■ Promoting Early Literacy Skills: Effects of In-Service Education for Early Childhood Educators

■ Favoriser les capacités précoces de lecture et d'écriture : effets d'une formation en exercice des éducatrices de la petite enfance

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Abstract

This study examined the effects of in-service education on educators' use of story comprehension utterances, narrative models, and print/sound references during interactive book reading. Participants included sixteen early childhood educators with groups of four typically-developing children, aged 18 to 67 months. Eight educators in the experimental group were taught to engage in story-related discussion to promote children's early literacy skills. At posttest, the experimental group significantly increased their use of abstract story comprehension utterances and narrative action utterances relative to the control group. In turn, children in the experimental group responded more frequently to Level 3 story comprehension utterances. At follow-up, the educators did not maintain their posttest changes. The results support the viability of this type of in-service education for early child care settings but suggest the need for more intensive training and support in order for educators to maintain their gains in the longer term.

Abrégé

Cette étude a examiné les effets de la formation des éducatrices en exercice sur leur utilisation d'énoncés de compréhension d'une histoire, de modèles de narration et de références imprimées ou sonores durant la lecture interactive d'un livre. Les participants comprennent seize éducatrices de la petite enfance avec des groupes de quatre enfants ayant un développement type, âgés entre 18 et 67 mois. On a enseigné à huit éducatrices du groupe expérimental à lancer une discussion liée à l'histoire pour favoriser l'acquisition de compétences en lecture et en écriture chez les enfants. Lors du test après la formation, le groupe expérimental a augmenté de manière significative son utilisation d'énoncés de compréhension abstraite d'une histoire abstraite par rapport au groupe de contrôle. Quant aux enfants du groupe expérimental, ils ont réagi plus fréquemment aux énoncés de compréhension de niveau 3. Lors du suivi, les éducatrices n'ont pas conservé les changements après leur formation. Les résultats indiquent la viabilité de ce type de formation en exercice dans les milieux de la petite enfance, mais montrent aussi la nécessité d'offrir une formation plus intensive et un soutien pour que les éducatrices conservent leurs gains à long terme.

Key Words: child care, children, early literacy, interactive book reading, early childhood education

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The purpose of this study was to investigate the effects of an in-service education program on early childhood educators' interactive book reading. Specifically, this study examined the efficacy of a short intervention on educators' models of story comprehension, narrative structure, and print/sound references while they were reading to small groups of preschoolers. In addition, this study examined the preschoolers' verbal engagement with their educators. Interactive book reading refers to an activity during which an adult reads a storybook to one or more children while encouraging the children's participation, providing feedback to the children, and adapting the reading style to the children's linguistic and cognitive abilities (Arnold, Lonigan,

Whitehurst, & Epstein, 1994; Hargrave & Senechal, 2000; Whitehurst, Arnold, Epstein, Angell, & Fischel, 1994; Whitehurst & Lonigan, 1998). Several interventions have been based on interactive book reading with the objective of developing children's expressive language competence and have reported significant improvements in receptive and expressive vocabulary (Arnold et al., 1994; Reese & Cox, 1999; Wasik & Bond, 2001; Whitehurst, Arnold et al., 1994; Whitehurst & Lonigan, 1998).

Increasingly, large numbers of children attend child care centres where their developmental progress is facilitated by early childhood educators. Educators are in an ideal position to facilitate the development of language and early literacy skills because they have the opportunity to engage small groups of children in interactive book reading on a daily basis. Moreover, child care facilities afford environments in which books are easily accessible (e.g., in book centres) and book reading is an integral part of children's daily routines (e.g., during circle time, rest time, and free play). Investigations of interactive book reading conducted in child care centres have illustrated positive outcomes for children's vocabulary and language development (Senechal, 1997; Valdez-Menchaca & Whitehurst, 1992; Whitehurst, Arnold et al., 1994; Whitehurst, Epstein et al., 1994; Whitehurst et al., 1988).

This study investigates the effects of interactive book reading on educators' models of story comprehension, narrative structure, and print/sound references, all of which predict proficient reading ability at school age (Dickinson & Tabors, 2001; Scarborough & Dobrich, 1994; Wells, 1985). Story comprehension skills are promoted when educators expose children to varying levels of abstract language during discussion about the story's events and characters (e.g., Sorsby & Martlew, 1991). Children who hear abstract linguistic models may develop conceptual knowledge that goes beyond the "here and now" and is required for reading comprehension in later academic grades (e.g., inferring, predicting, and perspective-taking). Because stories are abstract by nature, they demand active participation on the part of the child for adequate comprehension to occur (Reese & Cox, 1999). Thus, educators who maximize opportunities for story talk that goes beyond the here and now create an environment for children to learn how to construct and interpret the story's events. Previous studies have examined the association between story comprehension utterances and children's language outcomes during storybook reading. Two studies demonstrated that interactive book reading and increased analytical talk during story reading with 4-year-old children were highly correlated with children's gains in story comprehension skills at five years of age (Dickinson & Smith, 1991; Haden, Reese, & Fivush, 1996). A subsequent study by van Kleeck et al. (van Kleeck, Gillam, Hamilton, & McGrath, 1997) indicated that a higher frequency of talk that included both low and high levels of abstraction was associated with better performance one year later on the Preschool Language Assessment Instrument (PLAI) (Blank, Rose, & Berlin, 1978). Although this latter study focused on parent-child interactions, educator-child interactions also have the potential to model abstract language.

A second benefit of interactive book reading is the provision of narrative structure models that expose children to the essential elements of stories (e.g., Hoggan & Strong, 1994; Klecan-Aker, 1993). Incidental modelling of narrative structure exposes children to important information about the setting, the problem, the character's actions to resolve the problem, and the resolution. By highlighting and talking about these structures, children implicitly learn about key features of narratives, including the internal organization of stories and expectations for how the content is sequenced. When early childhood educators engage in interactive book reading, they may transfer their implicit knowledge of narrative structure to children based on cultural norms and expectations. Unfortunately, there is a paucity of literature addressing adults' models of narrative structure or the mechanism by which narrative competencies are learned. Dickinson & Keebler (1989) noted that during interactive book reading, early childhood educators make little reference to elements of narrative structure such as the climax and resolution. Yet, by the age of six years, children are expected to produce a classic oral narrative involving a clear delineation of the setting (e.g., stating who, what, and where) and at least three core elements of narrative structure (i.e., initiating event, action, and resolution) (McCabe & Rollins, 1994).

Finally, interactive book reading also provides opportunities for early childhood educators to use print and sound references, such as explicit remarks that alert children to the location of print on a page, letter knowledge, sounds of letters, or word reading (e.g., "This word says *big*."). Explicit references may direct children's attention to print directionality, alphabet knowledge, and sound awareness, thereby facilitating the acquisition of important precursors to decoding word-level text (Justice & Ezell, 2000, 2002; Lomax & McGee, 1987; Storch & Whitehurst, 2002). Few adults spontaneously refer to print and/or sounds during book reading (van Kleeck, 2003). Nonetheless, several studies have demonstrated the effectiveness of print/sound referencing interventions, including pointing to or tracking print, commenting about print concepts (e.g., "This word says *big*."), and asking questions about sounds (e.g., "What sound does "big" start with?") (Ezell & Justice, 2000; Justice & Ezell, 2000, 2002; McCormick & Mason, 1986). Following such interventions, children made specific gains on measures of print and sound recognition. One can conclude from these findings that when adults make explicit reference to print and sounds during interactive book reading, children's knowledge and awareness of these specific skills is heightened.

This exploratory study is a follow-up to a previous study that examined the efficacy of in-service education on interactive book reading strategies of early childhood educators in child care centres (Girolametto, Weitzman, & Greenberg, 2003). In this previous study, the authors reported that educators engaged the children in conversation about stories more often following the in-service program.

The primary objective of the current study was to examine whether the inservice program also increased qualitative aspects of the educators' conversations, including the use of abstract story comprehension utterances, narrative models, and print and/or sound references. To date, there are few investigations on the value of interactive book reading intervention for modelling these precursors to conventional literacy (van Kleeck, 1998). The current study adds to the growing body of literature on interactive book reading interventions by investigating the effects of a short intervention for child care staff focusing on three areas of early literacy facilitation. Moreover, this study examines children's responses to story comprehension utterances of increasing abstraction. Previous studies conducted in child care centres have not specifically investigated children's immediate responses to low versus high level story comprehension utterances.

This study is presented as exploratory work because of the small sample size and lack of information from the existing literature to guide some of the hypotheses. Therefore, this study is focused on determining the viability of the inservice training program for centre-based child care environments and on identifying questions for future research on educator-child interactions. The study addressed three specific research questions: (a) What changes do educators make in their models of story comprehension, narrative structure, print/sound references following a brief intervention? (b) Are changes maintained at follow-up? (c) If educators make changes to their models of story comprehension, what is the impact on children's rate of responses? Given the lack of existing information on educator-child interaction, the hypotheses are guided by the available literature on parent-child interaction and outcomes following parent training. We hypothesized that educators in the experimental group would increase their use of abstract story comprehension utterances, narrative models, and print/sound references. We also hypothesized that they would maintain these changes at follow-up, 9 months following the end of the in-service program. These hypotheses are based on the explicit goals of the in-service training program and findings from previous investigations (Justice, Chow, Capellini, Flanigan, & Colton, 2003; Justice & Ezell, 2000). We also hypothesized that the children would demonstrate greater responsiveness to story comprehension utterances than children in the control group.

Method

Participants

Early Childhood Educators. The participants in this study were 16 early childhood educators who worked in four licensed child care centres in the metropolitan area of Toronto. All educators had completed high school as well as 2 years of postsecondary education resulting in a diploma in early childhood education. All educators were female and had at least 2 years experience in child care settings. Two educators worked in toddler classrooms (one each in the experimental and control groups) and the remainder worked in preschool classrooms. The toddler classrooms included children aged 18 to 30 months and had an adult-child ratio of 1:5 whereas the preschool classrooms included children up to 72 months of age and had an adult-child ratio of 1:8 as mandated by law in the province of Ontario. The educators were randomly assigned to experimental and control groups by centre so that colleagues could attend the in-service program together. This was also done to prevent experimental and control group members from talking to each other and influencing the outcomes. Two centres (i.e., eight educators) were randomly assigned to receive the in-service program and two centres (i.e., eight educators) were randomly assigned to a waiting list control group. Therefore, the design of this study must be considered quasi-experimental.

Descriptive data on the pretest characteristics of the early childhood educators can be found in Table 1. There were no significant differences between the experimental and control groups for the number of years of education. However, despite random assignment, the educators in the experimental group were older and had more work experience, $t(14) = 2.52$, $p \leq .05$ and $t(14) = 2.76$, $p \leq .05$, respectively. Because of this pretest difference, the results of this study must be interpreted cautiously.

Children. Each early childhood educator was videotaped in interaction with a small group of four children from her classroom. The group size was set at four children because previous research indicated that adult language input was adversely affected by larger group sizes (Pellegrino & Scopesi, 1990) and that young children were more interactive in small rather than large group settings (McCabe et al., 1996). The educator was asked to select four children from her classroom who exhibited typical development and whose parents consented to the study. The same children were involved in both the pretest and posttest videotapes. All children had age-appropriate speech and language development as determined by parent report and the educators' completion of the Speech and Language Assessment Scale (Hadley & Rice, 1993). Most of the children attended the facility on a full time basis (i.e., at least 40 hours per week) and attended the particular child care centre for at least 2 months prior to the study. At pretest, the children ranged in age from 18-67 months and the experimental and control groups did not differ from each other statistically in terms of the children's chronological age. Summary data describing the characteristics of the children can be found in Table 2.

At the follow-up test, 9 months after the posttest, the early childhood educators in the original experimental group took part in a final set of adult-child interactions. A new group of children was recruited because the original children had either transferred to different classrooms or had left the child care centre. Children in the follow-up group were selected in the same manner described above and did not differ in age or gender from those in the initial experimental group at pretest. The characteristics of the follow-up group are also displayed in Table 2.

Table 1

Characteristics of the Early Childhood Educators

Variable		Experimental Group (*n* = 8)	Control Group (*n* = 8)
Age (in years):	M (SD)	38.3 (4.2)	31.5 (6.3)
	Min-Max	35-48	25-45
Years of Education:	M (SD)	14.5 (0.5)	14.8 (0.7)
	Min-Max	14-15	14-17
Years of Experience:			
< 10 years		0	5
11 – 19 years		6	2
> 20 years		2	1

Table 2

Characteristics of the Children in the Experimental, Control and Follow-up Groups

Variables		Experimental Group (*n* = 32)	Control Group (*n* = 32)	Follow-up Group (*n* = 28)[1]
Age (months):				
	M (SD)	37.8 (10.6)	39.6 (10.4)	37.8 (10.6)
	Min-Max	20 - 67	18 - 57	23 - 59
Gender	Male	14	19	14
	Female	18	13	14
Time in Child Care:[2]				
	2- 6 months	10	2	9
	7-12 months	10	13	8
	13 months +	12	17	11
Attendance:				
	Full-time	29	26	28
	Part-time	3	6	0

[1]One educator did not participate in the follow-up test and consequently the total number of children was reduced by four.
[2]Length of time in months that child has attended the particular child care centre.

Design and Procedure

The study utilized a quasi-experimental design with random assignment to experimental and control groups. The early childhood educators in the control group were assessed at pretest and posttest using the same procedures as the experimental group, and participated in the in-service training program once the posttests were concluded. No suggestions were provided to this group during the 4-month control phase. The control group received in-service training after the posttest; however, their own posttest data were not collected because data for a non-treated control group was not available for comparison.

The early childhood educators worked in four child care centres that were on a waiting list to receive an in-service training program entitled Learning Language and Loving It - The Hanen Program for Early Childhood Educators (Weitzman, 1992). A speech-language pathologist from The Hanen Centre, who delivered the training program, contacted the supervisors of the four child care centres to confirm their interest in participating in the program. The clinician then conducted a 1-hour orientation session at each of the four centres to describe the in-service training requirements and the research components of the program. The educators who agreed to participate in the study completed a brief questionnaire that requested demographic information (e.g., age, training, years of experience). They were given copies of research information and consent forms to distribute to the parents of all the children in their classroom.

One to 2 weeks after the orientation session, a research assistant visited each of the centres to meet the early childhood educators, collect all parent consent forms, and make appointments for filming adult-child interactions. The educators completed the Speech and Language Assessment Scale (Hadley & Rice, 1993) separately for each of these children in order to ensure that their speech and language development

was progressing typically. The research assistant filmed a ten-minute segment of adult-child interaction during an ongoing, unplanned activity. This was conducted to familiarize the educators and children with the videotaping procedures and these videotapes were not used for analysis. Only the children participating in the study were videotaped; the other children played with similar materials in another room, or in a different area of the same classroom, or participated in outdoor play.

The second visit (pretest) for all 16 early childhood educators occurred immediately before the experimental program. A portable camera with a directional microphone was used to permit the research assistant to position herself so that the behaviours of the educator and the children could be videotaped simultaneously. The groups were videotaped for 15 minutes in a book reading activity that took place on the floor of the designated book centre. Typically, the educator and children sat on a carpet or on pillows, in a circle. The research assistant provided the educator with a set of four books, When the TV Broke (Ziefert, 1989), Just Me and My Babysitter (Mayer, 1986), When I'm Sleepy (Howard, 1985), and Good Dog, Carl (Day, 1986). The latter book differed from the others by virtue of being wordless. The educators started with a book that was available in the child care centre and familiar to the children, then used one or more of the books that were provided. The order and number of books were not constrained. The same procedure was used for videotaping the adult-child interactions at posttest 4 months later (immediately following the in-service program), and at follow-up, 9 months after the posttest.

Following each visit, the early childhood educators completed an informal questionnaire that asked them to rate their impressions of the representativeness of their interactions on a 5-point scale (1 = very typical; 3 = typical; 5 = not typical). At pretest, all educators rated their amount of talk and rate of speech as typical (mean rating = 2.6 and 3.0, respectively). In addition, the educators determined that their comfort level was typical of unobserved interaction (mean rating = 3.1). Similar ratings were obtained at posttest (amount of talk, 2.6; rate, 2.9; and comfort level, 3.0). Thus, these ratings provided some assurance that they believed their interactions during book reading to be similar to other unobserved book reading interactions in the child care centre.

In-service Education Program

The in-service education program, Learning Language and Loving It, was delivered by an experienced speech-language pathologist, certified by The Hanen Centre to administer this program. The 14-week program included eight group evening sessions to teach program strategies and six individual sessions in the child care centre, each consisting of a 5-minute videotape of adult-child interaction followed by 30 minutes of individual feedback and discussion regarding the use of program strategies. The group sessions were 2.5 hours long and took place in the evening after the child care centre was closed. Each

session included various learner-centred activities such as interactive lectures, observation and analysis of videotapes that illustrated program techniques, large and small group discussions, and role-plays of program techniques. During the individual visits, the speech-language pathologist videotaped the educators interacting with children in the context of ongoing activities and provided on-the-spot coaching as necessary. The educator subsequently reviewed these videotapes and the speech-language pathologist provided immediate feedback on the use of program strategies.

One 2.5-hour session and one entire videotaping consultation were devoted to interactive book reading. The video consultation was held one week after the session and provided the educator with specific and immediate feedback on her use of interactive book reading strategies. Educators also read Chapter 10 of Learning Language and Loving It (Weitzman, 1992), which focused on interactive book reading and included three main groups of strategies. First, educators were taught to extend the children's background knowledge, relate story events to their personal experiences, and predict story events from pictures or text. Second, educators were encouraged to introduce preschool children to more complex stories that involved key components of narrative structure such as the setting, problem, response, action/attempt, direct consequence, and the reaction of main characters. Third, educators were taught to reference print and sounds by indicating the title, author, or illustrator, commenting on words (e.g., strange-looking words, long, words, short words), and highlighting syllables and sounds when reading words. A summary of these strategies can be found in the Appendix.

Outcome Measures

Transcription and Reliability. The 15-minute book reading videotapes were transcribed using the Systematic Analysis of Language Transcripts (SALT) (Miller & Chapman, 1998). Transcripts included the adult's utterances and all intelligible utterances spoken by each of the four children on separate speaker lines. Transcripts were prepared by a research assistant and each transcript was verified by a second research assistant, a graduate student in speech-language pathology, following a procedure used by Johnston (2001). Agreement reliability was conducted on a random selection of 25% of the transcripts (i.e., a total of 180 minutes of interaction) using the following formula: number of agreements / (the number agreements + disagreements) x 100 (Sackett, 1978). Agreement reliability for the educators was 98% for utterance boundaries and 99% for words. Reliability for the children was 98% for utterance boundaries and 97% for words.

Coding System and Reliability. All utterances of the early childhood educators were coded for story comprehension level, narrative structure, and print/sound references. The coding system was not mutually exclusive; educators' utterances received multiple codes if they met the criteria for more than one area. Utterances that did not fit any of the criteria (e.g., imperatives used to control

children's behaviour or off-topic comments) and utterances that were read directly from the text were not coded.

A. Story Comprehension Codes. The coding system for story comprehension was an adaptation of previously published protocols that examined the level of abstraction in adults' utterances during book reading (Dickinson & Smith, 1994; Haden et al., 1996; Van Kleeck & Beckley-McCall, 2002). Story comprehension included the following four codes.

Level 1. Picture Description - comments or questions that provided picture descriptions or elicited responses focused on picture description. Picture description included labeling objects, describing actions, or locating objects (e.g., "It's called a crib." or "What's mommy doing in this picture?").

Level 2. Text and Story Awareness - comments or questions that (a) prompted children for specific words in the text (e.g., "And the doggie ate the ...."), (b) asked children to repeat or paraphrase lines of text (e.g., "What did the doctor say?"), or (c) asked children factual questions to verify text comprehension (e.g., "What did the dog eat?").

Level 3. Background Knowledge - comments or questions that (a) utilized children's relevant background knowledge or prior experiences (e.g., "What does mommy put on your pizza at home?"), (b) encouraged children to enact story events (e.g., "Show me how you yawn."), or (c) asked children to make simple judgments about story events (e.g., "Do you think the doggie is naughty?").

Level 4. Integration - comments or questions that promoted analysis and evaluation of story events, including (a) speculating about or predicting events in the story (e.g., "What's going to happen next?"), (b) hypothesizing or imagining alternatives or solutions (e.g., "What if the mother had come home sooner?"), or (c) taking a character's perspective (e.g., "How does Jeffrey feel about that?").

B. Narrative Structure Codes. The coding system for narrative structure was adapted from existing descriptions of children's story grammar (Liles, Duffy, Merritt, & Purcell, 1995; Paul, Hernandez, Taylor, & Johnson, 1996). The educators' utterances that were directly related to the story were assigned one of six codes:

1. Setting - utterances that described the location, the characters, and the overarching time frame of the story.

2. Initiating Event - utterances that described a problem that propelled the main character to act. A character may cause an initiating event (e.g., the parents go out and leave a babysitter) or the event may occur spontaneously (e.g., the TV breaks).

3. Internal Response - utterances that described a character's feelings about the problem that has occurred (e.g., "But is his sister crying?" or "Is she having a good time?").

4. Action - utterances that included an attempt to resolve the problem on the part of the main character. This may be a single event or a series of events (e.g., "She's breaking the dishes." or "She made macaroni and cheese

for dinner.").

5. Direct Consequence or Resolution - utterances that described the direct consequence resulting from the characters' actions that ultimately resolved the problem (e.g., "And the TV was fixed, but he didn't miss it at all.").

6. Reaction – utterances that referred to a character's reaction to the resolution. The character's reaction is an expression of his/her internal state or feelings about a situation (e.g., "When she comes home, how is mommy going to feel?").

C. Print/Sound Reference Codes. The coding system for print/sound awareness was adopted from the work of Justice and Ezell (2002). It included the following four codes:

1. Book Reading Concepts - utterances containing words such as "letter, print, read, spell, illustrator, author, alphabet, lines, rhyme, sentence, symbol, title/name, word, write" as well as book handling conventions (e.g., "It's upside down" or "You turn the pages this way").

2. Form Segmentation - utterances that informed children about word awareness (e.g., indicating where a word began or ended, commenting on the length of a word). It also included alphabet knowledge (e.g., mentioning a letter name or counting letters in a word).

3. Word Reading - utterances that included requesting children to locate a specific word in the text, pointing out how to read a word (e.g., "This word says *big*."), or asking a child to read a specific word.

4. Phoneme Awareness - utterances that commented on sounds in words (e.g., "The word *book* starts with the /b/ sound"). It was also used when educators pointed out grapheme-phoneme correspondences (e.g., "This letter makes the sound /b/" or "The first letter in the word book is a /b/").

Children's Response Codes. Children's responses to the educators' story comprehension utterances were coded as either a response or no response. Responses were accepted if they used at least one intelligible word and immediately followed the educators' story comprehension utterance.

The reliability of the adult and child coding systems was computed by randomly selecting 20% of the transcripts to be recoded by a research assistant who was blind to the assignment of subjects to groups and was unaware of the research questions. Interrater reliability was calculated using the formula: number of agreements / (the number agreements + disagreements) x 100 (Sackett, 1978). Interrater reliability for each of the four print/sound awareness codes was 100% ($n = 23$ codes). Interrater reliability for the four story comprehension codes ranged from 86% to 91% with overall reliability achieving 89% ($n = 797$ codes). Overall interrater reliability for the six individual narrative codes ranged from 83% to 100% with overall reliability reaching 96% ($n = 400$ codes). Finally, overall interrater reliability for the children's responses was calculated for 20% of the transcripts and was 96% ($n = 239$ responses).

Results

The results are presented in four sections: (a) pretest comparisons of experimental and control groups, (b) outcomes for the child care educators, (c) outcomes for the children, and (d) follow-up data and individual profiles for the child care educators. Comparisons between the two groups were conducted on difference scores, that is, the gain between the pretest and the posttest. This was done to control for the variation in pretest scores of the two groups. Statistical analyses of the difference scores were made using nonparametric statistics because the sample size was small and it could not be assumed that the data were normally distributed. Because all hypotheses were directional, the posttest comparisons were assessed using a series of Mann Whitney U tests with a one-tailed probability level set at .05.

Pretest Analyses

No significant differences were found between the two groups of child care educators for any of the following dependent variables at pretest: story comprehension utterances, narrative structure models, or print/sound references. Moreover, there were no significant differences at pretest between the two groups of children on responses to the four levels of story comprehension utterances.

Outcomes for Child Care Educators

The first question asked whether child care educators in the experimental and control groups differed in their use of story comprehension utterances from pretest to posttest. Story comprehension utterances were coded from concrete (Levels 1 and 2) to more abstract levels (Levels 3 and 4). Table 3 displays the summary statistics for the percentage of story comprehension utterances at each level. A series of Mann-Whitney U tests were conducted on the difference scores (posttest-pretest) for each of the four levels of story comprehension utterances. There were significant differences for the difference scores of Levels 1 and 3 utterances only, $U = 14.5$, $p = .033$ and $U = 11.0$, $p = .014$, respectively. An examination of the data in Table 3 indicates that the educators who received the experimental intervention decreased their use of Level 1 utterances and increased their use of Level 3 utterances in comparison to the control group. There were no significant differences for Level 2 or Level 4 story comprehension utterances.

The second question asked if child care educators in the experimental group made greater gains in narrative structure models than child care educators in the control group. These data are displayed in Table 4. All utterances within one complete story were coded for narrative structure for each child care educator. One child care provider in the experimental group (Subject 01) did not read a complete story during the posttest session and was excluded from the following analyses. A series of Mann-Whitney U tests were conducted on the difference scores (posttest – pretest) for the six subtypes of narrative models. Child care educators in the experimental group made significantly greater gains in Action utterances than the control group at posttest, $U = 8.5$, $p = .011$. There were no significant differences for any of the other five narrative structure utterance types.

The third question asked whether child care educators in the experimental and control groups differed in their use of print/sound references (i.e., print concepts, sound awareness, word reading, and form segmentation) at posttest. Print concepts included all utterances that included a reference to print. Sound awareness referred to sounds that letters make. Word reading referred to utterances that explicitly read a word (e.g., "What does this word say?"). Form segmentation referred to utterances that pointed out letters and sounds in words. Table 5 lists the summary data for the frequency of these codes. The data in Table 5 indicate that the educators used very few print/sound references overall and there were few changes from pretest to posttest. There were no significant differences for the difference scores of the two groups for these variables.

Table 3

Means and Standard Deviations for the Frequency of Educators' Utterances at each Level of Story Comprehension

Variable		Experimental Group Mean (SD)	Control Group Mean (SD)	U and p values [1] (one-tailed)
# SC Level 1[2]	Pre	66.6 (23.3)	43.9 (33.1)	
	Post	39.4 (22.1)	44.3 (24.4)	$U = 14.5$, $p = .033$
# SC Level 2[2]	Pre	10.8 (6.3)	8.3 (7.2)	
	Post	12.8 (9.9)	13.1 (9.0)	$U = 28.0$, $p = .363$
# SC Level 3[2]	Pre	35.4 (16.1)	33.0 (14.3)	
	Post	52.5 (19.8)	27.5 (13.3)	$U = 11.0$, $p = .014$
# SC Level 4[2]	Pre	8.4 (5.2)	4.1 (2.1)	
	Post	9.0 (8.6)	7.4 (3.3)	$U = 20.5$, $p = .117$

Note: Pre = pretest; Post = posttest; SC = Story Comprehension utterances; SC Level 1 = story comprehension utterances at Level 1, etc.
[1]Analyses were conducted on difference scores (e.g., T2 – T1).
[2]The frequency of Levels 1, 2, 3, 4 story comprehension utterances is calculated from a standard 10 minutes of book reading.

Table 4

Summary Data for the Frequency of Narrative Models used by Educators[1]

Variable		Experimental Group[2] Mean (SD)	Control Group Mean (SD)	U and p values[3] (one-tailed)
# Setting	Pre	8.8 (6.5)	5.0 (3.5)	
	Post	7.3 (5.2)	5.1 (4.8)	U = 27.5, p = .478
# Initiating Event	Pre	4.0 (4.0)	4.5 (4.8)	
	Post	7.4 (5.4)	5.6 (2.0)	U = 19.5, p = .168
# Internal Response	Pre	0.8 (1.2)	0.0 (0.0)	
	Post	1.0 (1.9)	0.3 (0.7)	U = 27.0, p = .478
# Action	Pre	33.6 (16.2)	30.3 (25.3)	
	Post	66.6 (32.4)	24.4 (21.2)	U = 8.5, p = .011
# Direct Consequence	Pre	6.4 (10.3)	5.8 (7.4)	
	Post	8.3 (5.8)	5.6 (8.9)	U = 16.5, p = .095
# Reaction	Pre	1.9 (4.5)	0.4 (0.5)	
	Post	0.4 (1.1)	0.6 (1.1)	U = 22.0, p = .268

Note: Pre = pretest; Post = posttest.
[1]The utterances from one complete story for each educator were used for this analysis.
[2]One educator in the experimental group did not read a full story and was excluded from these analyses.
[3]Analyses were conducted on difference scores (e.g., T2 – T1).

Table 5

Summary Data for the Frequency of Print/Sound References used by the Educators

Context/Variable		Experimental Group Mean (SD)	Control Group Mean (SD)	U and p values[1] (one-tailed)
# Book Reading	Pre	2.0 (3.5)	3.1 (3.3)	
Concepts	Post	2.3 (2.6)	3.1 (2.6)	U = 32.0, p = .500
# Word Reading	Pre	0.0 (0.0)	0.1 (0.4)	
	Post	0.0 (0.0)	0.5 (0.8)	U = 24.0, p = .221
# Form	Pre	0.0 (0.0)	0.0 (0.0)	
Segmentation	Post	0.0 (0.0)	0.6 (1.8)	U = 28.0, p = .361

Note: Pre = pretest; Post = posttest.
[1]Analyses were conducted on difference scores (e.g., T2 – T1).

Outcomes for the Children

The final set of analyses examined children's responses to the educators' story comprehension utterances. There were significant differences in the difference scores for responses to Level 1 and Level 3 utterances only, $U = 15.5, p = .042$ and $U = 15.0, p = .042$, respectively. The children in the experimental group decreased their responses to Level 1 utterances and increased their responses to Level 3 utterances from pretest to posttest. Table 6 indicates that, at posttest, the children in the experimental group provided twice as many responses to Level 3 story comprehension utterances than the children in the control group.

Program Gains and Maintenance - Individual Data

The individual profiles of the educators in the experimental group were examined to uncover patterns of program gains and maintenance of these gains at follow-up (i.e., 9 months following the posttest). The posttest and follow-up data for three key variables are displayed in Table 7. A gain was arbitrarily defined as an increase over the pretest score by at least 10% (or an increase of at least two print/sound references). Four of the eight educators made gains in their use of Levels 3 and 4 story comprehension utterances from pretest to posttest. However, only two of these educators (IDs 5 and 9) maintained these gains at follow-up. Four educators made pretest – posttest gains in their use of print/sound references; however, none of them maintained these gains. Finally, in terms of narrative models, three educators demonstrated gains from

Table 6

Means and Standard Deviations for the Frequency of Children's Responses to the Educators' Story Comprehension Utterances

Variable		Experimental Group Mean (SD)	Control Group Mean (SD)	*U* and *p* values[1] (one-tailed)
# Responses to SC Level 1	Pre	30.1 (17.0)	15.0 (11.7)	
	Post	18.6 (9.0)	16.8 (5.4)	*U* = 15.5, *p* = .042
# Responses to SC Level 2	Pre	3.4 (2.6)	2.0 (1.1)	
	Post	5.6 (5.3)	4.4 (5.0)	*U* = 31.5, *p* = .480
# Responses to SC Level 3	Pre	18.4 (6.8)	15.1 (8.9)	
	Post	27.6 (13.9)	13.4 (7.9)	*U* = 15.0, *p* = .042
# Responses to SC Level 4	Pre	3.6 (3.7)	1.6 (1.8)	
	Post	3.9 (3.3)	2.8 (2.9)	*U* = 23.0, *p* = .191

Note: Pre = pretest; Post = posttest; SC = story comprehension utterances at Levels 1, 2, 3, and 4. The frequency of responses was based on the total number of responses to each level of story comprehension utterances (i.e., Level 1, 2, 3, or 4).
[1]Analyses were conducted on difference scores (e.g., T2 – T1).

pretest to posttest and two of them (IDs 2 and 5) maintained these gains at follow-up. Taken together, it appears that educators did not maintain the gains they made in the specific measures examined in the experimental group.

Discussion

The results of this exploratory study indicate that, following intervention, the educators in the experimental program (a) adopted story comprehension strategies designed to promote a high level of abstraction and (b) used more action-related utterances during interactive book reading relative to a control group. These findings extend the results of a previous study (Girolametto et al., 2003) in which the same educators increased the overall amount of conversational talk, waited for children to initiate, and encouraged dialogue during the storybook reading. The current results confirm that, in comparison to a control group, the quality of the educators' utterances also improved as a result of their participation in an in-service education program.

One explanation for the selective increase in Level 3 utterances may be due to their age-appropriate content. These utterances integrate children's life experiences into conversations about the story, involve them in making judgments about story events, and help them express world knowledge related to the story. In contrast, it is possible that Level 4 utterances did not increase because they were above the developmental level of some of the preschool-aged children in the experimental group, which ranged from 20 months to 57 months of age. Level 4 utterances encourage children to make hypothetical predictions,

problem-solve, and explain concepts and may have been too difficult for children under 36 months of age. For example, in a study by van Kleeck et al. (van Kleeck et al., 1997), in which parents used Level 4 utterances more frequently, the children were all above 3 years of age (i.e., between 42 and 49 months). In addition, small group interactions in child care centres may elicit different patterns of interaction than dyadic book reading, in which adults can more finely tune their language to the children's competencies.

The changes in educators' use of Level 3 story comprehension utterances were accompanied by an increase in the children's responses to Level 3 utterances during interactive story reading. These responses included content that was at a higher level of abstraction (i.e., they took the character's perspective, made judgments, related personal experiences connected to the story, or compared similarities and differences). The findings for children are a positive indication that with in-service education educators can increase the overall frequency of children's responses to abstract language relative to a control group. From a practical perspective, this information may be a powerful motivator for supervisors of child care centres to promote in-service education and for the educators themselves to adopt and maintain program strategies. From a theoretical perspective, the findings reported in this study concerning increases in the frequency of children's Level 3 utterances are promising. Social interactionist theories of language acquisition posit that increased language productivity may facilitate language development by providing more occasions to practice language forms and receive feedback on communicative attempts (Bohannon & Bonvillian,

Table 7

Individual Pretest, Posttest and Follow-up Values for educators in the experimental group on measures of early literacy.

ID	Time	SC Utterances Levels 3 & 4	# Print/Sound References[1]	% Narrative Models
No Posttest Gains or Maintenance				
1	Pre	9%	0	53%
	Post	8%	0	n/a [2]
	F-up	18%	0	54%
Posttest Gains in One or Two Areas with No Maintenance				
4	Pre	18%	0	44%
	Post	16%	2 +	50%
	F-up	17%	0	38%
7 [3]	Pre	21%	2	46%
	Post	35% +	0	43%
	F-up	n/a	n/a	n/a
3	Pre	17%	0	61%
	Post	34% +	4 +	42%
	F-up	21%	0	44%
8	Pre	34%	0	37%
	Post	22%	7 +	51% +
	F-up	37%	0	46
Posttest Gains in One or Two Areas with Maintenance in at Least One Area				
5	Pre	20%	4	50%
	Post	49% +	0	66% +
	F-up	40% +	0	66% +
2	Pre	18%	10	22%
	Post	28% +	4	49% +
	F-up	24%	1	36% +
9	Pre	24%	0	34%
	Post	44% +	1	39%
	F-up	46% +	0	52%

Note: Pre = pretest; Post = posttest; F-up = follow-up test. Change was defined as a gain of 10% in Story Comprehension Utterances at Levels 3 & 4 and in Narrative Models; or by at least 2 occurrences of Print/Sound References. Maintenance was defined as a gain of at least 10% relative to the pretest score.

[1] Print/sound references includes print concepts, sound awareness, word reading, and form segmentation.

[2] This participant did not read a complete story during the posttest.

[3] This participant relocated and did not participate in the follow-up test.

1997). The use of abstract language has been associated with better abstract language skills and story comprehension abilities in the school years (Dickinson & Tabors, 2001; van Kleeck et al., 1997). Whether the frequency of abstract language use improves over time and facilitates story comprehension was not addressed by this study and needs to be assessed in future studies of this approach.

This study is the first to examine the effects of an interactive book reading intervention on narrative models. The data reveal that action utterances receive the most emphasis both prior to and following intervention. Following the intervention, the educators increased the number of narrative models that highlighted actions taken by the main character to resolve the problem. Educators may have emphasized actions because they are key concepts that are easy to relate to the children's everyday experiences. For example, in the case of When the TV Broke (Ziefert, 1989), educators asked the children what happened when their TV sets broke or what activities they liked to do when not watching TV. Thus, the concomitant increases in Level 3 utterances and action utterances were likely related. Future research is needed to determine whether adults' narrative models influence children's story productions, as the mechanism by which children acquire competency in narrative structure is unclear.

There were no differences between the two groups of educators in terms of verbal strategies that modelled print/sound references. Print/sound references included book reading concepts (e.g., "read", "write", "author", "illustrator"), word reading (e.g., "This word says *big*."), sound awareness (e.g., "this word starts with /t/") and form segmentation (pointing out letters or sounds in words). Previous studies have reported significant gains in this area following interventions that specifically target print/sound references (Justice & Ezell, 2000, 2002) The educators in this study may have avoided print/sound references because they tend to interrupt the flow of the story and detract from conversations on the story's topic. Alternatively, it is possible that the educators believed

the children in this study were too young to benefit from print/sound references. It may be valuable for consultants to stress the importance of print/sound referencing and provide examples of different references that may be conducted as pre-reading or post-reading activities (e.g., examining the words in the book's title, pointing out sounds in the main character's name, writing letters to the main character). The feasibility of these suggestions needs to be confirmed by future studies that survey educators' knowledge of and attitudes toward early literacy in pre-school environments.

Unfortunately, the follow-up findings indicated that the educators in the experimental group did not maintain the gains they had made in story comprehension and narrative structure models over the 9-month follow-up period. It must be noted that the follow-up observation was conducted with a new group of children, which may have affected the educators' ability to generalize their new skills. Nonetheless, the finding that educators did not maintain gains over a follow-up period has been reported by other intervention studies conducted in child care centres (Girolametto, Weitzman, & Greenberg, 2004; Whitehurst, Epstein et al., 1994). This suggests that additional booster sessions or further training may be required to help educators maintain their gains over time. Alternative models of in-service education, such as a collaborative model in which educators and speech-language pathologists work side-by-side, may more effectively integrate early literacy instruction into preschool classrooms (e.g., Justice & Kaderavek, 2004; Kaderavek & Justice, 2004).

Several limitations must be noted in interpreting the findings of this study. First, all educators in this study had diplomas in early childhood education, elected to participate in the training program, and were supported in this endeavour by their supervisors. Thus, the outcomes of this study may not reflect the gains that might be made by child care assistants or other untrained educators. A second limitation is that the educators in the experimental group were older and more experienced. These educators may have incorporated the suggested changes but then settled back into habitual routines of story reading. Future ethnographic studies may contribute to our understanding of how background, experience, education, and attitudinal variables of educators may interact with in-service training. A third limitation of the present study is that a small number of educators were observed in a group situation that had a restricted number of children. Moreover, the assignment of educators and children to experimental and control groups was not entirely random. Replication involving random assignment, more educators, larger groups of children, and diverse literacy activities is needed to construct a complete picture of the potential effects of the in-service education on early childhood educators' language input.

This study yields important implications for speech-language pathologists and literacy consultants who consult to early childhood settings. First, educators may be counselled about the value of using utterances at higher levels of abstraction in discussing stories with young children. Asking questions that invite children to think and imagine is a strategy that may require additional emphasis during story reading as the majority of story talk utterances used in this study reflected low levels of abstraction. Second, educators may be counselled to increase the saliency and frequency of core aspects of narrative structure other than action, such as problem statements and resolutions. This study did not evaluate children's uptake of the incidental models of narrative structure that educators provided during conversations about the story. Future research needs to examine the impact on children's narrative productions. Third, the lack of maintenance of the in-service education strategies between posttest and follow-up indicates the need to follow individual educators more closely in order to identify those who require additional coaching and feedback to help them use these strategies. Research is needed to identify alternative models of consultation that may provide more durable results. Finally, it may be important to discuss the individual's underlying beliefs and knowledge about early literacy to provide the consultant with insight about individualizing the in-service training to meet the learner's needs.

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Appendix

Content of the Session on Sharing Books

I.   Strategies for Building Story Comprehension
   (a)   Observe children's reactions to books, wait for them
         to initiate, and follow their lead.
   (b)   Encourage children to make sense of the book by relating it to their experiences.
   (c)   Extend the story by asking children to predict, imagine, or project themselves into the story events
         (e.g., wonder aloud to promote prediction).
   (d)   Ask children for an emotional response to the story.

II. Strategies for Increasing Print and Sound References
   (a)   Point out print in the environment and in booka (e.g., first words in a story, strange-looking words, long
         words, and short words).
   (b)   Encourage children to figure out the meaning of novel words from the pictures and context.
   (c)   Point out syllables and sounds in words (e.g., "My name is so long. Listen: 'Chris- ti- na'" or "Cat. Cut. These
         two words both start with /k/").

C. Strategies for Promoting Narrative Structure Awareness
   (a)   Choose more complex stories that introduce setting and main characters, problem, response, outcome
         of the attempt, and reaction from the main characters.
   (b)   Explain the story's events and the character's actions.