among the three groups regarding the children's understanding of causal inferences in the distal measure.

c) The interactive book-reading intervention exerted a different effect in terms of improving the children's understanding of referential inferences in the distal measure. EG1 and EG2 produced the most improvement in comparison to the CG. This difference was significant between EG1 and the CG, and between EG2 and the CG.

These results add to the evidence that SLPs should be involved in Tier 1 interventions and support teachers as they implement language skill-enhancing pedagogical approaches.

The relevance of the targets

The results suggest that causal and referential inferencing should be targeted in activities that promote emergent literacy skills because it is possible to improve inferencing skills as early as the preschool years, which can help to provide an important foundation for reading proficiency in the later years. Interestingly, only one referential inference was targeted per book, which is low compared to the three causal references per book. The instruction for referential inferences is similar from one inference to another (i.e. 'Listen for who we spoke about just before'). Moreover, the referent is usually close to the pronoun in books that are at an appropriate level for 5-year-olds. This likely facilitated the children's improvement in the distal measure, despite the relatively limited amount of instruction.

Causal inferences, on the contrary, require the listener to understand the link between two events or between an event and an internal state, which can be quite far apart from each other; the listener is also required to integrate information that is drawn from world knowledge. This could be related to the fact that the expression of causality, especially in narratives, is coming at an early stage of development at 5 years of age (Veneziano & Hudelot, 2009). The instruction for causal inferences cannot rely on the same amount of implicit knowledge to make it more explicit for children, as is the case with referential inferences. This might also explain why improved causal inferencing was not as manifest as it was for referential inferencing. In the proximal measure (with the book *Le Monstre Poilu*), the book-reading context might have been a supportive environment in which the children could demonstrate their improvements. The task's

context was indeed closer to the context in which the intervention was delivered, and the illustrations might have provided additional support.

The magnitude of the changes was small to moderate, whereas Elleman's meta-analysis (2017) reported moderate to large effects. However, it is important to bear in mind that the CG was an active group, considering that all the teachers participated in the initial workshop. Moreover, the study was conducted in a relatively short timeframe, which can also explain the small to moderate magnitude of the changes. From a practical and a clinical point of view, considering that kindergarten teachers often read a book to their pupils each day, the results suggest that despite having new or revised knowledge about inferences, teachers in the CG did not sufficiently apply that knowledge to enhance their regular book-reading to match the level of improvement that was achieved with the interactive book-reading intervention. Bianco et al. (2010) explained the null effect on oral comprehension of a story-analysis programme (consisting of repeated book-reading in small groups) by stating that children are already exposed to daily book-reading. Hence, the authors suggest that 'doing more of the same thing is not the best way of helping children to develop their oral comprehension skills' (p. 234). It is possible that the manner in which this condition was delivered (e.g. not sufficiently explicit or interactive) may have impeded the manifestation of its benefit, compared to their 'explicit lessons' condition.

In relation to the current project, all three groups improved their results on the outcome measures. The improvement that was noted among the CG children could be attributed to maturation or improvement driven by the usual stimulation that is provided in kindergarten classes. Some aspects of delivering the interactive book-reading sessions

likely warranted an effect on inference comprehension that went beyond the regular book-reading delivered by teachers in the CG, even though they had recently gained specific knowledge about the approach.

Our results are consistent with those of Dawes, Leitão, Claessen, and Kane (2019), who reported improved inference comprehension in children with language developmental disorders. Their study's intervention shared a similarity with the present study's, although the settings (this study used a school instead of a language centre setting) and the RTI tier of intervention (this study used Tier 1 while theirs used Tier 2) were different. In sum, our study achieved similar results in terms of improved inference comprehension in children from low socio-economic settings.

The addition of PD modalities

The differences in terms of responses between EG1 and EG2 enabled the authors to hypothesise regarding the potential added benefit of offering PD modalities to teachers alongside intervention delivery by a professional such as an SLP. One possibility, considering the results of the *Le Monstre Poilu* subtest, is that the EG1 children had, in addition to the 7-week SLP-delivered intervention, another 7 weeks during which the teachers could put into practice and continue to reflect on what they had learnt through the PD modalities. There was a significant difference between EG1 and the CG. For EG2, where only the effect of the 7-week SLP-delivered intervention was measured at post-testing, the results showed only a trend towards a significant difference between EG2 and the CG. Those results suggest that the SLP-delivered intervention on its own was insufficient to produce a significant difference and that adding instruction delivered by a trained teacher afterwards may have contributed to the observed significant difference.

Ongoing work is currently underway regarding the teachers' reported changes in practice. Nonetheless, our present results lend themselves to the hypothesis that there are additional benefits to be reaped from PD modalities, mainly from modelling. Another hypothesis to explain this difference could be the consolidating effect of time for EG1. The inclusion of a post-test directly after the intervention and another one later on could help to better identify this effect, if it is present.

Finally, the cost–effect benefit of coaching as a PD modality has been discussed in the literature (e.g. Piasta et al., 2017). Using modelling, it is possible to achieve immediate gains for children, beyond eventual gains for teachers. This should be taken into account when evaluating modelling's cost–effect advantage.

Limitations and future perspective

Considering the context and the project frame, it was not possible to document the influence of other variables on the improvement of inferencing abilities (e.g. language delays). It was also not possible to document the long-term gains derived from the intervention, if there were any, in terms of the children's reading comprehension and their interest in reading in later primary grades. Moreover, the SLPs who made the pre- and post-intervention assessment were not blinded to the control and intervention conditions. However, the SLPs who did the post-intervention assessment were unfamiliar to all the children, since they were not the ones who provided the in-classroom intervention. We are also confident that the systematic nature of the task and the common guidelines for the task's administration left no room for any bias that could have favoured a particular child or group of children.

The content of the intervention relied on the best practices that are recommended in the literature. However, it is not possible to definitively identify which aspects of the intervention should be seen as the 'active ingredients' that are responsible for the impacts that can be observed in the results. Based on previous work (e.g. Elleman, 2017; Paris & Paris, 2007; Pesco & Devlin, 2014), we can speculate that pedagogical methods such as explicit teaching through modelling might be crucial to achieving gains, while other aspects could be less essential. Dunst, Williams, Trivette, Simkus, and Hamby's (2012) meta-analysis revealed that some characteristics (e.g. asking open-ended questions and providing decontextualised explanations) lead to better outcomes in terms of children's language and literacy. Further analysis of the interactions between the SLP and the children would likely enhance the practical application of these results. A project on this matter is currently underway. Preliminary results tend to highlight the role of the SLP's responses to children's spontaneous comments during reading as well as the SLP's management of speaking turns in such a way as to aim to provide conversational opportunities to all the children in class, particularly those who tend to be more passive during language-focused group activities.

Recall that this project was imposed on all teachers, some of whom were reluctant to participate, at first. Engaging in a coaching process demands that one is invested in changing their practices (Kraft, Blazar, & Hogan, 2018). Calling on teachers who are enthusiastic about changing their practices with respect to reading stories to children would have been difficult to achieve prior to the project. Given that this readiness to change is usually difficult to achieve in clinical settings, future research could further

explore the particular benefit of modelling as a stand-alone PD modality, based on our encouraging results, which were achieved in ‘real-world conditions’ (Piasta et al., 2017).

Conclusion

Targeting causal and referential inferencing abilities through interactive book-reading activities seems to be effective in 5-year-old kindergarteners. Further research should investigate the long-term effects of such an intervention. The effect of modelling on teachers’ changes in practices should also be explored in-depth as a stand-alone PD modality. Our findings contribute to the evidence on SLP involvement in Tier 1 intervention, thus more efficiently supporting children, especially those from low socio-economic settings, in developing reading proficiency.

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Declaration of Interest

No potential conflict of interest is reported by the authors.

References

Archibald, LMD. (2017). SLP-educator classroom collaboration: A review to inform reason-based practice. *Autism & Developmental Language Impairments, 2,* 1–17.

Barton, K. (2019). MuMIn: Multi-Model Inference. R package version 1.43.6. https://CRAN.R-project.org/package=MuMIn

Bianco, M., Bressoux, P., Doyen, A. L., Lambert, E., Lima, L., Pellenq, C., & Zorman, M. (2010). Early training in oral comprehension and phonological skills: Results of a three-year longitudinal study. *Scientific Studies of Reading, 14*(3), 211–246.

Bichonnier, H. (1982). *Le monstre poilu*. Paris: Gallimard.

Cain, K., & Oakhill, J.V. (1999). Inference making ability and its relation to comprehension failure in young children. *Reading and Writing, 11*, 489–503.

Coyne, M.D., McCoach, D.B., Loftus, S., Zipoli Jr., R., & Kapp, S. (2009). Direct vocabulary instruction in kindergarten: Teaching for breadth versus depth. *The Elementary School Journal, 110,* 1–18.

Cunningham, A.E., Zibulsky, J., & Callahan, M.D. (2009). Starting small: Building preschool teacher knowledge that supports early literacy development. *Reading and Writing, 22,* 487–510.

Dawes, E., Leitão, S., Claessen, M., & Kane, R. (2019). A randomized controlled trial of an oral inferential comprehension intervention for young children with developmental language disorders. *Child Language Teaching and Therapy, 35*(1), 39–54.

Ducrot, O. (1972). *Dire et ne pas dire.* Paris, France: Hermann.

Dunst, C. J., Williams, A. L., Trivette, C. M., Simkus, A., & Hamby, D. W. (2012). Relationships between inferential book reading strategies and young children's language and literacy competence. *CELL reviews, 5*(10), 1–10.

Dupin de Saint-André, M., Montésinos-Gelet, I., & Morin, M.F (2008). *Outil d'évaluation de l'habileté des élèves du préscolaire à faire des inférences.* Montréal: Centre de diffusion du Département de didactique de l'Université de Montréal.

Ebbels, S. H., McCartney, E., Slonims, V., Dockrell, J. E., & Frazier Norbury, C. (2019). Evidence-based pathways to intervention for children with language disorders. *International Journal of Language Disorder, 54*(1), 3-19.

Egert, F., Fukkink, R. G., & Eckhardt, A. G. (2018). Impact of in-service professional development programs for early childhood teachers on quality ratings and child outcomes: A meta-analysis. *Review of Educational Research, 88*(3), 401–433.

Elleman, A. M. (2017). Examining the impact of inference instruction on the literal and inferential comprehension of skilled and less skilled readers: A meta-analytic review. *Journal of Educational Psychology, 109*(6), 761–781.

Filiatrault-Veilleux, P., Desmarais, C., Bouchard, C., Trudeau, N., & Leblond, J. (2016). Conception et qualités psychométriques d'un outil d'évaluation de la compréhension d'inférences en contexte de récit chez des enfants âgés de 3 à 6 ans. *Revue Canadienne d'Orthophonie et d'Audiologie, 40*(2), 149–163.

Florit, E., Roch, M., & Levorato, C. (2011). Listening text comprehension of explicit and implicit information in preschoolers: The role of verbal and inferential skills. *Discourse Processes, 48,* 119–138.

Gonzalez, J. E., Pollard-Durodola, S., Simmons, D. C., Taylor, A. B., Davis, M. D., Fogarty, M., & Simmons, L. (2014). Enhancing preschool children's vocabulary: Effects of teacher talk before, during and after shared reading. *Early Childhood Research Quarterly, 29*, 214–226.

Girolametto, L., Weitzman, E., Lefebvre, P., & Greenberg, J. (2007). The effects of in-service education to promote emergent literacy in childcare centers: a feasibility study. *Language, Speech, and Hearing Services in Schools, 38,* 72–83.

Hawken, J. (2009). *Pour un enseignement efficace de la lecture et de l'écriture : une trousse d'intervention appuyée par la recherche.* Réseau Canadien de Recherche sur le Langage et l'Alphabétisation, p. 148 Repéré à : http://www.treaqfp.qc.ca/106/PDF/TROUSSE_Reseau_de_chercheurs.pdf

Horn, E., & Banerjee, R. (2009). Understanding curriculum modifications and embedded learning opportunities in the context of supporting all children's success. *Language, Speech and Hearing Services in Schools, 40,* 406–415

Justice, L. M., Chow, S. M., Capellini, C., Flanigan, K., & Colton, S. (2003). Emergent literacy intervention for vulnerable preschoolers: Relative effects of two approaches. *American Journal of Speech-Language Pathology, 12*, 320–332.

Justice, L. M. & Kadevarek, J. N. (2004). Embedded-explicit emergent literacy intervention I: Background and description of approach. *Language, Speech, and Hearing Services in Schools, 35*, 201–211.

Justice, L. M., Meier, J., & Walpole, S. (2005). Learning new words from storybooks: An efficacy study with at-risk kindergartners. *Language, Speech, and Hearing Services in Schools, 36,* 17–32.

Korth, B. B., Sharp, A. C., & Culatta, B. (2010). Classroom modeling of supplemental literacy instruction: Influencing the beliefs and practices of classroom teachers. *Communication Disorders Quarterly, 31*(2), 113–127.

Kraft, M. A., Blazar, D., & Hogan, D. (2018). The effect of teacher coaching on instruction and achievement: A meta-analysis of the causal evidence. *Review of Educational Research, 88*(4), 547–588.

Kuznetsova, A., Brockhoff, P. B., & Christensen R. H. B. (2017). lmerTest package: Tests in linear mixed effects models. *Journal of Statistical Software, 82*(13), 1–26. doi: 10.18637/jss.v082.i13.

Law, J., Lee, W., Roulstone, S., Wren, Y., Zeng, B., & Lindsay, G. (2012) *'What works': Interventions for children and young people with speech, language and communication needs.* London: Department for Education. ISBN: 978-1-78105-160-3BCRP10

Leach, J. M., Scarborough, H. S., & Rescorla, L. (2003). Late-emerging reading disabilities. *Journal of Educational Psychology, 95*(2), 211–224.

Lefebvre, P. (2016). *La lecture interactive enrichie: Lire des histoires au préscolaire pour préparer efficacement les enfants à lire et à écrire à l'école*. Formation Donnée le 20 et 21 Octobre 2016 à l'Ordre des Orthophonistes et Audiologistes du Québec.

Lefebvre, P., Bruneau, J., & Desmarais, C. (2012). Analyse conceptuelle de la compréhension inférentielle en petite enfance à partir d'une recension des modèles théoriques. *Revue des Sciences de l'Éducation, 38*(3), 533–553.

Lefebvre, P., Trudeau, N., & Sutton, A. (2011). Enhancing vocabulary, print awareness and phonological awareness through shared storybook reading with low-income preschoolers. *Journal of Early Childhood Literacy, 11*(4), 453–479.

Markussen-Brown, J., Juhl, C. B., Piasta, S. B., Bleses, D., Højen, A., & Justice, L. M. (2017). The effects of language- and literacy-focused professional development on early educators and children: A best-evidence meta-analysis. *Early Childhood Research Quarterly, 38*, 97–115.

Maskidi, H., & Boisclair, A. (2006). Interactive reading: A context for expanding the expression of causal relations in preschoolers. *Written Language & Literacy, 9*(2) 177–211.

Milburn, T. F., Girolametto, L., Weitzman, E., & Greenberg, J. (2014). Enhancing preschool educators' ability to facilitate conversations during shared book reading. *Journal of Early Childhood Literacy, 14*(1), 105–140.

Ministère de l'Éducation et de l'Enseignement Supérieur. (2018). Indice de Milieu Socio-économique (IMSE). Available at: http://www.education.gouv.qc.ca/enseignants/aide-et-soutien/milieux-defavorises/agir-autrement/indice-de-milieu-socio-economique-imse/

Murawski, W. W., & Hughes, C. E. (2009). Response to intervention, collaboration, and co-teaching: A logical combination for successful systemic change. *Preventing School Failure: Alternative Education for Children and Youth, 53*(4), 267–277.

Nakagawa, S. & Schielzeth, H. (2013). A general and simple method for obtaining R2 from generalized linear mixed-effects models. *Methods in Ecology and Evolution 4*(2), 133–142. DOI: 10.1111/j.2041-210x.2012.00261.x

National Early Literacy Panel. (2008). *Developing early literacy: Report of the National Early Literacy Panel*. Washington, DC: National Center for Family Literacy

Neuman, S. B. & Wright, T. S. (2010). Promoting language and literacy development for early childhood educators, a mixed-methods study of coursework and coaching. *The Elementary School Journal, 111*(1), 63–86.

Oakhill, J. V. & Cain, K. (2012). The precursors of reading ability in young readers: Evidence from a four-year longitudinal study. *Scientific Studies of Reading, 16*(2), 91–121.

Paris, A. H. & Paris, S.G. (2007). Teaching narrative comprehension strategies to first graders. *Cognition and Instruction, 25*(1), 1-44.

Pesco, D., & Devlin, C. (2014). The effects of explicit instruction on French-speaking kindergarteners' understanding of stories. *Child Language Teaching and Therapy, 31*(2), 195–206. doi:10.1177/0265659014548518

Pesco, D., & Gagné, A. (2017). Scaffolding narrative skills: A meta-analysis of instruction in early childhood settings. *Early Education and Development*, 28(7), 773–793.

Piasta, S. B., Justice, L. M., Cabell, S. Q., Wiggins, A. K., Turnbull, K. P., Curenton, S. M. (2012). Impact of professional development on preschool teachers' conversational responsivity and children's linguistic productivity and complexity. *Early Childhood Research Quarterly, 27,* 387–400.

Piasta, S. B., Justice, L. M., O'Connell, A. A., Mauck, S. A., Weber-Mayrer, M., Schachter, R. E., Farley, K. S., & Spear, C. F. (2017). Effectiveness of large-scale, state-sponsored language and literacy professional development on early childhood educator outcomes. *Journal of Research on Educational Effectiveness, 10*(2), 354–378, DOI: 10.1080/19345747.2016.1270378

R Development Core Team. (2018). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0, URL http://www.R-project.org.

Reder, L. M. (1980). The role of elaboration in the comprehension and retention of prose: A critical review. *Review of Educational Research, 50*(1), 5–53.

Rezzonico, S., Hipfner-Boucher, K., Milburn, T., Weitzman, E., Greenberg, J., Pelletier, J., & Girolametto, L. (2015). Improving preschool educators' shared book reading oractices: Effects of coaching in professional development. *American Journal of Speech-Language Pathology*, *24*(4), 717–732.

Schachter, R. E. (2015). An analytic study of the professional development research in early childhood education. *Early Education and Development, 26*(8), 1057–1085, DOI: 10.1080/10409289.2015.1009335

Sampson Graner, P., Faggella-Luby M. N., & Fritschmann, N. S. (2005). An overview of responsiveness to intervention, what practitioners ought to know. *Topics in Language Disorders*, *25*(2), 93–105.

Scheiner, E. Y. & Gorsetman, C. (2009). Do preschool teachers consider inferences for book discussions? *Early Child Development and Care*, *179*(5), 595–608.

Stanovich, P. J. & Stanovich, K. E. (2003). *Using research and reason in education: How teachers can use scientifically based research to make curricular & instructional decisions.* RMN Research Corporation: Portsmounth, NH.

Statistique Canada. (2017). Proportion de la population selon la langue maternelle déclarée, pour différentes régions au Canada, Recensement de 2016. Available at : https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/dv-vd/lang/index-fra.cfm

Van de Pol, J., Volman, M., & Benhuizen, J. (2010). Scaffolding in teacher–student interaction: A decade of research. *Educational Psychology Review*, *22*, 271–296.

Van Dijk, T. A. & Kintsch, W. (1983). *Strategies of discourse comprehension.* Academic Press: New York.

Van Kleeck, A. (2008). Providing preschool foundations for later reading comprehension: The importance of and ideas for targeting inferencing in storybook-sharing interventions. *Psychology in the Schools, 45*(7), 627–643.

Veneziano, E. & Hudelot, C. (2009). Explaining events in narratives: The impact of scaffolding in 4- to 12-year-old children. *Psychology of Language and Communication*, *13*(1), 3–20.

Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry, 17*, 89–100.

Wickham, H. (2016) *ggplot2: Elegant graphics for data analysis*. Springer-Verlag, New York.

Zucker, T. A., Cabell, S. Q., Justice, L. M., Pentimonti, J. M., & Kadevarek, J. N. (2013). The role of frequent, interactive prekindergarten shared reading in the longitudinal development of language and literacy skills. *Developmental Psychology*, *49*(8), 1425–1439.

Appendix 1: List of Books

Bland, N. (2008). *Gros ours grincheux*. Toronto: Scholastic Canada.

Dieterlé, N. & Lévy, D. (2015). *Jojo l'ombrelle.* Paris: Belin

Oldland, N. (2011). *Le castor qui travaillait trop fort.* Toronto: Scholastic Canada

Poilleve, S. (2003). *Le plus féroce des loups.* Paris: Flammarion

Scotton, R. (2015). *Splat le chat.* Paris: Nathan.

Swerts, A. & Van Lindenhiuzen, E. (2016) *Flora veut un chien.* Namur: Nord-Sud

Wormell, C. (2011). *Petit ours mal peigné et les 6 souris blanches.* Paris: École des loisirs.