

QUESTIONING BEYOND THE BOOK IN TEACHER-CHILD READING: THE
EFFECT OF HIGH COGNITIVELY DEMANDING QUESTIONS ON CHILDREN' S
VOCABULARY GROWTH

A Dissertation

by

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ABSTRACT

Shared book reading (SBR) is considered the standard in fostering preschool children's oral language skills. However, research has emphasized that extratextual conversation around book reading (i.e., questions, comments, and statements outside the actual reading), in particular, is related to effective book reading because it provides children with the opportunity to interact with word and word meanings beyond the text. The present dissertation examines how teacher questioning around SBR, and particularly high cognitive demand questions, impact children's vocabulary growth.

No reviews of the research have been conducted on the effect of cognitive complexity of questions around SBR on preschoolers' vocabulary knowledge. Therefore, the second chapter of this dissertation presents a systematic literature review that summarizes and identifies the similarities and differences among studies of questions shared book reading conducted in recent years. The review revealed that the effect of cognitive complexity of questions around SBR on preschoolers' vocabulary knowledge is limited, and the findings are not conclusive.

The third chapter consists of an observational study that examined how the cognitive complexity of teacher-generated questions around SBR was associated with preschoolers' receptive and expressive vocabulary knowledge. The sample consisted of 100 children nested under 13 teachers who were part of a larger vocabulary intervention study in which small groups of children participated in 18 weeks of 5-day instructional shared reading cycles of approximately 20-minutes. The teachers followed a well-scripted curriculum, but for purposes of the present study only spontaneous, unscripted

teacher questions around SBR were considered. The reading sessions were video recorded, and teachers' questions were coded according a rubric that evaluated cognitive demand level (four levels, from labeling to associating words and concepts) using The Observer XT (Noldus Information Technology, 2013). It was hypothesized that teachers who asked more spontaneous questions than required by the curriculum (i.e., unscripted questions) would be more effective at increasing children's vocabulary learning. It was also hypothesized that cognitively demanding questions would be associated with higher word learning among children.

Contrary to the expectations, the frequency and duration of all unscripted questions did not predict expressive nor receptive children's vocabulary knowledge on standardized or researcher-developed measures. However, the duration of questions that placed high cognitive demands on the children predicted their scores on a standardized test of expressive vocabulary.

To my daughter Sofia


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TABLE OF CONTENTS

ABSTRACT	ii
	
ACKNOWLEDGEMENTS	x
LIST OF TABLES	xkk
CHAPTER I INTRODUCTION	1
CHAPTER II EXTRATEXTUAL TALK AROUND SHARED BOOK READING: A SYSTEMATIC REVIEW OF THE ROLE OF QUESTION'S COGNITIVE DEMAND ON CHILDREN'S VOCABULARY GROWTH	6
Extratextual Talk around Shared Book Reading: A Systematic Review of the Role of Question's Cognitive Demand on Children's Vocabulary Growth	7
Shared Book Reading and Vocabulary Growth	8
Extratextual Conversations around Shared Book Reading	9
The use of questions around shared book reading	13
Purpose of the Review.....	14
Method	15
Inclusion criteria and search strategies.....	15
Coding of the studies	16
Studies included in the review.....	16
Results	18
Studies that used a wholistic approach.....	25
Studies that used an utterance level analysis approach	29
Discussion	41
Limitations and future directions	53
CHAPTER III QUESTIONING AROUND TEACHER-CHILD BOOK READING: THE EFFECT OF QUESTIONS THAT GO BEYOND THE SCRIPTED CURRICULUM ON CHILDREN'S VOCABULARY GROWTH	57
Questioning Around Teacher-Child Book Reading: The Effect of Questions that Go beyond the Scripted Curriculum on Children's Vocabulary Growth.....	58
The Contribution of SBR to Vocabulary Growth	59
The Importance of Instructional Strategies Intended to Foster Vocabulary Depth.....	60
Extratextual Conversations around SBR.....	64
Cognitive Complexity of Questions around Shared Book Reading.....	67

Purpose	73
Research Questions	73
Method	75
Original Study	75
Current Study	78
Results	88
Relation between teacher’s unscripted questions and children’s vocabulary outcomes.....	90
Discussion	97
Implications	103
Limitations and future directions	105
CHAPTER IV CONCLUSION.....	108
REFERENCES	113

LIST OF TABLES

		Page
Table 2.1	Summary of Studies Included in the Review	19
Table 3.1	Summary of The Observer Coding Scheme: Teacher’s Utterance Types Behavior Group	84
Table 3.2	Summary of Modifiers of Unscripted Questions: Cognitive Complexity...86	
Table 3.3	Intraclass Correlation Coefficients for Raters Using Frequency and Duration of Unscripted Questions at Different Levels of Cognitive Complexity	88
Table 3.4	Percentage of Questions at Different Levels of Cognitive Complexity for Scripted and Unscripted Questions.....	89
Table 3.5	Descriptive Statistics for Duration and Frequency of Unscripted Questions of Different Levels of Cognitive Complexity	90
Table 3.6	Summary of Intercorrelations, Ranges, Means, and Standard Deviations for PPVT-III, EOWPVT, RDRPVT, and RDEPVT Pretest and Posttest Scores	92
Table 3.7	Results for Random Intercept Models with no Predictors for Posttest PPVT-III, EOWPVT, RDRPVT, and RDEPVT Scores and Intraclass Correlation Coefficients	93
Table 3.8	Fixed Effects Results for Multilevel Models Predicting Posttest PPVT-III, EOWPVT, RDRPVT, and RDEPVT Scores	95
Table 3.9	Random Effects Results for Multilevel Models Predicting Posttest PPVT-III, EOWPVT, RDRPVT, and RDEPVT Scores	96

CHAPTER I

INTRODUCTION

Among oral language skills, vocabulary knowledge has been recognized as a strong predictor of reading achievement and comprehension (e.g., Beck, McKeown, & Kucan, 2008; Hindman, Skibbe, Miller, & Zimmerman, 2010; Joshi, 2005; Juel, 2006; Scarborough, 1998; Snow, Burns, & Griffin, 1998). Despite its importance, a significant number of children enter school with limited vocabulary knowledge, placing them at great risk for subsequent reading difficulties (National Institute of Child Health and Human Development [NICHD], 2000; Snow et al., 1998). Among those at risk, children from low income families and/or English language learners (ELL) often enter school with very low vocabulary knowledge compared to their peers from higher socioeconomic status (SES); (Hart & Risley, 1995, 2003; Hoff, 2003). Low SES children often come from homes where they experience limited interactions with language, less exposure to literacy rich opportunities, converse less with adults, and are exposed to fewer words than children from higher SES families (Hart & Risley, 1995).

The National Reading Panel (NICHD, 2000) highlighted the importance of vocabulary knowledge in learning to read and asserted that vocabulary instruction leads to significant gains in reading comprehension. The beneficial effect of vocabulary knowledge on reading comprehension is not limited to the early years of school, but it is also important later in students' life (Juel, 2006). For instance, Cunningham and Stanovich (1997) found that vocabulary knowledge assessed in first grade predicted about one third of reading comprehension in eleventh grade.

Different vocabulary domains have been examined as predictors of reading achievement (Snow et al., 1998). Two frequently assessed domains in studies with young children are receptive and expressive vocabulary. Receptive vocabulary refers to the vocabulary that a person can understand when it is presented in text or as others speak; expressive vocabulary is the vocabulary that a person uses in writing or when speaking to others (McCardle & Chhabra, 2004). In 1998, a National Research Council panel of reading experts (Snow et al., 1998) reported that the mean correlation between receptive vocabulary in kindergarten and reading scores in the first three grades was $r = .36$. For expressive vocabulary, the average correlation was $r = .45$. In 2008, the National Early Literacy Panel (NELP) showed that receptive and expressive vocabulary had moderate to weak relationships with reading comprehension (mean $r = .34$ and $.24$, respectively). Even though the relationships reported by the Panel were not very strong, the authors (NELP, 2008) highlighted that more complex oral language skills, such as grammatical knowledge, definitional vocabulary, and listening comprehension, depended on vocabulary knowledge. Some researchers (Dickinson, Golinkoff, & Hirsh-Pasek, 2010), however, have criticized the NELP report, arguing that the effects of language on reading need to be assessed across substantially longer time periods, and that the NELP report did not explicitly consider that language may influence reading via indirect pathways. Given the importance of vocabulary for later schooling and the evidence showing that early differences in vocabulary knowledge remain or grow larger as children progress through school (e.g., Beck, McKeown, & Kucan, 2002; Biemillier, 2001; Biemiller & Slonim, 2001), fostering vocabulary knowledge among young

children, especially among those who are at risk of reading difficulties, is an important educational goal.

Young children's listening and speaking competencies are more advanced than reading and writing; for this reason, oral language interventions are considered to be the standard for enhancing vocabulary knowledge for non-readers (Beck et al., 2002). Vocabulary in young children can be enhanced through adult-guided and focused strategies. Among those strategies, shared book reading (SBR) is an effective means of promoting children's language and literacy development (Biemiller, 2003; Bus, van Ijzendoorn, & Pellegrini, 1995; De Temple & Snow, 2003; Dickinson & Tabors, 2001; Mol, Bus, & de Jong, 2009; Mol, Bus, de Jong, & Smeets, 2008; Mol & Bus, 2011; NELP, 2008; Scarborough & Dobrich, 1994). SBR is broadly defined as an activity where an adult reads a book to a child or group of children (What Works Clearinghouse [WWC], 2006), and research has demonstrated that participation in SBR is associated with children's language growth (Bus et al., 1995 for a review). However, a growing body of evidence has focused on how different features of SBR influence children's language and literacy skills (Teale, 2003). Instructional practices that target vocabulary depth and extratextual conversations around SBR are some of the strategies that can facilitate more effective SBR (Gonzalez et al., 2014).

Vocabulary depth refers to how well a person knows words' meanings (Coyne, McCoach, Loftus, Zipoli, & Kapp, 2009). Although the benefits of improving vocabulary breadth (i.e., the numbers of words that a person knows) have been widely studied, the positive effects of vocabulary depth have received less attention (Li &

Kirby, 2014; Strasser, del Río, Larraín, 2013). For instance, research has supported that direct instruction that moves beyond memorizing dictionary definitions and provides children with the opportunity to interact with words in rich and complex contexts has a positive influence on reading comprehension (Coyne et al., 2009; NICHD, 2000; Strasser et al., 2013; Stahl & Fairbanks, 1986).

Recent research also has shown that interactive and extratextual conversations around SBR provide numerous opportunities for children to interact with words and word meanings (Anderson, Anderson, Lynch, Shapiro, & Eun Ki, 2012; Ard & Beverly, 2004). Through extratextual talk in the form of questions, comments, and statements that go beyond the book, adults can encourage children's participation and expand their discourse (Price, Bradley, & Smith, 2012), increasing word learning (Blewitt, Rump, Shealy, & Cook, 2009; Wasik & Bond, 2001).

Within extratextual conversations, questioning is a common strategy used to promote children's active participation (Massey, Pence, Justice, & Bowles, 2008) related to vocabulary knowledge (Blewitt, et al. 2009; Ewers & Brownson, 1999; Sénéchal, 1997). A growing body of research has focused on the level of abstract thinking demanded by adult questioning around SBR. It has been argued that adult talk that is cognitively demanding promotes vocabulary learning, particularly vocabulary depth (van Kleeck, 2008). However, the literature in this domain is limited, and research findings have not been conclusive. (e.g., Biemiller, 2003; Hindman, Connor, Jewkes, & Morrison, 2008; Justice, 2002; Zucker, Justice, Piasta, & Kaderavek, 2010). The present dissertation is an effort to add new evidence to the existing body of knowledge by

examining how extratextual conversations around SBR and particularly questions that are cognitively demanding may facilitate word learning in young children.

The second chapter of this dissertation is a systematic literature review intended to synthesize studies that examine the impact of questioning styles on vocabulary knowledge during SBR on preschooler language and literacy outcomes. To this author's knowledge, there are no previous reviews on this topic. The third chapter is an observational study that analyzed the relationship between teacher-generated questions of different cognitive demand levels and predominantly low SES preschoolers' receptive and expressive vocabulary on standardized and researcher developed measures. The participants of this study were 13 teachers and 100 children who were part of a larger 18-week scripted shared-reading study intended to improve vocabulary knowledge through teacher-guided shared reading instruction. For the purpose of the present article, only the teacher's unscripted questions were analyzed.

CHAPTER II

EXTRATEXTUAL TALK AROUND SHARED BOOK READING: A SYSTEMATIC REVIEW OF THE ROLE OF QUESTION'S COGNITIVE DEMAND ON CHILDREN'S VOCABULARY GROWTH

Shared book reading (SBR) has been identified as an effective method to enhance vocabulary learning among non-reader children. However, in the last years, research has emphasized that the instructional practices that surround SBR also are relevant and, consequently, the role of extratextual conversations that occur before, during, and after SBR have been empirically examined. The present review focuses on the cognitive demand of extratextual questions and their relationship with children's vocabulary growth. However, the literature in this domain is very limited. Out of the eleven studies included in the present review, only four of them focused exclusively on the role of question's cognitive complexity. Study findings were organized according to the approach used to explore the effect of the cognitive demand of adults' talk on children's vocabulary outcomes: wholistic approach; utterance approach, focused on questions and comments; and utterance approach, focused on questions. In general terms, studies that examined adults' talk showed that high cognitive demand talk produced greater vocabulary gains. Conversely, studies that examined the cognitive demand of questioning showed that high cognitive demand questions were not more efficient for improving word learning than low cognitive demand questions. However, several characteristics of the studies explored may account for these differences.

Extratextual Talk around Shared Book Reading: A Systematic Review of the Role of Question's Cognitive Demand on Children's Vocabulary Growth

The National Reading Panel recognized vocabulary as one of the five important components of reading and highlighted that “benefits in understanding text by applying letter-sound correspondences to printed material come about only if target word is in the learner’s oral vocabulary” (NICHD, 2000, p. 4-3). Several studies have highlighted that vocabulary knowledge is an important predictor of reading achievement and comprehension (Beck et al., 2008; Juel, 2006; Joshi, 2005; Scarborough, 1998; Snow et al., 1998). Nevertheless, a significant number of children enter school with low word knowledge, particularly children from low income families who are in disadvantage compared to their peers from higher socioeconomic status (Hart & Risley, 1995, 2003; Hoff, 2003). The chances of successfully addressing this vocabulary gap are greatest in the preschool and early primary years (Biemiller & Boote, 2006; Biemiller & Slonim, 2001). Therefore, early vocabulary interventions are important for effectively improving children’s word knowledge. Recent meta-analyses have reported gains around one standard deviation of early vocabulary interventions on children word’s knowledge for regular and at-risk population (Marulis & Neuman, 2010; Marulis & Neuman, 2013).

Among children who are non-readers, SBR has been identified as an effective and appropriate method to enhance children’s literacy and oral language (Biemiller, 2003; De Temple & Snow, 2003). Meta-analytic results indicate that participation in SBR activities is associated with children’s language growth (Bus et al., 1995), and in the past years, research has focused on the instructional practices that surround SBR and

how these practices may impact children's literacy and language development. However, it has been difficult to identify the specific behaviors that are most effective to foster children's word learning (Blewitt et al., 2009).

A growing body of research has examined how the level of abstract thinking demanded by adult questions around SBR affects children's vocabulary (e.g., Biemiller, 2003; Hindman et al., 2008; Justice, 2002; Zucker et al., 2010). Research has shown that extratextual conversations around SBR (i.e., talk beyond the text reading) provide multiple opportunities for children to interact with words and word meanings (Anderson et al., 2012; Art & Beverly, 2004) promoting vocabulary growth (Blewitt, et al. 2009; Ewers & Brownson, 1999; Sénéchal, 1997). It has also been suggested that conversations that are cognitively demanding are effective at increasing children's word knowledge, particularly vocabulary depth (van Kleeck, 2008). Notwithstanding, the literature in this domain is limited and research findings have not been conclusive. Consequently, the purpose of the present article is to review the extant literature to provide a clearer picture of what limited research there is on the relationship between the cognitive complexity of extratextual questions and vocabulary knowledge in young children.

Shared Book Reading and Vocabulary Growth

Among oral interventions, SBR has been the preferred method for improving vocabulary knowledge in young children. Widely defined as an activity in which an adult reads a book to a child or group of children (NELP, 2008; WWC, 2006), SBR is a more general term that comprises different reading practices. SBR, interactive SBR, and

dialogic-book reading basically differ in children's level of involvement in the reading experience (Trivett & Dunst, 2007). Whereas SBR does not require an extensive interaction among the participants, in the interactive SBR, children are actively involved in the story by adults asking questions and providing prompts, comments, and feedback (Mol et al., 2009). Dialogic reading is a technique that asks for even more involvement from children. In dialogic reading, adults and kids switch roles so that children become the storytellers supported by an adult who functions as an active listener and questioner (Trivett & Dunst, 2007).

Different reviews have reported moderate positive associations between SBR and language development (Bus et al., 1995; Mol et al., 2009). Book reading is a rich language input where children are exposed to more sophisticated vocabulary and to different content domains compared to what they experience in everyday life (De Temple & Snow, 2003; Juel, 2006; van Kleeck, 2006). Although empirical evidence supports the effectiveness of SBR on children's vocabulary knowledge (Bus et al., 1995; Mol et al., 2008; Mol et al., 2009; Mol & Bus, 2011; NELP, 2008; Scarborough & Dobrich, 1994), research has begun to focus on how the instructional practices that *surround* SBR may impact children's word learning (Teale, 2003). Among these practices, extratextual talk is considered an important element for supporting children's word learning (Gonzalez et al., 2014).

Extratextual Conversations around Shared Book Reading

Extratextual conversations around SBR (i.e., questions, comments, or conversation facilitation) provide opportunities for children to interact with words and

word meanings, thus increasing vocabulary gains (Ard & Beverly, 2004; Walsh & Blewitt, 2006; Zucker, Cabell, Justice, Pentimonti, & Kaderavek, 2013). SBR gives adults the opportunity to encourage children's participation, to expand their discourse, and to support children's learning (Price et al., 2012). Several studies have suggested that children's active participation during SBR may benefit vocabulary growth (Ewers & Brownson, 1999; Sénéchal, 1997; Sénéchal & Thomas, 1995; Whitehurst et al., 1988; see Ard & Beverly, 2004; Justice, 2002 for contrary results). Research has shown that reading techniques that more actively involve children in the process, such as interactive or dialogic reading, are more likely to produce positive results in reading-related outcomes (Trivette & Dunst, 2007). For instance, Wasik and Bond (2001) examined word learning in children who participated in interactive book reading activities in a 15 weeks preschool intervention period compared to children who experienced regular book reading. Teachers in the treatment group were trained to introduce new vocabulary, ask open-ended questions, and to engage children in conversation about the book. Children in the interactive book reading group learned more book-related vocabulary compared with children who experienced regular book reading.

In order to maximize the benefits of extratextual talk around SBR, research has focused on what specific aspects of these reading techniques may affect children's word learning. Of particular interest for the present review is a growing body of research that examines the effect of the cognitive demand of adults' talk on children's word learning. Depending on the cognitive demands that are placed on the child, language skills may be placed in a continuum that goes from literal to inferential (Zucker et al., 2010). Whereas

literal skills involve low cognitive demand tasks—tasks that children can accomplish using the information they can perceive—, inferential skills involve high cognitive demand tasks—where children have to process abstract information that is not directly available to them. At the low level of abstraction, children are tasked with labeling or describing characters, objects, and actions that are in the book. Inferential language, instead, requires children to analyze, hypothesize, or reflect on and integrate ideas and information (Zucker et al., 2010). For instance, the question *What is this?* merely requires children to say the name of an object they are seeing. Conversely, if the teacher asks *Why do you think the farmer will buy a scarecrow?* children must reflect and hypothesize considering the information they already have, a task which is more cognitively demanding.

Different terms have been utilized in research to describe the abstract language used by parents and teachers during SBR, such as decontextualized language (Hindman et al., 2008), analytical talk (Dickinson & Smith, 1994), cognitively challenging language (Massey et al., 2008), and inferential language (van Kleeck, 2008). Although these terms may present some differences in their operationalization, all of them refer to increasing cognitive demands placed on children during book sharing routines (van Kleeck, 2008) and denote high demand interactions that require some degree of decontextualization or distance from the story being read (Blewitt et al., 2009). It has been reported that the use of high cognitive demand questions and comments during book reading serve to model reading comprehension strategies for children, improving their listening and reading comprehension skills (van Kleeck, 2008). Scholars also have

examined how the cognitive demand of extratextual talk around SBR is related to children's vocabulary growth (e.g., Dickinson & Smith, 1994; Gonzalez et al., 2014; Zucker et al., 2010).

It has been posited that extratextual conversation that promotes the use of higher cognitive skills in children facilitates more complex and deeper knowledge of words and concepts (Dickinson, Darrow, Ngo, & D'Souza, 2009; Gonzalez et al., 2014; Van Kleeck, 2008). Vocabulary knowledge can be divided into two dimensions: vocabulary breadth, operationalized as the number of words that a person knows; and vocabulary depth that refers to the extent of semantic representation or how well the meanings are known (Coyne et al., 2009; Wagner, Muse, & Tannembaum, 2007; Ouelette, 2006). Although children can improve their vocabulary breadth by just hearing words during book-sharing activities (Robbins & Ehri, 1994), improving vocabulary depth would require extended instruction that facilitate word processing (Coyne et al., 2009). Adults can increase the cognitive and linguistic demands on children during SBR through high cognitive demand talk and scaffolding, challenging their current abilities up to a level where they can participate successfully (McGinty, Justice, Zucker, Gosse, & Skibbe, 2012), helping them to learn new words in a meaningful context.

The mechanisms whereby high cognitive demand talk improves children's word learning are unclear. Some evidence suggests that elaborative interrogations (i.e., questions that are cognitively demanding) may focus children's attention on previously learned knowledge supporting new associations that will be learned (Martin & Pressley, 1991). It has been proposed that encoding an event in terms of rich knowledge activates

more semantic links, thus creating access routes to facilitate information retrieval (Anderson & Reder, 1979). Therefore, the processing of the new information is enriched during encoding through questions that demand children to elaborate on previous knowledge structures, making multiple associations with previous knowledge structures facilitates information retrieval (Anderson & Reder, 1979; Ekuni, Vaz, & Bueno, 2011).

The use of questions around shared book reading

The effort for identifying the behaviors the most effectively promote word learning has also examined what specific utterances used around SBR are more efficient to facilitate vocabulary growth. Several studies have concluded that children's active participation during SBR positively affects vocabulary growth (Ewers & Brownson, 1999; Sénéchal, 1997; Sénéchal & Thomas, 1995; Whitehurst et al., 1988). Considering that teachers' questions are one of the most common forms of extratextual talk used in preschool settings (Zucker et al., 2010), representing about one third of all teacher utterances (Massey et al., 2008), different studies have explored the effectiveness of asking questions about the content or vocabulary around SBR for improving word knowledge. It has been argued that questions promote children's engagement in verbal interactions and have the potential to increase their participation in extended discourse (Massey et al., 2008).

Findings from several studies have recognized questions as an effective instructional strategy to engage children in verbal exchanges during SBR, and to enhance learning of new words (Blewitt et al., 2009; Ewers & Brownson, 1999; Sénéchal, 1997). For instance, Sénéchal (1997) found that preschoolers who were

exposed to a questioning condition during SBR outperformed children who only where exposed to a repeated reading of words, both in receptive and expressive vocabulary. Similarly, Ewers and Brownson (1999) found that kindergarteners learned more novel receptive vocabulary words when adults asked them questions promoting an active role (e.g., *what* or *where* questions) than when children had a passive participation (e.g., hearing only a synonym for a target word). However, contrary evidence has challenged these positive results (e.g., Ard & Beverly, 2004; Justice, 2002).

The way in which adults read to children may explain the benefits to children's literacy-related abilities (Reese, Cox, Harte, & McAnally, 2003). Evidence has shown the relevance not only of the "what", but also of the "how" in the reading practice (Teale, 2003). A growing body of research has empirically explored how the cognitive demand of adult's questions around SBR may impact children's word learning; however the results are not conclusive. The present review is an effort to synthesize studies that examine the impact of questioning around SBR on young children's vocabulary knowledge

Purpose of the Review

To this author's knowledge, to date there are no reviews on the impact of questions of different cognitive demand level on vocabulary knowledge during SBR. The purpose of this article is to review previous research findings in this domain, identify the similarities and differences among previous study results, and suggest future research directions that could help to clarify the relationship between the level of cognitive demand of questions during SBR and children's vocabulary growth.

Method

Inclusion criteria and search strategies

Three criteria were used to select studies. First, the participants were normally developed young children, from two to 6 years old. Second, the studies considered questions from two different levels of cognitive demand during SBR (high cognitive demand vs. low cognitive demand) as predictors. Third, study outcomes used vocabulary knowledge as the dependent variable. Given that the literature in this domain is limited, correlational, experimental, and quasi-experimental studies were included in the review.

Several electronic databases and search engines were used for locating studies: Scopus (SciVerse), Web of Knowledge, ERIC (EBSCO), PsycINFO (ProQuest), ScienceDirect (Elsevier), Web of Science (ISI). The studies included were published between 1994 and 2014. Dissertations also were included in this search. The book *Beginning Literacy with Language* (Dickinson & Tabors, 2001) also was reviewed to identify additional studies. When an article was included, its reference list was further examined to identify additional articles. A forward citation search also was conducted; that is, articles citing an article from the ongoing reference list were examined for possible inclusion in this review.

The keywords used to conduct this search were: shared book reading, reading, vocabulary, extratextual questions, extratextual talk, extratextual conversations, inferential questions, inferential language, inferencing, abstract language, and decontextualized language.

Coding of the studies

The characteristics of the studies included in this review were coded as follow:

(a) *bibliographic reference*: full APA-style article reference, and year of publication; (b) *sample descriptors*: number of participants in the study, mean age, children's first language, language used in the intervention, socioeconomic status (low, middle, or high); (c) *research design descriptors*: design (experimental or quasi-experimental, correlational), duration of the intervention (in weeks); delivery of the intervention (experimenter, teacher, and/or parent), size of groups in which book reading took place (individual, small group [max. 6 children], large group), use of scripted questions (yes or no); (d) *predictors of vocabulary knowledge*: questions, adult's talk, reading style; and (e) *outcome measures*: test(s) used to measure vocabulary (receptive and/or expressive, researcher-developed or standardized), test data.

Studies included in the review

Eleven studies were included in the present review. Although the main purpose of this review was to examine the role of question's cognitive complexity around SBR on children's vocabulary outcomes, since 1994 to date, a limited number of studies that focused exclusively on questioning were located. For this reason, studies that examined the cognitive demand level of adult's reading styles or a combination of questions and comments (i.e., teacher talk) also were included. Therefore, the present review was organized according to the approach used by each study for describing book reading strategies, similarly to Dickinson and Smith (1994). Dickinson and Smith stated that analyses of book reading can be placed in a continuum from wholistic to utterance-level

analyses. Wholistic approaches examine book reading styles and try to characterize reading strategies in terms of broad patterns. Utterance-level approaches examine events in terms of frequency of specific interactions that may influence children's outcomes.

In the present review, the different studies were organized into three groups: the first group included studies that took a more wholistic approach and examined how different adults reading styles relate to children's outcomes (Dickinson & Tabor, 2001, data related with teachers; Haden, Reese, & Fivush, 1996; Reese & Cox, 1999). In this group of studies, the adults' reading styles were identified via cluster analysis techniques and/or incorporated other variables beyond the cognitive demand level of the extratextual talk that characterized the group. The inclusion of these articles was deemed relevant for understanding the association between the demand level of extratextual talk and vocabulary learning at a broad, holistic level. The second group is comprised of studies that examined adult's talk and included questions and comments that teachers and parents make when reading to children (Dickinson & Tabor, 2001, data related with mothers and teachers; Gonzalez et al, 2014; Hindman et al., 2008; Hindman, Wasik, & Erhart, 2012; Silverman, 2007). The third group is comprised of studies that only looked at the demand level of questioning around SBR (Blewitt et al., 2009 [two studies]; Justice, 2002; Zucker et al., 2010). Although some of these studies did not specifically examine the frequency of some utterances (e.g., Blewitt et al., 2009, Justice, 2002), they did focus on questions and thus it was possible to evaluate the role of this particular utterance on children's word learning. Details of each study are reported in Table 2.1.

Several studies that consider the cognitive demand of the extratextual conversation around SBR were not included. Van Kleeck, Vander Woude, and Hammet's (2006) and Mc Ginty et al.'s (2012) samples were composed by children with specific language impairment. Another group of studies that are customarily referenced in extratextual talk research are those conducted by Whitehurst and colleagues (e.g., Whitehurst et al., 1988) who developed the *dialogic style* of SBR. Whereas this reading technique uses extratextual questions to facilitate word learning, these questions are typically of low cognitive demand and incorporate other elements beyond the extratextual talk, such as encouraging children to become the storyteller. Moreover, studies that explore the effectiveness of the dialogic style of reading have not compared this reading style against other cognitively complex reading styles.

Results

In all of the studies selected, the participants were young children (means ranging from 3.92 to 5.76 years old), and the children's primary language was English. The adult who read to the children varied in the different studies, the teacher or the experimenter being the most common readers (see Table 2.1). The number of children who were read to by teachers or experimenters also varied in the studies included in this review. In some studies adults read to children individually (Blewitt et al., 2009; Haden et al., 1996; Justice, 2002) and in others they read to the whole class (Dickinson & Tabors, 2001; Hindman et al., 2008; Hindman et al., 2012; Zucker et al., 2010). Only in one study the teachers read to a small group of children (Gonzalez et al., 2014). Below are the results of all the studies according to the approach they used to explore the effect of

Table 2.1

Summary of Studies Included in the Review

Study	N, age of child	Adult who read	SES	Treatment/intensity and duration	Treatment/Study description	Results
Studies that used a wholistic approach						
Correlational studies						
Dickinson & Smith (1994); Dickinson & Tabors (2001).	25, 4 years old / 5 years old at test	Teacher	Low SES	Coded reading of 1 book	Reading styles: co-constructive (talk during reading, limited talk before and after, conversations of high cognitive demand); didactic-interactive (limited talk, recall of predictable and recently read text), performance-oriented (most discussion before or after reading, questions of high cognitive demand).	RECEPTIVE-SD: Children in the performance oriented groups performed better than children in the didactic-interactive classrooms.
Haden, Reese, & Fivush (1996)	17 (Time 1 :40 months; Time 2 :58 months; Time 3: 70 months)	Mother	Middle Class	Mother read one familiar and one unfamiliar book at 40 and at 58 months.	Reading styles: describer (mostly use of descriptions), the comprehender (print knowledge and high cognitive demand talk), and collaborators (confirmations).	RECEPTIVE-SD: Children of comprehender mothers scored higher at age 6 than did children of mothers reading in the other two styles on unfamiliar books. No differences among groups on familiar books.
Experimental studies						
Reese & Cox (1999)	48 4.0 - 4.10 years old (M=4. 5 month)	Experi- menter	Middle class	Individual tutorial. 2-3 readings sessions for week for 6 weeks. (32 books, 2 to 3 books each session)	Children assigned to: describer style (low demand-labels and descriptions- and interrupting); comprehender style (high demand-predictions and inferences story and emotions- and interrupting) ; performance oriented style (high demand and non interrupting).	RECEPTIVE-SD: Children in describer condition showed significantly greater vocabulary gains than children in performance-oriented group. RECEPTIVE-SD: Interaction effect: Children with higher initial vocabulary skills gained most from performance oriented; children with lower initial skills gained more from describer style.

Table 2.1 Continued

Study	N, age of child	Adult who read	SES	Treatment/intensity and duration	Treatment/Study description	Results
Studies that used an utterance level analysis approach: focus on adult's talk						
Correlational studies						
Dickinson & Smith (1994); Dickinson & Tabors (2001)	25 (4, 5 years old)	Teacher	Low SES	Coded the reading of 1 book at school	Children and teachers' utterances coded at three levels: placement (before, during, after reading), request or responses, and content (cognitively challenging talk, low cognitive demand talk, and talk to manage interactions).	RECEPTIVE-SD: Analytical talk accounted for 50% of the variance in children's vocabulary after 1 year of school visit (variable included proportion of prompted and responsive analysis, prediction, and vocabulary utterances of both teachers and children).
	51 (3, 4, 5 years old)	Mother	Low SES	Three home visits at, 3 (one books read), 4 (two books read), 5 years old (three books read)	Researchers coded immediate talk: comments and questions focused here and now (labeling, yes-no questions) vs. nonimmediate talk: personal experiences, comments and questions about general knowledge, inferences and predictions while mothers read.	RECEPTIVE-SD: Percentage of immediate utterances was negatively associated to receptive vocabulary and early literacy measures. RECEPTIVE-SD: Mother's percentage and number of utterance of nonimmediate talk were associated to receptive vocabulary (age 3 and 5 with different books).
Hindman et al. (2008)	99 (2.81 to 5.22 years, $M=3.95$, $SD=0.52$)	Parents / Teacher	Middle Class	One observation at home and one observation at school.	Children reading with their parents at home and with teachers in the preschool. Adults' talk coded as contextualized talk (comments and questions about concretes ideas or objects that are clearly depicted in the book) vs decontextualized talk (comments and questions about concepts not depicted in the book, defining, predicting).	EXPRESSIVE-SD: Vocabulary was unrelated to teachers' contextualized talk and marginally inversely related to parents' contextualized talk. EXPRESSIVE-SD: For children with higher initial vocabulary knowledge more lower order talk was negatively related to Spring outcomes at home and school EXPRESSIVE-SD: Decontextualized talk by parents and teachers was an effective predictor of vocabulary at the end of preschool EXPRESSIVE-SD: Effects of teacher's decontextualized talk were stronger for children with lower initial vocabulary skills.

Table 2.1 Continued

Study	N, age of child	Adult who read	SES	Treatment/intensity and duration	Treatment/Study description	Results
Studies that used an utterance level analysis approach: focus on adult's talk						
Correlational studies						
Hindman et al. (2012)	153 3 to 4 years old	Teacher	Low SES	Teachers videotaped reading one book in Spring and one book in Fall. Unfamiliar book.	Book related discussion coded in terms teacher use of contextualized and decontextualized talk.	RECEPTIVE-SD: Statistically significant relation between contextualized talk and vocabulary in Spring and with decontextualized talk . RECEPTIVE-SD: Interaction-Contextualized talk was most strongly associated with Spring scores for children with lowest initial vocabulary. No contributions to learning of contextualized talk among children with strongest initial competence.
Gonzalez et al. (2014)	92 4.08 to 5 years <i>M</i> = 4.58 (<i>SD</i> = 0.30)	Teacher	Low SES	Small group tutorial (6 children) in 20 minutes daily, 5 days a week for 18 weeks. (59 science- and 35 social studies- vocabulary words;32 books)	Study looked at teacher talk before, during, and after reading, along with the cognitive complexity of questions: labeling, describing and associating.	RECEPTIVE-SD: Duration allocated by teachers to vocabulary association questioning and to comprehension-association questioning significantly predicted posttest scores EXPRESSIVE-SD: Frequency and duration of vocabulary-association questioning a significant predictor of expressive vocabulary No interactions between type of talk and initial vocabulary level (expressive or receptive SD).
Quasi-experimental studies						
Silverman (2007)	94	Teacher	Low (35%) and Middle Class	Whole class. 3 day lesson plan for 6 weeks (30 words; 5 from each of 6 books). Not unfamiliar words. Books read three times each.	Contextual (discussion about story, new words, connect them with background knowledge and experience); Analytical (words in new contexts outside their experience, compare, evaluate use of new words + contextual); Anchored (attend to letters and sounds in words+ contextual+ analytical).	RECEPTIVE-RD: Children in the analytical and anchored condition learned more words on receptive vocabulary than contextual condition EXPRESSIVE-RD: (definition of words): No difference between analytical and anchored condition; differences between anchored and contextual and analytical and contextual.

Table 2.1 Continued

Study	N, age of child	Adult who read	SES	Treatment/intensity and duration	Treatment/Study description	Results
Studies that used an utterance level analysis approach: focus on adult's talk						
Quasi-experimental studies						
Silverman (2007) (Follow up study)	50	Teacher	Low (38%) and Middle Class		Same conditions reported above (Silverman, 2007)	<p>RECEPTIVE-RD: Differences at posttest between anchored and contextual. At follow up, scores in the anchored higher than analytical and contextual.</p> <p>EXPRESSIVE-RD (definition of words): At posttest scores in the analytical and anchored conditions were higher than contextual. At posttest differences between anchored and contextual were significant. Interactions with SES and ELL status at follow up.</p>
Studies that used an utterance level analysis approach: focus on questioning						
Correlational studies						
Zucker et al. (2010)	117 (expressive)-115 (receptive) 3.42 - 5 years old (M=4.32, SD=0.87)	Teacher	Low SES	Whole class tutorial in 4 reading sessions weekly x 30 weeks. Control group. Study based on one video recorded.	Teachers reading children. Teacher and children utterances were coded according to four levels of cognitive complexity: Literal level 1, literal level 2, Inferential level 1, Inferential level 2. Teacher used a book provided by experimenter. Children had read the text before (at least twice).	<p>RECEPTIVE-SD: No effects of frequency of literal or inferential questions when controlling by initial vocabulary</p> <p>Interaction between initial receptive vocabulary skills and proportion of inferential questions was significant based on more liberal alpha ($p=.097$). Children with lower scores benefited from literal questions and high scores from inferential questions</p> <p>EXPRESSIVE-SD: No effects of frequency of literal or inferential questions when controlling by initial vocabulary.</p>

Table 2.1 Continued

Study	N, age of child	Adult who read	SES	Treatment/intensity and duration	Treatment/Study description	Results
Studies that used an utterance level analysis approach: focus on questioning						
Experimental studies						
Justice (2002)	23 37 to 59 months <i>M</i> =3.92 years, <i>SD</i> =7 months	Experimenter	Middle Class	Individual tutorial, 2 reading sessions, period of one week (10 new words, 2 exposures to each word)	Adult read one storybook on each sessions to children assigned to two experimental conditions: questioning vs. labeling of novel words, and conceptual (high cognitive complexity) vs. perceptual (low cognitive complexity).	RECEPTIVE-RD: Conceptual and perceptual questions had the same effect on children word leaning (No advantages or disadvantages) EXPRESSIVE-RD: Conceptual and perceptual questions had the same effect on children word leaning (No advantages or disadvantages)
Blewitt et al. (2009a)	58 2,10 - 4,1 years old (<i>M</i> =3.58, <i>SD</i> =0.30)	Experimenter	Middle to upper middle class	Individual tutorial in 4 reading sessions over a period of 6 weeks (six textual and six extratextual exposures to 9 target unfamiliar words, through three storybooks)	Experimenter read books to children in four intervention conditions: resulting from the intersection of questioning demand level (low vs. high) with placement (interrupting vs. noninterrupting)+ control condition with no vocabulary-relevant extratextual questions.	RECEPTIVE-RD: No effects of cognitive demand level or placement on immediate or delayed tests. Matthew effect EXPRESSIVE -RD: No effects of cognitive demand level or placement immediate or delayed tests Matthew effect General vocabulary (standardized receptive) did not moderate effectiveness of high or low demanding questions in any of the dependent measures RECEPTIVE-SD: No effects of cognitive demand level or placement Intervention did not affect general vocabulary knowledge.

Table 2.1

Study	N, age of child	Adult who read	SES	Treatment/intensity and duration	Treatment/Study description	Results
Studies that used an utterance level analysis approach: focus on questioning						
Experimental studies						
Blewitt et al. (2009b)	50 3,00 - 3,11 years old (<i>M</i> =3.68, <i>SD</i> =0.21)	Experimenter	Middle to upper middle class	Individual tutorial in 4 reading sessions over a period of six weeks (six textual and six extratextual exposures to 9 target unfamiliar words, through three storybooks)	Experimenter read books to children in three intervention conditions: low cognitive demand questions, high cognitive demand questions, and a scaffolding-like condition (low and high demand questions). All questions in interrupting fashion.	RECEPTIVE-RD: No differences between high and low demand level questions on posttest No differences between scaffolding condition and the other two conditions combined. Matthew effect EXPRESSIVE-RD (definition of words): No differences between high and low demand level questions on posttest . Children in the scaffolding like condition had better results than children in the low and high demand conditions combined. Matthew effect RECEPTIVE-SD: No effect of demand level.

Notes. SD = Standardized vocabulary measure; RD = Researcher-developed vocabulary measure.

the cognitive demand of adults talk on children's vocabulary outcomes: wholistic approach, utterance approach focused on questions and comments, and utterance approach focused on questions.

Studies that used a wholistic approach

As it was said before, studies that used a wholistic approach refer to general conversational styles to characterize broad reading patterns (Dickinson & Smith, 1994). In the present review, the three studies that used this approach defined the reading styles not only in terms of the cognitive demand placed on children during book sharing routines, but also in the amount of talk before, during, or after reading; the interruption of the discussion; or the combination of different types of questions and comments around SBR.

The first of these studies is a longitudinal research project conducted by Dickinson, Tabors, and colleagues (Dickinson & Smith, 1994; Dickinson & Tabors, 2001) called the Home-School Study of Language and Literacy Development. In this study, started in 1987, the authors explored longitudinally how parents and teachers supported language development in children from low-income families. In an article published in 1994, Dickinson and Smith reported the results for the first cohort of this study ($n = 25$), and in a book published later Dickinson and Tabors (2001) reported the findings of the first years of data collection ($n = 74$).

Dickinson and colleagues (Dickinson & Smith, 1994; Dickinson & Tabors, 2001) observed teachers, parents, and children and took two different approaches to analyze the data. First, they distinguished different reading styles among teachers and examined

how these reading styles were related to children's vocabulary outcomes (these results are summarized here). They also explored how the frequency of specific interactions between teachers, parents, and children were associated with vocabulary growth (utterance level analyses that will be analyzed later). The children were visited once a year at ages 3, 4, and 5 at home and at their preschool program. Reading time (among other children's activities) was videotaped, teachers and parents were interviewed, and when the children were five years old different language and literacy measures were administered.

Regarding teachers, when the children were 4 years old, Dickinson and Smith (1994) identified three reading styles in 25 classrooms via cluster analysis (the same results were reported by Dickinson & Tabors, 2001): co-constructive style (characterized by talk during reading, limited talk before and after, and conversations of high cognitive demand), didactic-interactional style (limited talk, group recall of predictable text and recently read text), and performance-oriented style (most discussion before or after reading, questions of high cognitive demand). Using group membership as predictor, they found a significant effect for the standardized receptive vocabulary measure. Post hoc comparisons revealed one statistically significant difference between groups. At five years old, children in the performance-oriented group had significantly better receptive standardized vocabulary scores than children in the didactic-interactional group. That is, children who were exposed to a more cognitively demanding reading style performed better on vocabulary measures than children exposed to a less cognitively demanding style.

In a similar study, but conducted with a sample of mothers and children ($n = 17$), Haden et al. (1996) visited families when children were 40- and 58-months old and asked the mothers to read an unfamiliar and a familiar storybook. All mother and child comments that were not part of the text were coded. When children were 70 months, an emergent literacy assessment was administered. Through cluster analysis the authors distinguished three reading styles used by mothers: the describer style (mostly use of descriptions), the comprehender style (print knowledge and high cognitive demand talk; similar to Dickinson & Smith's (1994) performance-oriented style), and collaborators (high use of confirmations). Children of comprehender mothers scored higher on standardized receptive vocabulary measures at age 6 than children of mothers in the other two styles on unfamiliar books. However, no statistically differences were found on familiar books. Although the study hypotheses were partially supported, it is important to note that given the fairly small number of participants, results from Haden et al. should be interpreted with caution. That is, research with a larger sample would be needed to establish the validity of these findings.

In the third study that examined reading styles, Reese and Cox (1999), assigned 48 four year old to receive one of three treatments based on naturally occurring styles that were described previously on the literature (Dickinson & Smith, 1994; Haden et al., 1996): describer style (low demand and interrupting); comprehender style (high demand and interrupting); performance oriented style (high demand and non-interrupting). The intervention took place during six weeks with two to three reading sessions per week.

The administrators followed a strict reading protocol for each of the conditions with scripted comments and questions. No target words were considered.

Contrary to previous research findings (Dickinson & Smith, 1994; Haden et al., 1996), Reese and Cox (1999) found that the describer condition (the less cognitive demanding condition) resulted in greater vocabulary gains on a standardized receptive vocabulary measure than the performance-oriented condition. Most importantly, Reese and Cox reported an interaction between reading style and initial vocabulary level: whereas children with higher initial vocabulary skills gained more from a performance-oriented style, children with lower initial skills gained more from a describer style.

The results from these studies, which examined wholistic approaches to SBR activities, suggest that a reading style that is more cognitively demanding positively affects children's receptive word learning (Dickinson & Smith, 1994; Haden et al., 1996). Reese and Cox's (1999) main result that children in the describer condition showed greater vocabulary gains than children in the other more cognitively demanding conditions could be accounted for by differences in sample characteristics. Although previous research has shown that less demanding styles may be effective for improving children's vocabulary knowledge (e.g., *dialogic reading*, Whitehurst et al., 1992), studies that compare high and low cognitive demanding styles have not reached the same conclusion. Reese and Cox suggest that studies that found that higher demand styles were more beneficial were conducted either with older children (Dickinson & Smith, 1994) or with children of above average skills (Haden et al., 1996).

Reese and Cox's (1999) finding that children's initial vocabulary skills moderated the effect of reading style on word learning has been later replicated in studies that focus on adult's talk (Hindman et al., 2012). This last result highlights the possibility that reading styles are not one fit for all children. A less cognitively demanding style would be more appropriate for children with a lower initial vocabulary level, whereas a higher demand style would work better for more advanced children.

Although these studies are important for extratextual talk research and are commonly referenced in this literature, given that each broad reading style combines questions, comments, and other variables, it is difficult to draw meaningful conclusions regarding the effect of specific interactions during SBR. Using this type of approach is not possible to identify the specific stylistic behaviors (Blewitt et al., 2009) that most effectively promote vocabulary learning.

Studies that used an utterance level analysis approach

A second group of studies is comprised of studies that focus on specific interactions (i.e., comments and questions, only questions) around SBR that may impact children's word learning. Of these studies, five examined the relationship between adults talk and children's vocabulary outcomes, and four focused exclusively on the role of questions of high or low cognitive demand on vocabulary growth.

Studies that focus on adults' talk. This group of studies explored how the cognitive complexity of comments and questions of teachers and parents that go beyond text reading was related to children's vocabulary growth. Four of these five studies are correlational studies (Dickinson & Tabors, 2001; Gonzalez et al., 2014; Hindman et al.,

2008; Hindman et al., 2012), and one of them (Silverman, 2007) is a quasi-experimental study. With the exception of Silverman's (2007) study, studies in this category only reported standardized vocabulary measures. These studies are described below and main results are discussed.

In addition to reading styles, the classical Home-School Study of Language and Literacy Development (Dickinson & Smith, 1994; Dickinson & Tabors, 2001) examined the characteristics of teachers and parents' utterances around SBR. Regarding teachers, the results from the first cohort of four year olds ($n = 25$) showed that conversations that were analytical—a type of talk characterized by high cognitive demand questions and comments related to analysis, prediction, and words meaning—were positively correlated to kindergarten's children receptive standardized vocabulary scores, accounting for 50% of the variance in children's vocabulary (Dickinson & Smith, 1994). These findings were corroborated later with the whole sample ($n = 65$; Dickinson & Tabors, 2001). Dickinson and colleagues (Dickinson & Tabors, 2001) also videotaped mothers reading to their children at ages 3, 4, and 5 ($n = 51$). In these three visits books were provided by the research team. The authors coded mothers' talk and distinguished between immediate talk (comments and questions focused here and now, such as labeling) and non-immediate talk (comments and questions referred to personal experiences, general knowledge, inferences, and predictions). In this analysis they found that the amount of immediate talk decreased as children got older, and, concordant with the findings from the classrooms, the percentage and number of utterances of nonimmediate talk were associated to children's receptive vocabulary at ages 3 and 5.

Conversely, the percentage of mother's immediate utterances was negatively associated to receptive vocabulary.

In Hindman et al.'s (2008) study, 99 children from middle class families were visited once at home and once at school and were videotaped reading with their parents and with their teachers, respectively. Teachers were asked to select their own books at school, and parents were provided with a book by the researchers. Adults' talk was coded as contextualized talk (comments and questions about concrete ideas or objects that are clearly depicted in the book) or decontextualized talk (comments and questions about concepts not depicted in the book, defining, predicting). Hindman et al. found that expressive standardized vocabulary scores were unrelated to teachers' contextualized talk (low cognitive demand) and inversely related to parents' contextualized talk. Hindman and colleagues also reported that decontextualized talk by parents and teachers was an effective predictor of expressive vocabulary at the end of preschool, and the effects of teacher decontextualized talk were stronger for children with low initial vocabulary skills.

Another study that explored the effects of extratextual talk of different levels of cognitive demand on children's receptive and expressive vocabulary was a quasi-experimental study conducted by Silverman (2007). Ninety-four children were assigned to receive one of three treatment conditions in a three-lesson plan for six weeks: contextual (discussion based on connecting words to their use in books and to children's personal experience); analytical (discussion that enhanced contextual instruction with semantic analysis of words in contexts other than the books and children's experience);

and anchored (discussion that augmented analytical instruction with attention to spoken and written forms of words). The design included researcher-developed measures of receptive and expressive vocabulary. Children in the analytical and anchored conditions had better scores on measures of receptive and expressive vocabulary than children in the less cognitively demanding contextual condition. No statistically significant difference was found between the analytical and anchored condition. In a follow up study, Silverman (2007) investigated the effects of instruction with 50 children from the original study 6 months after the intervention, when the children were in first grade. At follow up, the author found that scores in the anchored condition were higher than analytical and contextual conditions on the researcher-developed receptive vocabulary measure. On the expressive measure scores she only found statistically significant differences between the anchored and contextual conditions.

More recently, Hindman et al. (2012) analyzed book-related discussion during SBR in terms of teacher use of contextualized and decontextualized talk (similar to Hindman et al., 2008). Head Start teachers ($n = 10$) and children ($n = 153$) were videotaped reading one unfamiliar book in Spring and another unfamiliar book in the Fall. Given the nested nature of the data the authors considered to conduct multilevel modeling. However, a low intraclass correlation coefficient ($0.03, p = .097$) determined that they conducted an ordinary least squares multiple regression. Hindman et al. (2012) found that both contextualized and decontextualized teachers' talk predicted children's receptive vocabulary learning. In the case of decontextualized talk, this association was not moderated by children initial receptive vocabulary knowledge; however,

contextualized talk was more strongly associated with vocabulary scores for children with low initial vocabulary and did not contribute to learning among children with the high initial vocabulary. This interaction effect was similar to the one reported by Reese and Cox (1999).

The fifth study was conducted by Gonzalez et al. (2014) and examined teacher talk before, during, and after reading, along with its cognitive complexity and their relation to children's receptive and expressive vocabulary. This observational study was part of a larger vocabulary intervention intended to accelerate vocabulary knowledge through SBR that Gonzalez et al. implemented with preschool children from low income families. Participants were 13 treatment teachers and 92 children who, over the course of 18 weeks, participated in small-groups sessions of teacher-guided reading instruction. The books were provided by the research team, and the teachers used a scripted curriculum. However, teachers were not prevented from asking additional questions or making comments during the instructional time. Gonzalez et al. coded teachers talk (including unscripted questions and comments) according to three types of cognitive complexity (label, define, or associate) and the instructional focus of each event (i.e., target vocabulary word or comprehension/concept knowledge). Gonzalez et al. conducted a multilevel modeling analysis and found that duration of teacher's vocabulary and comprehension association talk (high cognitive complexity) was related to receptive vocabulary, and duration and frequency of teacher vocabulary-related association talk predicted expressive vocabulary. Gonzalez et al. did not find interactions with initial vocabulary skills.

Taken together, these studies provide some interesting information regarding the relationship between the cognitive demands of extratextual talk around SBR and children's vocabulary outcomes. With the exception of Hindman et al.'s (2012) study, results indicate that extratextual talk that was more cognitively demanding had better results either on standardized receptive vocabulary measures (Dickinson & Smith, 1994; Dickinson & Tabors, 2001, Gonzalez et. al, 2014), standardized expressive vocabulary measures (Gonzalez et al., 2014; Hindman et al., 2008), or researcher-developed expressive and receptive vocabulary measures (Silverman, 2007). Moreover, Hindman et al. (2008) and Gonzalez et al. (2014) found that low cognitive demand talk did not predict word learning and, in the case of Hindman et al.'s (2008) study, parents' contextualized talk was inversely related to vocabulary growth. Hindman et al. (2012) did not reject the value of more challenging talk on children's word learning, but they found that both low and high cognitive demand talk predicted children's vocabulary growth. Silverman's (2007) studies did not compare low versus high cognitive demand conditions, but rather confronted a low cognitive demand condition (contextual) versus a condition that included low and high cognitive demands questions and comments (analytical). Silverman's findings are relevant because she found that a combination of low and high cognitive demand resulted in increased word learning.

However, additional findings added some complexity to the role of the cognitive demand of extratextual talk by challenging the idea that high or low cognitive demand talk may be one-size-fits-all. Using a sample of middle class children, Hindman et al. (2008) found that the effects of decontextualized talk were beneficial for all children, but

particularly stronger for children with the relative lowest initial expressive vocabulary knowledge. This finding is contradictory with Reese and Cox's (1999) study that, using also a sample of middle class children, demonstrated that a more cognitively demanding style was more beneficial for children with higher initial receptive vocabulary skills. Furthermore, Hindman et al.'s (2008) initial findings could not be successfully replicated by Hindman et al. (2012) or Gonzalez et al. (2014)'s who worked with low SES samples and who reported that the effect of decontextualized talk was not moderated by children initial vocabulary skills.

On the other hand, Hindman et al. (2012) reported that both contextualized and decontextualized talk were associated with children's receptive word learning; however, contextualized talk was more strongly associated to vocabulary gains among children with the lowest initial receptive vocabulary skills. This finding is consistent with Reese and Cox's (1999) study, which also found that children with lower initial receptive vocabulary skills benefited more from a describer reading style.

In sum, it is not unreasonable to posit that when children are exposed to high cognitive demand talk beyond the book reading, they learn more vocabulary words compared to low cognitive demand questions and comments. It seems, however, that this effect depends on children's characteristics, such as initial vocabulary skills. However, there is no consensus on this issue and characteristics of the studies may account for these discrepancies. For instance, it is possible that in Hindman et al.'s (2008) study more skilled children did not benefited as much as less skilled children because they could have reached a ceiling where the questions asked did not produced the same

amount of improvement as in the case of children with lower vocabulary skills. As Hindman et al. (2008) suggested, further analysis of the talk exchanged could shed some light on this issue. There are different levels of abstraction within decontextualized talk. For instance, questions that require children to access previous knowledge or experiences are less cognitive demanding than questions that require to analyze or hypotheses about relationships of some events. In fact, Zucker et al. (2010) found that not all inferential questions led to elaborated child responses; rather, questions at the higher level of abstraction the questions produced more elaborated responses. Thus, a finer analysis of *types* of decontextualized talk used by teachers or parents and their effects on word learning could help clarify this issue.

Another aspect of the studies presented here is that most studies—except for Silverman’s (2007)—are correlational studies and they cannot establish a causal relationship between cognitively demanding extratextual talk and children’s vocabulary. Thus, other variables may account for the observed differences in vocabulary gains.

Studies that focus on questioning. Only four studies focused exclusively on the role of the cognitive demand of questioning on children’s vocabulary growth. Three of them were experimental studies (Blewitt et al., 2009, 2 studies; Justice, 2002) and one was a correlational study (Zucker, 2010). At the onset, it is important to recognize that similarly to other studies considered for the present review, the sample sizes of these experiments were less than optimal (study *ns* between 23 and 58, with 2 and 5 experimental conditions, respectively).

In an experiment conducted with 23 middle class preschool children, Justice (2002) sought to answer to what extent questioning versus labeling during SBR could exert a differential influence on children's expressive and receptive vocabulary, and whether perceptual (low cognitive complexity) versus conceptual (high cognitive complexity) questions differentially influenced vocabulary learning. Each child was assigned 10 unknown words and received individual tutorial by an adult reader in two reading sessions over a period of one week. Each of the ten words was randomly assigned to either a labeling or a questioning condition. The children were exposed to their five questioning words via perceptual ($n = 12$) or conceptual ($n = 13$) questions. Word exposure was controlled by using written scripts so that every child was exposed to each word one time during each reading session. Researcher-developed measures of expressive and receptive vocabulary were administered after the second reading session. First, Justice found that the exposure to labeling produced greater gains in receptive vocabulary than questioning, but no difference was found in expressive vocabulary. In terms of the cognitive complexity of questions, Justice reported that conceptual and perceptual questions were equally effective for improving children's expressive and receptive vocabulary.

In 2009, Blewitt et al. published two experimental studies that explored the effect of the cognitive level and placement of extratextual questions on children expressive and receptive vocabulary. In the first experiment, 58 preschool children from middle to upper middle class were randomly assigned to five conditions: one control and four intervention conditions—resulting from the intersection of questioning demand level

(low vs. high) with placement (interrupting vs. noninterrupting). Children received individual tutorial in four reading sessions over a period of six weeks and had six textual and six extratextual exposures to 9 target unfamiliar words, through three storybooks. In this study the demand level of the questions or the placement had no effect on researcher-developed measures of comprehension or production of target words. Although Blewitt et al. found that children with larger general receptive vocabularies prior to the intervention had better results at posttest in comprehension and production of words (Matthew effect, Stanovich, 1986); however, general vocabulary did not moderate the effectiveness of high or low demanding questions on comprehension or production of words. Finally, the demand level or placement of questions did not predict scores on a standardized measure of receptive vocabulary.

In their second experiment, Blewitt et al. (2009) randomly assigned 50 preschool children to three intervention conditions: low cognitive demand questions, high cognitive demand questions, and a scaffolding–like condition that began with low cognitive demand questions and later introduced high cognitive demand questions. The procedures of the reading sessions were the same as those utilized in the first experiment. Consistent with data from the first experiment, Blewitt et al. found no differences between low and high demand conditions on researcher-developed measures of comprehension or definition of words. They also found a Matthew effect for each of the dependent measures—children with higher initial generalized vocabulary scores performed better at both posttests. Then, Blewitt et al. combined the low and high demand question conditions and compared them to the scaffolding-like condition. In this

analysis, Blewitt et al. found that the scaffolding condition was more effective than the other two conditions combined only in definition of words (an expressive vocabulary measure) but not in comprehension of words. Finally, as in the first experiment, none of the demand levels predicted general vocabulary.

The last study that examined the relationship between the cognitive demand of questions and children's vocabulary knowledge is a correlational study conducted by Zucker et al. (2010). In this study, the authors observed naturally occurring interactions between 25 teachers and 117 four year old children from low SES. These participants were part of larger study in the regular reading condition, and the observation was made based on one video where teachers were reading one book provided by the examiner (this was at least the second time the children were exposed to the same book). Among others things, the authors coded the cognitive complexity of teacher's questions according to four levels of cognitive complexity: literal level 1, literal level 2, inferential level 1, and inferential level 2. Contrary to their expectations, Zucker et al. did not find effects of frequency of literal or inferential questions on standardized receptive or expressive vocabulary measures when controlling by initial vocabulary.

Interestingly, and contrary to the majority of the results reported by studies that examined adults' talk, none of the studies reviewed in the present section found that more cognitively demanding questions around SBR were more effective for improving word learning compared to low cognitive demand questions. Justice (2002) found that low and high cognitive demand questions were equally effective for children's vocabulary growth as measured by researcher-developed expressive and receptive

vocabulary measures. In their first study Blewitt et al. (2009) reported no effects of cognitive demand level of questions on children's vocabulary, and in a second study, Blewitt et al. found no difference when comparing low and high cognitive demand questions, and between low and high cognitive demand questions together compared to a scaffolding-like condition on a researcher-developed receptive vocabulary measure. However, in this second experiment, children in the scaffolding-like condition performed better than their peers on a definition test that examined more deep and elaborated understanding of words. This result is similar to the finding reported by Silverman (2007), who found that a combination of low and high cognitive demand talk was better for word learning than low cognitive demand talk by itself. Finally, Zucker et al. (2010) found no effects of literal or inferential questions on receptive and expressive standardized vocabulary measures.

Studies that examined the role of questions and comments on children's word learning found that extratextual talk that was more cognitively demanding was more effective for improving children's word knowledge (Dickinson & Smith, 1994; Dickinson & Tabors, 2001, Gonzalez et. al, 2014; Hindman et al., 2008) or was equally effective as low cognitive demand talk (Hindman et al., 2012). In this group of studies, some interactions also were reported suggesting that this effect would not be equal for all children (Hindman et al., 2008; Hindman et al., 2012), although this findings are not conclusive.

These results raise some questions about the impact of the characteristics of the study and of the questions and their cognitive demand level in improving word

knowledge. Given the differences among the studies analyzed in this section, the comparisons are not straightforward. Several characteristics of the studies and/or the samples may be considered to interpret the findings. For instance, Justice's (2009) and Blewitt's (2009) studies are experimental studies, and they strictly controlled the familiarity of the words and the number of times of that exposure. Conversely, most of the studies that examined questions and comments together were correlational studies in which word knowledge or word exposure were not controlled (e.g., Dickinson & Smith, 1994; Gonzalez et al., 2014; Hindman et al., 2008; Hindman et al., 2012). It is possible that familiarity and word exposure may have had some influence on the different results. It is also plausible that the extension and intensity of the interventions of Justice and Blewitt et al.'s studies were not sufficient compared with naturally occurring interactions (Dickinson & Tabors, 2001; Hindman et al., 2008; Hindman et al., 2012) or with longer interventions (Gonzalez et al., 2014). Again, the small group sizes in the experimental studies reduce the likelihood of finding statistically significant effects. Finally, differences in the predictors used in the two groups of studies also could explain divergent outcomes; whereas one group observed comments and questions together, the other specifically focused on the effect of questioning.

Discussion

The present review sought to examine the relationship between the cognitive demand of extratextual questions around SBR and vocabulary growth among young children. Although it has been argued that cognitively demanding questions are an appropriate method to foster vocabulary knowledge (van Kleeck, 2008), there have been

no prior reviews of the research literature to substantiate this claim. Therefore, the systematic review reported here was conducted to fill that void.

The findings from the studies included in this review only partially supported the hypothesized benefits of cognitively demanding questions around SBR on children's vocabulary development. Given that only four studies that focused exclusively on the effect of the cognitive demands of adults' questions were found, studies that looked at different forms of adult SBR discourse during SBR (including, but not limited to questioning) were included in the present review. Therefore, studies were grouped into three categories: studies that used a wholistic approach, studies that used an utterance level approach focused on adults' questions and comments, and studies that used an utterance level approach focused exclusively on adults' questions.

Interestingly, the findings regarding the role of the cognitive demand level of extratextual talk on children's vocabulary differ among the three different groups of studies. It appears that features of the studies or populations studied moderated the effectiveness of extratextual talk on vocabulary outcomes. Two of the three studies clustered in the wholistic approach group found that children who were exposed to reading styles that were more cognitively demanding outperformed their peers exposed to less challenging styles (Dickinson and Smith, 1994; Haden et al.; 1996). Conversely, Reese and Cox (1999), in an experimental study, found that children in the describer condition (the less challenging condition) had greater vocabulary gains. However, Reese and Cox also reported an interaction effect wherein children with higher initial

vocabulary skills gained more from a more cognitively demanding style, and children with lower initial skills gained more from a less demanding style.

As a group, the wholistic approach studies showed that a challenging style had a positive effect on children's word learning. However, the experiment conducted by Reese and Cox (1999) reveals that this benefit may depend on children's previous abilities. As it was mentioned before, this group of studies on adults' SBR styles combined questions and comments of different cognitive demand.

The group of studies that used an utterance level approach examined the effects of questions and comments on children's vocabulary outcomes, either considering the frequency of these utterances or the comparison among different treatment conditions. Four of the five studies that explored the effects of questions and comments together were correlational. In these studies, extratextual talk that was more cognitively demanding better supported children's word knowledge (Dickinson & Tabors, 2001; Gonzalez et al., 2014; Hindman et al., 2008, Silverman, 2007). One of these studies found that both low and high cognitive demand talk were effective for improving children's vocabulary (Hindman et al., 2012). Interestingly, Hindman et al. (2008) also reported an interaction effect between decontextualized talk and initial vocabulary skills, such that the effects of decontextualized talk were stronger for children with lowest initial vocabulary skills. Regarding contextualized talk, Hindman et al. (2012) found that this type of talk was more strongly associated with vocabulary scores for children with the lowest initially vocabulary skills. All but Hindman et al.'s (2008) samples, were children from low income families.

The studies that specifically looked at the cognitive demand level of questions around SBR reported that the demand level neither had an effect nor differentially affected children's word learning (Blewitt et al., 2009; Justice, 2002; Zucker et al., 2010). Only a combination of questions of low and high cognitive demand—the scaffolding-like condition from Blewitt et al.'s (2009) second study—improved children's expressive vocabulary beyond low and high cognitive demand questions in separated conditions.

Overall, the results summarized above present an interesting, but complex picture about adults' extratextual talk around SBR and its differential influence on children's vocabulary growth. Although generally supportive of the notion that the cognitive demand level of extratextual talk affect children's learning, studies grouped within the wholistic approach compare reading styles that combined different variables and it is difficult to pinpoint what specific variables contributed to improve word knowledge. Nevertheless, and following Reese and Cox's (1999) rationale on this issue, it is plausible that the differences observed between Dickinson and Smith, (1994) and Haden et al. (1996) and Reese and Cox' findings could be explained by sample characteristics. For instance, older children (e.g., Dickinson & Smith, 1994) or children of above average skills (e.g., Haden et al., 1996) may have benefited more from a more cognitively demanding style than those from Reese and Cox study, who gained more vocabulary knowledge with a less demanding style. In addition, Reese and Cox study only examined improvements on a standardized receptive vocabulary measure. Another possibility is that Reese and Cox's intervention was not powerful enough to impact

general vocabulary. The impact on a researcher-developed measure would have been informative.

Among studies grouped under the utterance level approach, those that examined comments and questions (adults' talk) found that more cognitive demand talk was more effective for improving children's vocabulary learning, whereas studies that explored only questioning demand level did not find more challenging questions to produce more vocabulary gains.

There are several potential explanations for making sense of the differences between studies. To begin with, almost every study that explored the effects of adults' talk on children's vocabulary used correlational designs (Dickinson & Tabors, 2001; Gonzalez et al., 2014; Hindman et al., 2008; Hindman et al., 2012; except for Silverman, 2007), whereas three of the four studies that examined the effect of questioning were experimental (Blewitt et al., 2009; Justice, 2002). These differences in the design of the studies could have affected the results in different ways. Because causality cannot not be inferred from correlational designs, it is not appropriate to conclude that high cognitive demand talk improved vocabulary learning. It is possible that the positive findings related to the effects of high cognitive demand talk on vocabulary growth were associated to other factors and not only to the demand level of extra textual talk. For instance, teachers or parents could have used more high cognitive demand talk with children with higher vocabulary skills and less challenging talk with less skilled children. In this case, the findings could be explained by the initial vocabulary level of the sample instead of the cognitive demand of the extratextual talk itself.

On the other hand, the null results or non-differential effects of the experimental studies that examined the effects of questions of different demand level not only could be taken as evidence that high cognitive demand questions do not improve children's word knowledge, but also could be explained by lack of power to detect those effects. In three intervention studies (Blewitt et al., 2009, two studies; Justice, 2002), the samples were small (23 to 58 children), especially considering that Blewitt et al. (2009) compared five and three conditions in their studies, and Justice (2002) compared two intervention conditions. The power of the studies also could be affected by the length of the interventions, one week in Justice's study and six weeks in Blewitt et al.'s studies. Thus, interventions may have been too short or not intensive enough for improving children's target word learning, particularly taking into account that these children were exposed to unfamiliar words. Learning new unfamiliar words is difficult, and longer and more intensive interventions may be necessary before positive effects surface.

Another critical difference between the two groups of studies that examined teacher talk at the utterance level is that they examined the effects of different predictors on children's word learning. Whereas one group explored the effects of extratextual questions and comments, the other group exclusively analyzed the role of questioning. Questions by themselves (as analyzed in Blewitt et al., 2009; Justice, 2002; and Zucker et al.'s 2010 studies) may not be sufficient for improving children's learning, and it is the combination of questions and comments that is required (e.g., Dickinson & Tabors, 2001; Gonzalez et al., 2014; Hindman et al., 2008; Hindman et al., 2012; Silverman, 2007). However, the evidence in this area is not conclusive, and it is not clear whether

questions or comments or a combination of them is the best way to improve children's word learning.

Research suggests that children's active participation during SBR benefits their vocabulary growth (Ewers & Brownson, 1999; Sénéchal, 1997; Sénéchal & Thomas, 1995; Whitehurst et al., 1988), and some studies have demonstrated that the use of questions by adults who read to preschoolers is an effective strategy to engage children in verbal exchanges during SBR and to enhance learning of new words, compared to less interactive strategies such as the use of comments (e.g., Blewitt et al., 2009; Sénéchal, 1997; Ewers & Brownson, 1999). However, some studies have reported contrary evidence. Justice (2002) found that adults' labeling of novel words was more effective than questioning to facilitate children's receptive word learning, but not for expressive word learning. Ard and Beverly (2004) examined the effects of adult questions and comments during SBR on children's acquisition of nonsense words. Forty preschoolers were assigned to one of four conditions: repeated joint book reading only, repeated joint book reading with questions, repeated joint book reading with comments, repeated joint book reading with both questions and comments. All the groups evidenced improved receptive and expressive acquisition of words. However, for receptive vocabulary, all the three intervention groups performed significantly better than the control group. In the expressive vocabulary posttest, children in the combined comments and questions condition and the comments only condition produced significantly more words than children in the question and control conditions, with children in the combined condition performing better than all the conditions.

As in Ard and Beverly's (2004) study, the findings from the present review suggest that a combination of comments and questions is the more effective way of improving children's word learning. Particularly in the case of high cognitive talk, it is plausible that comments and questions may play different roles in the process of learning vocabulary, especially when the word is unknown. It is interesting that in Ard and Beverly's study, the comment condition was more effective than the question condition (similar to Justice's, 2002 study). Although questions are developed to maximize children's production, Ard and Beverly stated that production practice fostered by questions is useful only if meaning mapping has occurred successfully. Ard and Beverly used nonsense nouns and verbs whose referents were objects and actions that could not be easily labeled by an adult (e.g., *wrapping around girl's arm*). Compared to the nouns and verbs in English, Ard and Beverly nonsense words involve a relatively higher level of complexity. Therefore, Ard and Beverly argued that comments could have supported better meaning development by directing the listener's attention to a referent and by presenting target words in a simpler syntactic construction. In essence, comments helped children map nonsense words to referents.

A fatal flaw of Ard and Beverly's (2004) study, however, is that children in the groups that performed better had more exposure to the target words, and it is well known that word exposure is positively related to word learning; the more times a child hears a word, the more likely it is he or she will learn it (Beck, Perfetti, & McKeown, 1982; NICHD, 2000). This is also an important weakness in other studies that have reported that questions are more effective than comments for improving children's vocabulary

knowledge where the effectiveness of questioning over comments may be confounded with word exposure (e.g., Sénéchal, 1997). In this line, a third element that must be considered in interpreting the differential results among the studies considered in the present review is word exposure. A major limitation when comparing the findings of the correlational studies that examined the relationship between the cognitive complexity of questions and comments and word learning (e.g., Dickinson & Smith, 1994; Gonzalez et al., 2014; Hindman et al., 2008; Hindman et al., 2012), and the experimental studies that examined the effect of questioning, is that in the first group of studies word exposure is unknown (e.g., Dickinson & Smith, 1994; Gonzalez et al., 2014; Hindman et al., 2008; Hindman et al., 2012), whereas in the second group of studies this variable was strictly controlled (Blewitt et al., 2009; Justice, 2002). In Justice's (2002) study, children had two exposures to each word; in Blewitt et al.'s (2009) study, children had six textual and six extratextual exposures to the target words. Thus, in these experimental studies children may have needed more exposure to the unfamiliar words to reap the benefits of the high cognitive demand questions. In addition, questions and comments that are more cognitively demanding may result in children being exposed to new words more frequently than in less challenging extratextual talk. Thus, word exposure, and not the demand level of extratextual talk, would explain vocabulary gains. Zucker et al. (2010) found that questions that are more challenging elicit extended responses. Therefore, via teacher's questions and comments or production practice through their own responses, children could be exposed to the new vocabulary more frequently when they hear more challenging questions. Consequently, the positive effect of high cognitive questions on

vocabulary learning would be confounded with word exposure, as it happens in the correlational studies reviewed in this article. Comparisons between studies seem useless until this critical problem is addressed in future studies.

Finally, different studies suggested that the effect of extratextual talk demand depends on children previous abilities or the specific target word knowledge. Consonant with Blewitt et al. (2009), when children are exposed to new and unknown words, they may require a scaffolding process that helps them first map the new words with their referents, and then, via more challenging questions, helps them to access elaborated aspects of words' meaning. This could explain the null results obtained in all the experiments that looked at the cognitive complexity of questions during SBR. As Blewitt et al. proposed, it is possible that Justice (2002) found low and high cognitive demand questions to be equally effective because her participants, exposed to completely unknown words, needed to associate the new labels with their referents, and, in this case, both high and low cognitive demand questions were useful for that purpose. According to Blewitt et al., when the words are unfamiliar, any input that repeats those words may help children bolster this association. From this point of view, the results obtained in studies that examined adult's talk or reading styles are not contradictory with those exposed in experimental studies that examined questioning, and the differences could be due to the familiarity that the children had with the words read. In fact, the findings from Reese and Cox (1999), Silverman (2007), and Hindman (2012) are in line with Blewitt et al. findings. Silverman and Hindman et al. (2012) suggest that a combination of low and high cognitive demand questions would be a good strategy for improving word

learning. Reese and Cox results propose that more advanced children benefit more from a more demanding style, and less skilled children from a less demanding style. It is plausible that more advanced children have some familiarity with the vocabulary they are reading, therefore, they benefit more from an extratextual talk that is more cognitively demanding.

The scaffolding hypothesis proposed by Blewitt et al. (2009) should not be discarded in interpreting the findings from correlational studies that found that high cognitive demand talk produced greater gains in children's vocabulary (Dickinson and Tabor, 2001; Hindman et al., 2008; Gonzalez et al., 2014). In this case, however, more information is needed. In the studies that examined teacher or parents' talk, children were not exposed to completely unfamiliar words; therefore, we do not know if out of the videotaped situations they had any practice with those words. It also is possible that these children have at least some familiarity with the words they read; therefore, they possibly had at least some association between the labels and referents tested. In this case, high cognitive demand talk could have been more effective than low demand talk for improving word knowledge because these not were completely unknown words.

The scaffolding hypothesis proposed by Blewitt et al. (2009) imply that the demand level of questions may have different effects depending of the familiarity that children have with the target words. This hypothesis is consistent with a Vygotskian perspective of learning in which children learn more efficiently when adults mediate children learning by adjusting their input around their zone of proximal development, that is, raising the cognitive and linguistic demands on children to a level where they can

participate successfully under adult guidance (e.g., Vygotsky, 1978). Therefore, the effectiveness of the demand level of the extratextual talk would be related to children's abilities—specifically the knowledge of the target words—and how an adult may collaborate with children to challenge them according to their particular needs.

This interpretation also is consonant with the fact that growth in word knowledge is incremental (Nagy & Scott, 2000), and that over time, words' meanings are refined, contributing to children's vocabulary depth (Ouelette, 2006). It seems that when children have no specific word knowledge, the demand level is not important; they just need to consolidate the word-referent association. However, if the child has already associated a novel label with a referent, it is through more challenging talk that children can access deeper word learning, making connections between new words and words they already know, or connecting the new words with their own experiences (Beck et al., 2008; Coyne, Capozzoli-Oldham, & Simmons, 2012). This would imply that a better and deeper understanding of a new word would be better supported by a combination of low and high cognitive demand questions.

To summarize, the findings from the present review suggest that several issues related to characteristics of the studies or the samples must be taken into account in evaluating the effect of different cognitive demand levels of extratextual talk on children's word learning. Whereas most of the studies that observed adults extratextual talk found that comments and questions of high cognitive demand were more effective for improving word learning than talk that were less cognitive demanding, the few studies that examined the abstraction level of questions reported no difference between

low and high cognitive demand questions, or that neither predicted vocabulary growth. One study though, by Blewitt et al. (2009), found that a combination of low and high cognitive demand questions—a scaffolding-like condition— was more effective in improving knowledge of unfamiliar words. Elements such as the design of the studies (correlational vs. experimental), the predictors utilized (questions and comments vs. questions only), the familiarity of the target words, and word exposure are some of the features that should be considered to assess the findings exposed. Therefore, more research is needed to clarify these findings.

Limitations and future directions

A first limitation of the present review is the low number of studies that examined the effect of the cognitive demand of questions on children’s vocabulary learning. Given that were found only four studies that examined the effect of questions on children’s word learning, the sample of the present review included studies that used more complex predictors such as adults’ talk or reading style. Although these studies included questions’ cognitive complexity, they also included other characteristics such as comments or placement of questions. It is not possible to isolate the effect of questioning, given that other confounded variables could explain the results. Moreover, given the small number of studies, the generalizability of the findings is limited. Future studies might examine more deeply the specific role of questions and comments of different cognitive demand level. Additionally, the characteristics of the questions asked by the teachers and the children’s answer also could shed some light on the particular benefits of questions and comments of different demand level. For example, the work of

Walsh and Blewitt (2006) and Walsh and Rose (2013) examined the effect of vocabulary eliciting and noneliciting questions on preschoolers' word knowledge. Walsh and Blewitt reported that noneliciting questions (questions that do not require the child to answer using the target words) were not significantly different from eliciting questions (questions that require the child to recall and respond with the target word) in promoting receptive vocabulary, a result that contrasted with that Walsh and Rose, who found that children in the noneliciting condition scored significantly higher than those in the eliciting condition. It has been argued that differences in the samples could explain the different results, but more research is warranted.

A second limitation is the lack of quasi-experimental and experimental studies. Only five of the studies considered in this review were experimental or quasi-experimental. In order to clarify the effectiveness of high and low cognitively demanding questions on children's vocabulary learning, experimentally controlled studies are necessary. Given the number of factors that may affect children's vocabulary learning, some of the variables that should be rigorously controlled in future experimental studies are word exposure and word familiarity. As noted before, word exposure by itself improves children's word learning (Beck et al., 1982; NICHD, 2000). Therefore, it is critical that future studies control for word exposure. Otherwise the results obtained may be related to the times that children heard a specific word, and not to the effect of the cognitive complexity of the extratextual questions. Similarly, it seems that word familiarity play some role in the effectiveness of the cognitive complexity of the extratextual talk around SBR (e.j., Blewitt et al., 2009). Controlling word familiarity,

by design or statistically, is important for clarifying the specific effect of questions of different level of cognitive demand on children's word learning.

A third limitation is that, although there are different concepts used to identify low and high cognitive demand talk or questions—such as decontextualized talk, analytical talk, or conceptual questions—there are some differences in the way in which these variables are defined and operationalized. Consequently, there are differences in the way in which questions or comments are coded in the different studies. For instance, some authors coded comments and questions that are related to personal experience as a high cognitive demand task (e.g., Gonzalez et al., 2014; Hindman et al., 2008; Hindman et al., 2012), whereas others considered this type of utterance as low cognitive demand task (e.g., Silverman, 2007). Something similar happened when coding definitions of words. In some cases, this was considered a high cognitive demand task (e.g., Dickinson & Smith, 1994), while in other studies this action was among low cognitive demand tasks (e.g., Gonzalez et al., 2014). These inconsistencies make it almost impossible to synthesize the results of the studies and certainly could have affected the conclusions of these comparisons. Future studies should clarify what it is understood as a low or high cognitive demand question and reporting a detailed coding scheme used during the study. Additionally, more replication studies using the same coding schemes could help to understand the role of the cognitive demand of questions on children's vocabulary learning.

Finally, given that standardized vocabulary measures are not as sensitive to vocabulary growth as researcher-developed measures (NELP, 2000), it is important that

experimental studies such as Justice (2002) and Blewitt et al., (2009) assessed vocabulary growth with this type of measure. However, for comparability and replicability of results, it also would be interesting to have information regarding children's performance on standardized receptive and expressive vocabulary measures. Moreover, the use of both researched-developed and standardized measures could help to understand whether extratextual talk of different demand levels impacts target vocabulary, general vocabulary, or both. Use of different measure of vocabulary also would be interesting given that word knowledge is incremental (Nagy & Scott, 2000). This is particularly important because it has been argued that high cognitive demand questions specifically benefit depth of word knowledge (van Kleeck, 2008). Therefore, measuring word knowledge not only in terms of the number of words learned, but also in the quality of that learning, is key (Coyne et al., 2009). Futures studies should consider measuring other features of oral language, such as syntax, morphology, and measures different levels of semantic knowledge that could inform about other dimensions of vocabulary (e.g., Coyne et al., 2009; Proctor, Silverman, Haring, & Montecillo, 2012; Strasser et al., 2013).

CHAPTER III

QUESTIONING AROUND TEACHER-CHILD BOOK READING: THE EFFECT OF QUESTIONS THAT GO BEYOND THE SCRIPTED CURRICULUM ON CHILDREN'S VOCABULARY GROWTH

This observational study analyzed the relationship between teacher-generated questions of different cognitive demand levels around shared book reading and predominantly low SES preschoolers' receptive and expressive vocabulary on standardized and researcher-developed measures. The participants of this study were 13 teachers and 100 children who were part of a larger 18-week scripted shared-reading study intended to improve vocabulary knowledge through teacher-guided shared reading instruction. Teachers' reading instruction was videotaped, and their unscripted questions were coded using the Observer XT 11.5 software (Noldus Information Technology, 2013). The duration of high cognitive demand questions was significantly related to general expressive vocabulary outcomes. No effects were found on researcher-developed measures of receptive and expressive vocabulary, or on a standardized receptive vocabulary measure. This study adds new information to the research that examines how the characteristics of extratextual questions may influence children's vocabulary learning by examining the effect of unscripted questions generated by teachers. Limitations and future directions for studies are discussed.

Questioning Around Teacher-Child Book Reading: The Effect of Questions that Go beyond the Scripted Curriculum on Children's Vocabulary Growth

The relationship between vocabulary knowledge and reading comprehension is well established (Beck et al., 2008; Hindman et al., 2010; Joshi, 2005; Juel, 2006; NICHD, 2000; Scarborough, 1998; Snow et al., 1998), and different models have been proposed to understand the nature of this relationship (Nagy, 2007; Stahl & Fairbanks, 1986; Wagner et al., 2007). Research also has shown that differences in vocabulary knowledge among children appears very early in life (Hart & Risley, 1995) and that vocabulary knowledge influences reading comprehension last later in academic life (Cuningham & Stanovich, 1997; Juel, 2006, Tilstra, McMaster, Van den Broek, Kendeou, & Rapp, 2009). Considering the critical role of word knowledge for future academic success, researchers have developed evidence-based interventions intended to foster oral language, mostly targeted towards promoting vocabulary growth in young children (e.g., Beck & McKeown, 2007; Gonzalez, et al., 2011, Whitehurst et al., 1988; Zevenbergen & Whitehurst, 2003).

Among the ways to develop oral language, shared book reading (SBR) is identified as one of the most intuitive and recommended methods to enhance children's literacy and oral language skills (Bus et al., 1995; NELP, 2008). An important body of research supports the finding that participation in SBR activities enhances children' oral language and vocabulary knowledge (Bus et al., 1995; Mol et al., 2009, Mol et al., 2008; Mol & Bus, 2011; NELP, 2008). Recent research has also pointed to important features associated with SBR (e.g., adult's behaviors, type of instruction, children'

characteristics, books' genre, among others) that enhance the influence on children's word learning. One area of research has focused on how the level of abstract thinking demanded by adult questioning around SBR impacts vocabulary learning. Although multiple studies have found that a question's cognitive complexity may yield different outcomes in children's vocabulary, these findings have not been conclusive (e.g., Biemiller, 2003; Hindman et al., 2008; Justice, 2002; Zucker et al., 2010). The present study investigates the relationship between the cognitive complexity of teachers' questions around SBR and its relationship to children's vocabulary.

The Contribution of SBR to Vocabulary Growth

SBR generally refers to an adult primarily reading a text to a child or group of children (NELP, 2008; WWC, 2006). This umbrella term may be characterized by different levels of interactivity between participants; however, interactive SBR is one of the most studied methods (NELP, 2008). Whereas some variation exists in terms of interactive reading style or implementation, the general purpose of this practice is to actively engage children in the story by adults asking questions and providing prompts, comments, and feedback (Mol et al., 2009). Book reading promotes children's language development (Wasik, Bond, & Hindman, 2006) because it exposes children to varied and sophisticated words that they are unlikely to encounter in ordinary interactions and it includes multiple content domains also unlikely to appear in everyday conversations (De Temple & Snow, 2003; Juel, 2006; van Kleeck, 2006).

Numerous studies have reported a positive association between SBR and language development (Bus et al., 1995; Mol & Bus, 2011; Mol et al., 2009; Mol et al.,

2008). Reported effect sizes are usually bigger for expressive vocabulary ($d = 0.59$ and $d = 0.62$) than for receptive vocabulary ($d = 0.45$ and $d = 0.22$) (Mol et al., 2009; Mol et al., 2008). More recently, Mol and Bus (2011) found moderate correlations between preschoolers and kindergarteners' print exposure and receptive and expressive vocabulary ($r = .33$ and $r = .35$, respectively).

Beyond the strong evidence regarding the positive effects of SBR on children's vocabulary knowledge (e.g., Bus et al., 1995; Mol et al., 2008; Mol et al., 2009; Mol & Bus, 2011; NELP, 2008; Scarborough & Dobrich, 1994), an emerging body of research has suggested that the quality of book reading is also relevant (Mol et al., 2009; Mol et al., 2008). The "what" and "how" of reading aloud has become an important issue in the reading practice (Teale, 2003) because the way in which adults read to children may explain the benefits to children's literacy-related abilities (Reese et al., 2003), especially word learning. According to recent research, some of the practices that may help children to learn new words during SBR are instruction oriented to deep processing of words and extratextual talk (Gonzalez et al., 2014).

The Importance of Instructional Strategies Intended to Foster Vocabulary Depth

Although implicit learning of novel words may occur when reading books to children, research has emphasized that direct and explicit instruction is crucial for word learning (NICHD, 2000). Some of the effective strategies used for directly teaching vocabulary are: multiple exposures to new words, contextual and definitional information, and use of instructional strategies that encourage deep processing of words (Biemiller & Boote, 2006; Coyne et al., 2012; Coyne et al., 2009; NICHD, 2000;

Silverman, 2007; Stahl & Fairbanks, 1986). Particularly relevant for the present study is the way in which adults can facilitate deeper word processing around SBR through questioning.

Vocabulary knowledge can be divided into two dimensions: vocabulary breadth, operationalized as the number of words that a person knows; and vocabulary depth, that is the richness of meaning of the words known or how well a person knows a word meaning (Wagner et al., 2007). Word knowledge is incremental and the level of word meaning can be seen as a continuum that varies from basic and superficial knowledge to a more complete knowledge (Nagy & Scott, 2000). Children can add words to their lexicon, improving their vocabulary breadth, without a complete understanding of those words. Over time, words meanings are refined contributing to children's vocabulary depth (Ouelette, 2006). Deeper word learning implies that the students go beyond memorizing simple dictionary definitions and understand words in a richer and more complex level by, for example, making connections between new words and words they already know or connecting the new words with their own experiences (Beck et al., 2008; Coyne et al., 2012). Elaborated vocabulary instruction at a depth level make word knowledge more flexible and accessible (Beck & Mckewon, 2007; Stahl & Fairbanks, 1986). There are different ways in which the depth of word knowledge can be operationalized. Some authors consider the knowledge of multiple meanings of words (Wagner et al., 2007) or levels of partial word knowledge (Coyne et al., 2009) as an index of vocabulary depth, while others have included morphology, semantics, and

syntax as three linguistic domains that account for the depth of word knowledge (e.g., Proctor et al., 2012).

The depth of word knowledge makes an important contribution to listening and reading comprehension (NICHD, 2000; Strasser et al., 2013; Stahl & Fairbanks, 1986). For instance, Proctor et al. (2012) found that vocabulary depth, particularly semantic and syntactic awareness, was predictive of reading comprehension above and beyond word identification and vocabulary breadth in children in grades 2-4. In two recent studies with younger children, Strasser et al. (2013) found that both breadth and depth of vocabulary were significant predictors of reading comprehension at ages 3.5 to 5 and ages 4.5 to 7, suggesting a robust effect. As Proctor et al. (2012) have stated, “comprehension involves not just reading words and knowing what they mean but how they are connected in language to make meaning” (p. 1661).

Vocabulary depth influences reading comprehension in different ways. How well a word is known may help to discriminate it from other words thus avoiding confusion and facilitating understanding of the word in different contexts (Coyne et al., 2009; Perfetti, 2007). Lexical quality may also influence the ability to learn meanings of new words, improving meaning retrieval of learned words, and facilitating the integration of words with the prior text read (Perfetti, 2007). Ultimately, vocabulary instruction that promotes deep word processing may enhance metalinguistic awareness which in turn has been related to reading and listening comprehension (Nagy, 2000).

Extended vocabulary instruction may facilitate deep word processing by providing children opportunities to discuss and interact with words and words meanings

outside the book reading (Coyne et al., 2009). An example of an instructional approach aimed to develop depth vocabulary learning is the rich instruction approach developed by Beck and McKewon (2007). Beck and McKewon provided rich word instruction for kindergarten and first grade students after storybook readings. The instructional practices included definition of words meanings and providing multiple examples of the words in multiple contexts. Students also were asked to judge the use of the words in appropriate and inappropriate contexts, and give their own examples. In their first study, Beck and McKewon reported that children who participated in the rich instruction group outperformed their classmates who did not received vocabulary instruction. The dependent variable was a picture-recognition task where children were asked to interpret the semantic elements of the target word in novel contexts. In their second study, students who received more rich instruction of words learned twice as many words than the students who received less instruction.

The positive effects of extended instruction on deep vocabulary knowledge also have been examined by Coyne and colleagues. Coyne et al. (2009) compared two vocabulary instructional approaches with kindergarten students: embedded instruction and extended instruction. In the embedded instruction condition, intended to enhance vocabulary breadth, words were introduced prior the book reading and children received a simple definition of the target word and recognized the word in a picture. During the extended instruction condition the words were introduced prior the storybook reading and defined during reading as in the embedded instruction condition. However, during the extended instruction condition words were reintroduced after the storybook reading

and additional word uses examples were given. Children were asked different types of questions regarding the target word and the relationships with other words, and also were given prompts to extend their responses. Findings showed that extended instruction resulted in more complete and refined word knowledge compared to embedded instruction.

In summary, it is well established that vocabulary is highly related to reading comprehension (Beck et al., 2008; Hindman et al., 2010; Joshi, 2005; Scarborough, 1998). To facilitate word learning, especially for at-risk children, however, understanding specific instructional strategies that go beyond learning simple dictionary definitions is important (Nagy & Scott, 2000). Researchers have indicated that both, breadth and depth of vocabulary are important for reading comprehension (Strasser et al., 2013). Some research has shown that vocabulary breadth and depth are differentially related to reading comprehension (Li & Kirby, 2014) and additional findings suggest that vocabulary depth plays an important role beyond vocabulary breadth (Ouellette, 2006; Perfetti, 2007; Strasser et al., 2013). Considering that both vocabulary breadth and depth may have an impact on listening and reading comprehension, adding more evidence to understand how to improve word depth knowledge in young children is an important educational goal.

Extratextual Conversations around SBR

As noted, extratextual conversations (i.e., talk beyond text reading) have been shown to relate positively to child language outcomes. Extratextual conversations may take place before, during, or after book reading and often pertain to story content,

vocabulary, or other elements related to the reading. Interactive and extratextual conversations around SBR provide numerous opportunities for children to interact with words and word meanings positively impacting vocabulary growth (Ard & Beverly, 2004; Walsh & Blewitt, 2006; Zucker et al., 2013). Extratextual talk in the form of questions, comments, and statements that go beyond the book reading, give adults the opportunity to encourage children's participation, to expand their discourse, and to support children's learning (Price et al., 2012). SBR provides a natural and favorable context for teachers and parents to extend talk in a highly interactive and cognitively challenging ways (Wasik & Bond, 2001; Wasik et al., 2006). Of particular importance to the present study is the body of research that examines the cognitive demand level of adult talk, and specifically the level of cognitive complexity of teacher questions around SBR.

While engaging in extratextual conversations, teacher questions are one of the most common forms of discourse used in preschool settings (Zucker et al., 2010) representing about one third of all the teacher utterances (de Rivera, Girolametto, Greenberg, & Weitzman, 2005; Massey et al., 2008). Adult questioning has been recognized as one effective reading strategy to engage children in verbal exchanges around SBR and to enhance learning of new words (Blewitt et al., 2009; Ewers & Brownson, 1999; Sénéchal, 1997; Walsh & Blewitt, 2006; but also see Ard & Beverly, 2004; Justice, 2002 for contrary results). Questions promote children's engagement in verbal interactions and have the potential to increase their participation in extended discourse (Justice, Wever, Ezell, & Bakeman, 2002; Massey et al., 2008).

Considering the effect of extratextual conversations around SBR, especially the use of questions and the documented relationship to vocabulary growth, vocabulary interventions have incorporated teacher questioning as a key practice to improve children language skills (Whitehurst et al., 1988; Zevenbergen & Whitehurst, 2003). Some interventions have included scripted questions during SBR in order to standardize the instruction and help teachers to develop elaborative conversations around book reading (e.g., Gonzalez et al., 2011; Pollard-Durodola et al., 2011). Research documents that provide teachers with well-organized and evidence-based curriculum-based can lead to positive change in the way teachers read books and subsequently children's oral language success (Dickinson et al., 2009).

One aspect of extratextual conversations that has not been addressed extensively in research is the effect of frequency on children's vocabulary growth. In a longitudinal study reported by Roberts, Jurgens, & Burchinal (2005) found that the frequency of mothers' book reading strategies used to convey information were positive associated to children's receptive vocabulary at ages 3 and at entry to kindergarten. Similarly, Zucker et al. (2013) found that extratextual talk before, during, and after book reading (considering an average score of literal, inferential, and code-related talk), was associated to children's expressive vocabulary in preschool and to receptive vocabulary in kindergarten. More extratextual talk would support children's language development. In the same way, but specifically considering the cognitive demand of extratextual talk, Gonzalez's et al. (2014) found that the frequency of teacher association questioning was significantly related to receptive vocabulary outcomes.

Likewise, the effect of the duration of SBR and particularly of extratextual talk on children's language outcomes have received little attention. Coyne and colleagues' (2004, 2009) findings, however, have highlighted the importance of extended conversations in terms of duration on children's word learning. For instance, Coyne et al. (2009) found that extended instruction (measured in terms of seconds and minutes) was associated to more deep word knowledge. Gonzalez et al. (2014) findings also supported the value of duration of extratextual talk. In their study Gonzalez et al. found that duration of teacher association questioning was significantly related to receptive and expressive vocabulary.

Cognitive Complexity of Questions around Shared Book Reading

A question's cognitive complexity can be distinguished along a continuum from literal to inferential depending on its level of abstraction. In low level abstraction, children discuss, describe, and/or respond to information perceived in the material (e.g., the book). Inferential language, instead, requires children to use their language skills to infer or abstract information that is not readily perceived (Zucker et al., 2010); in this case higher cognitive demands are placed on the child.

At the literal level, teacher questioning generally requires labeling or describing a character, an object, or an action happening in the book. In contrast, inferential language, is often used for deducing, analyzing, hypothesizing, reflecting on, or integrating information (Zucker et al., 2010). It has been posited that extratextual conversation that promotes the use of higher cognitive skills in children facilitates more complex and deeper knowledge of words and concepts (Dickinson et al., 2009; Gonzalez et al., 2014).

For example, there is evidence to support that generating semantically elaborative responses to “why” questions improves recall of sentences (Pressley, McDaniel, Turnure, Wood, & Ahmad, 1987; Pressley, Symons, McDaniel, Snyder, & Turner, 1988; see also Miller & Pressley, 1989 for contrary results) and vocabulary knowledge (Gonzalez et al., 2014). However, the way in which cognitively demanding questions foster language development is not altogether clear. On one hand, this outcome is in line with Slamecka and Graf’s (1978) widely known *generation effect*—the robust finding that self-generated words are better remembered than read words. On the other hand, different explanations have been offered to account for the positive effects of answering questions, and particularly, elaborative or cognitively demanding questions on the memory of novel words (Miller & Pressley, 1989). It has been suggested that tasks that require more cognitive effort improve recall because there is greater effort to integrate the environment and the target word facilitating retrieval, or items in higher effort situations are stored in memory as more stronger traces (Tyler, Hertel, McCallum, & Ellis, 1979). It has been also proposed that encoding an event in terms of rich knowledge activates more semantic links thus creating access routes to facilitate information retrieval (Anderson & Reder, 1979; Lockhart & Craick, 1990). It has also been argued that questioning prompts readers to associate queried and answered information affecting the encoding process which would facilitate retrieval of that material (Pressley et al., 1987; van den Broek, Tzeng, Risdien, & Basche, 2001).

Theoretically, from a social constructivist perspective, SBR can best be understood as a literacy activity in which actions are mediated by adults who scaffold

children's language around their zone of proximal development (ZPD; Vygotsky, 1978). The ZPD is "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (Vygotsky, 1978, p. 86). During book reading, through extratextual talk, and particularly through questions that are cognitively challenging, adults may encourage children participation, expand their language abilities, and support them by encouraging behaviors along their ZPD (Price et al., 2012), when learning occurs. Through high cognitive demand talk and scaffolding during SBR, adults raise cognitive and linguistic demands on children to a level where they can participate in a successful way (McGinty et al., 2012), helping them to learn new words in a meaningful context.

A growing body of empirical research has explored the hypothesis that engaging children in conversations rich in inferential language improves oral language skills associated with vocabulary growth and reading comprehension (Mandell Morrow & Brittain, 2003; van Kleeck, 2008). Nonetheless, there is no consensus on the relationship between adults' questioning around SBR and children's vocabulary development (Zucker et al., 2010). A limited number of studies have focused exclusively on the relationship between cognitive complexity of adult questioning and children' vocabulary growth (e.g. Blewitt et al., 2009, Gonzalez et al., 2014; Justice, 2000; Zucker et al., 2010).

Some studies focusing on the cognitive demand of different forms of adult discourse around SBR (including but not limited to questions) have supported the idea

that extratextual conversations that are more abstract or require more inferential language produce better results than interactions of lower cognitive demand on children's vocabulary growth (Dickinson & Porche, 2011; Gonzalez et al., 2014; Hindman et al., 2008). In a study focused on teacher and parent book-related talk (e.g., questions and comments around SBR), Hindman et al. (2008) videotaped naturally occurring interactions between 10 teachers and their students during a reading session twice during a year. The researchers found that standardized expressive vocabulary scores were unrelated to teacher's contextualized talk, and inversely, but marginally related to parents' low cognitive demanding talk. Conversely, decontextualized talk by parents and teachers (high cognitive demand questions and comments) was an effective predictor of expressive vocabulary at the end of preschool. Hindman et al. also found that the effects of teacher decontextualized talk were stronger for children with low initial expressive vocabulary skills.

Gonzalez et al. (2014) implemented a 18 week, 5-day instructional cycle of around 20 minutes a day shared-reading intervention in which trained preschool teachers who used a well scripted curriculum had detailed lesson plans in order to introduce and review target words and build background knowledge around book reading by asking specific questions and making comments before, during, and after reading aloud. Gonzalez's et al. findings supported previous worked by Hindman et al. (2008); they found that duration of teacher association questioning, which is more cognitively complex than labeling or defining and a form of inferential questioning, was significantly related to children's receptive vocabulary outcomes while both frequency

and duration of teacher vocabulary-related association-level questioning were related to expressive vocabulary.

On the other hand, some studies have found that neither literal nor inferential questions predicted children's vocabulary outcomes (Blewitt et al., 2009; Zucker et al., 2010). And a couple of studies have found no differences between the impact of high and low cognitive demand talk on children's word learning (Justice, 2002; Hindman et al., 2012).

For instance, Blewitt et al. (2009) conducted two related experiments to examine the impact of question cognitive demand level, placement and a scaffolding-like condition on children's vocabulary growth. In the first study Blewitt et al. found that neither the cognitive demand level of questions nor placement predicted children's vocabulary learning. However, the use of extratextual questioning, regardless of cognitive demand level or placement had greater impact on word learning than not asking question around book reading. In a second experiment, Blewitt et al. found that a scaffolding-like condition (low cognitive demand questions in the beginning and high cognitive demand questions later) was related to a greater knowledge on definition of words than the use of high and low cognitive demanding questions alone.

In a correlational study Zucker et al. (2010) reported that the frequency and proportion of teachers' high cognitive demand questions were not related to children's vocabulary outcomes. An important finding, however, was that the level of abstraction of teachers' questions was related to the level of children's responses, that is, all four level of abstraction of teachers' questions (from low to high level of abstraction) were

more likely to be followed by children's response at the same level of abstraction. The implication being that asking inferential questions is a good way to encourage children's inferential discourse.

In summary, although it has been argued that inferential questions around SBR can foster oral language skills (van Kleeck, 2008) results are inconclusive. Findings from Dickinson & Smith (1994), Hindman et al. (2008), and Gonzalez et al. (2014) support the idea that extratextual talk that is more cognitively demanding may have greater benefits on children's receptive and expressive vocabulary skills. However, others studies have found that low and high cognitive demand questions do not predict word learning (Blewitt et al., 2009; Zucker et al., 2010) and two others studies (Justice, 2002, Hindman et al., 2012) found that high and low cognitive demand talk had similar effects on children's word knowledge. Features of the studies or populations studied appear to interact with the effectiveness of shared reading interventions on vocabulary outcomes. For instance, some evidence suggests that the associations between children's vocabulary and teacher talk depend in part on children's initial level vocabulary skill. Findings from different studies have shown an interaction effect between vocabulary knowledge and teacher's talk such that lower cognitively demanding talk was more beneficial to children with the lowest initial vocabulary skills, and more challenging talk benefited children with higher initial vocabulary skills (Hindman et al., 2012; Reese & Cox, 1999; Zucker et al. 2010).

The present study is an extension of Gonzalez et al.'s (2014) study that examined patterns of teacher extratextual talk around SBR and the relationship with children's

expressive and receptive vocabulary outcomes. In Gonzalez et al.'s study, researchers examined the relationship between the shared-reading curriculum's scripted and unscripted questions and child vocabulary outcomes. Unlike Gonzalez et al., however, in the present study, only "unscripted" questions are coded and entered into an analysis evaluating the relationship between unscripted questions and child outcomes. That is, the present study focuses on how the level of abstraction of questions *not* required by the intervention curriculum relate to children's word learning.

Purpose

The present study is an observational look at the cognitive complexity of teacher questioning that occurs around SBR and the effect that it has on child vocabulary outcomes on researcher-developed and standardized measures of receptive and expressive vocabulary. Teachers vary in the degree to which they go beyond the "script" in an intervention to breathe life into textual and extratextual conversations with children; therefore, a unique aim of this study is to examine the effects of the additional questioning as a springboard to understanding the association between questioning complexity and child outcomes. Because all teacher participants are expected to follow a predefined intervention curriculum that includes scripted questions for SBR, the analyses will focus on a subset of questions that were not required by the intervention curriculum—that is, unscripted questions that go beyond the intervention curriculum.

Research Questions

The present is a correlational study that examines the association between the cognitive complexity of teachers' questions and children's word learning. Based on

previous research, it is anticipated that more cognitively complex teacher questioning will be associated with better child vocabulary outcomes.

Given that the participants of this study were part of an intervention that used a curriculum that incorporated scripted questions, a particular aim of the present study was to examine whether the cognitive complexity of questions *beyond* the intervention curriculum would relate to children's word learning. It was hypothesized that teachers who ask more questions than required by the curriculum (i.e., unscripted questions regardless of question complexity) will be more effective at increasing children's vocabulary learning. In essence, this expectation is consistent with Zucker et al (2013) findings, because the effectiveness of teacher questioning during SBR is considered an effective strategy overall. However, consistent with the extant literature, the effectiveness of questions may depend on the cognitive complexity of the questions posed. Therefore, it is also hypothesized that cognitively demanding questions will be associated with higher word learning among children.

Specific research questions are as follow:

1. Does the frequency and duration of unscripted teacher questions (i.e., regardless of question complexity) relate to preschoolers' vocabulary on researcher and standardized measures of receptive and expressive vocabulary?
2. Does frequency and duration of unscripted teacher questions of varying cognitive complexity relate to preschoolers' vocabulary on researcher and standardized measures of receptive and expressive vocabulary?

Method

Original Study

The present study is part of a larger study that examined the effects of an intensive SBR intervention targeting science and social studies content-related vocabulary to accelerate vocabulary development and build background knowledge for reading at-risk preschoolers. The study used an experimental design with school-level stratified random sampling where teachers were subsequently randomly assigned to either the intervention or practice-as-usual condition.

The study's treatment and control participants were enrolled in classrooms in nine schools in two ethnically diverse school districts in South Western United States. Twenty one classrooms participated in the project; seven were half day program and 14 were full day program. In one school district 85% of the preschool student qualified for free and reduced-cost lunch (69% of the student body qualified for the same benefits). In the second school district 90% of the preschoolers qualified for free and reduce-cost lunch (30% of the student body qualified for the same benefits) (Gonzalez et al., 2011).

Twenty-one prekindergarten and Head Start teachers participated in the study. In the fall the teachers were randomly assigned into treatment ($n = 13$) and business-as-usual condition ($n = 8$). Treatment teachers participated in a professional development in which they learned how to implement the SBR curriculum. Teachers in the business-as-usual condition did not receive additional training and did not use the intervention curriculum (Gonzalez et al., 2011).

A two-step screening process was used to select the 163 preschoolers who qualified for inclusion in the study. First, the students who had parental consent were administered the Peabody Picture Vocabulary Test-III (PPVT-III; Dunn & Dunn, 1997). Then, among the children whose scores most closely approximated the 15th, 30th, and 50th percentiles on the PPVT-III, two students from each of the target percentile ranks were selected to participate in the main study. The students selected in the treatment classrooms ($n = 100$) formed a single shared reading group (5 to 7 students), whereas students in the business-as-usual condition were grouped according to teacher's common practice (Gonzalez et al., 2011).

Children in the treatment group received 20-minute daily sessions of content-focused SBR and vocabulary instruction in 5-day instructional cycles over 18 weeks (Gonzalez et al., 2011). The intervention was organized by two science themes (*Nature and Living Things*) and two social studies themes (*Places Where We Live and Go* and *Earth*). Twenty-two science books (11 informational texts and 11 storybooks) and 14 social studies books (7 informational texts and 7 storybooks) were used in the instruction, from which 59 science and 35 social studies vocabulary words were chosen from the books as target words. These words were explicitly taught and integrated through the different themes and topics and across the books read by the teachers. Each day of the week had a different purpose during the 5-day instructional cycles. Some of the main differences were that new vocabulary was introduced in days 1 and 3, and reviewed in days 2, 4, and 5. According to the curriculum, questions asked in day 1 and 3 required low cognitive skills compared to the more challenging asked in day 2 and 4.

Finally, days 1 and 2 the teacher used a storybooks, days 3 and 4 the teacher used an information books, and day 5 the teacher used all the books for a review.

Each teacher received a manual that included thematic overviews and detailed lessons plans intended to introduce and review the target words across the book reading in a consistent manner. Each lesson contained explicit instructions and scripted questions that the teachers should ask to the children before, during, and after reading the book in order to ensure the discussion of words was distributed across the reading session. The scripted questions ranged from low level of abstraction, such as “*What is this?*” (when the teacher ask the students to label something) to more inferential questions, such as “*What is the difference between standing in the shade and standing in the sun?*” (Gonzalez et al., 2014). During professional development teachers were encouraged to “breath life” into the curriculum by going beyond the scripted questions and elaborate by ask extratextual spontaneous questions to highlight features of the book or how the book may relate to real life experiences among others.

To measure treatment fidelity, the study research team developed a measure of the critical components of the intervention for each of the five days of instructional cycle of the intervention. Each teacher was rated on specific activities before, during, and after reading components of the intervention using a Likert-type scale with anchors ranging from 0 (low implementation) to 3 (very high implementation). Trained observers conducted fidelity observations three times during the intervention. The inter-observer agreement for 20% of the fidelity ratings was .89 ($SD = .13$). The percentage of perfect

fidelity score ranged from 60.34% to 98.71% with a mean fidelity score of 85% ($SD = 12\%$) (Gonzalez et al., 2011).

Results from this main effects study showed that children in the intervention group outperformed their business-as-usual peers on vocabulary outcome measures. Specifically, the vocabulary intervention had statistically significant effects on the standardized measure of receptive vocabulary ($\delta_T = 0.93$), and both researcher-developed measures of receptive ($\delta_T = 1.41$) and expressive vocabulary ($\delta_T = 1.01$) (Gonzalez et al., 2011).

Current Study

Research Design. The present study is an extension of the study reported by Gonzalez et al. (2014) that used observational data from the original study presented above (Gonzalez et al., 2011). The current study used video clips from the 13 intervention teachers collected at the beginning, middle, and end of the 18-week intervention and used both pretest and posttest vocabulary data to examine the relationship between teacher questioning styles and children's receptive and expressive vocabulary as measured by standardized and research-developed tests at post-test. The present study examined only teachers' questioning (and not children responses) as predictors of vocabulary outcomes. This decision is supported by previous evidence that have found that children are most likely to respond at the same level of abstraction than teachers' questions (Zucker et al., 2010), that is, if teachers ask children high cognitive demand questions, it is highly likely that the children will respond with elaborated

answers. Moreover, video and audio equipment were not sensitive enough to audibly hear child responses.

Pretests were used as children's baseline scores (covariates). The predictor variables were frequency and duration of all unscripted questions and the frequency and duration of unscripted questions at four levels of cognitive complexity. In order to measure these variables, videotaped reading sessions were coded using the coding scheme described below

Participants. The aim of the present study was to examine how the cognitive complexity of questions that go beyond the intervention curriculum relate to children's vocabulary; that is, the study focused in a group of questions occurring in the context of the study intervention. Therefore, only students and teachers from the project intervention treatment condition were included in the analysis.

Teachers. For the present study, videos of the thirteen treatment teachers who participated in the original study (Gonzalez et al., 2011) were coded. Four of the 13 intervention teachers taught both a morning and an afternoon class, yielding a total of 17 intervention classes.

Seven teachers were from general education prekindergarten classrooms and six were from Head Start prekindergarten classrooms. Among these teachers, 92% ($n = 12$) held a bachelor's degree and 7% ($n = 1$) an associate's degree. Most of the intervention teachers held elementary (77%, $n = 10$) and/or early childhood certification (92%, $n = 12$), and around half of them (54%, $n = 7$) held English as Second Language (ESL) certification. Regarding teacher experience, these teachers had a mean of 12.00 ($SD =$

7.56) total years of teaching experience, and a mean of 8.92 ($SD = 6.16$) years teaching prekindergarten/Head Start.

Students. The 100 students selected for the treatment condition in the original study intervention main study (Gonzalez et al., 2011) were considered in the present study. Children participated in small reading groups whose sizes ranged from 5 to 7 with a median of 6, resulting in 17 intervention groups nested under the 13 teachers.

The children's ages at pretest ranged from 4.08 to 5 years, with a mean of 4.58 ($SD = 0.30$). Fifty-four percent of the students were female, and the children were ethnically diverse: 46% of the sample was African American, 24% white, 22% Hispanic or Latino, 5% Asian, and 3% other ethnicity. Students were mainly English speakers (94%) and over 90% were eligible for free or reduced-cost lunch. Most of the families in the sample (69%) had an annual income of \$24,000 or less. Eighty two percent of student's mother, and 79 percent of student's fathers had at least a high school diploma or GED.

Measures. Measures of students' pre- and posttest receptive and expressive vocabulary collected as part of the main study using a battery of language and literacy measures were used for the purposes of this study. In addition, observational data was collected using the Observer XT 11.5 software (Noldus Information Technology, 2013).

Receptive vocabulary. The Peabody Picture Vocabulary Test III (PPVT-III; Dunn & Dunn, 1997) was used to measure children's receptive vocabulary. The PPVT-III measures receptive vocabulary of children and adults in Standard English. The instrument has two parallel forms (A and B). Each item consists of four colored pictures,

and the items are ordered in increasing difficulty. The instrument is individually administered and usually takes about 10 to 15 minutes. For the administration the examiner says a spoken word and the examinee must point to or say the number of the picture that shows the meaning of that word. . The alpha and split half reliabilities coefficients reported by Dunn and Dunn (1997) ranged from .86 to .98 for both forms, showing good internal consistency.

In addition, a researcher-developed measure of content-related receptive vocabulary taught during the intervention was used. Similar in format to the PPVT-III, the Researcher-Developed Receptive Vocabulary test (RDRPVT) measures knowledge of 18 target words used throughout the WORLD intervention by asking the children to point to the target word named by the examiner. Alpha coefficients reported by the researchers (Gonzalez et al., 2011) were .66 and .77, and split half coefficients were .68 and .80 for pre- and posttest, respectively.

Expressive vocabulary. The Expressive One-Word Picture Vocabulary Test (EOWPVT; Bronwell, 2000) was used to assess children's expressive English vocabulary. The EOWPVT measures expressive vocabulary by asking the examinee to name a series of illustrations representing objects, concepts, or actions. The test does not require reading or writing skills and the difficulty of the items increases as the testing progresses. The median of the reported alpha coefficients reported by Bronwell (2000) was .96, with a range of .93 to .98.

In addition, a researcher-developed measure was used to assess content-related expressive vocabulary that was taught during the intervention. Similar in format to the

EOWPVT, the Research-Developed Expressive Picture Vocabulary Test (RDEPVT) assesses the same 18 vocabulary words as on the RDRPVT. In this instrument the examiner prompts the child to name the words pictured in illustrations. Alpha coefficients reported by the researchers (Gonzalez et al., 2011) were .52 and .77, and split half coefficients were .49 and .78 for pre- and posttest, respectively.

Observational system. Each of the 13 teachers was video-recorded during three reading sessions occurring at the beginning, middle, and end of the intervention, resulting in a total of 38 teacher observations (one teacher was observed only two times). For the present study, each video clip was coded using The Observer XT 11.5 software (Noldus Information Technology, 2013) and a coding scheme specifically designed for this study. The Observer XT is designed to collect, analyze, and present observational data. This program allows researchers to observe previously-recorded videos and then code the observations using system that they have developed to provide the variables needed for their study. The output from the pooled observations can then be exported to a data file to perform further analysis using spreadsheets or statistical software.

In the present study, teachers' questions during shared reading sessions were coded in order to identify scripted and unscripted questions (i.e., questions that are required vs. questions that are not required in the curriculum). Then the level of cognitive complexity of the unscripted questions generated by teachers was coded. A first level of coding was a mutually exclusive and cumulatively exhaustive classification of teachers' utterances in the observed sessions. This means that during the time of the observation teacher's actions were coded such that two behaviors could not occur at the

same time and when one behavior started and it was coded the previous behavior ended. In this way duration of the observation was captured. For example, if the teacher was reading the book this was coded as *reading*. If the teacher stopped reading and asked a question that was related to the reading but not specified in the curriculum, this was coded as *scripted questions related to reading*. This type of coding permits the measurement of the duration (time spent) and the frequency (number of times) of every behavior and its characteristics for further analyses.

To summarize, first the type of teacher's utterance was identified as (a) *unscripted question related to reading*, (b) *scripted question related to reading*, (c) *reading*, and (d) *other (this code included comments and questions not related to reading)*. Then all of the behaviors coded as *unscripted questions related to reading* made by the teachers were coded in terms of their cognitive complexity. Description and examples of these behaviors are shown in Table 3.1.

Table 3.1

Summary of The Observer Coding Scheme: Teacher's Utterance Types Behavior Group

Behavior	Description	Examples
Reading	Teacher reads printed text	
	A question is: Any utterance related to the story or the target vocabulary that appears in an interrogative form	<i>"What is he doing?"</i>
	Utterance in declarative form but that has rising intonation	<i>"He goes to the library?"</i>
	Questions statements that include the words <i>what, who, where, when, why</i>	<i>"Tell me what do you think will happen next."</i>
Scripted question related to reading	Scripted questions are: Questions presented exactly as written in the curriculum or with only two words that are different from the script.	
	Questions in which the teacher doesn't say the last say words that refer to the page, but the question remain the same. Ex: <i>What do you think you will learn about bank on this page = What do you think you will learn about bank</i> (she has to include the target word in the question)	
Unscripted question related to reading		<i>"What is he doing?"</i>
	An unscripted question is any question not meeting the definition of scripted questions presented above.	<i>"He goes to the library?"</i>
		<i>"Tell me what do you think will happen next."</i>

Table 3.1 Continued

Behavior	Description	Examples
		“This is a bear”
	All utterances not categorized as question related to reading (e.g., comments, directives, talk)	
	Questions that are related to behavior management	“Will you sit down, please?”
Other	Turn taking questions	“Do you want to say something?”
	Rhetorical questions	“He should go to the grocery store, shouldn’t he?”
	Conversational questions	“Do you like how he sings?”

Second, unscripted questions related to reading (i.e., questions that the teacher asked about the content of the book being read or related vocabulary that were not scripted in the curriculum) were coded according to their cognitive complexity (Table 3.2). Four levels of cognitive complexity of the questions that reflected a range from low cognitive complexity to cognitively challenging tasks were identified: (a) *Level 1*, questions required a child to label or identify an object or character, or to repeat a word; (b) *Level 2*, questions required describing or recalling information; (c) *Level 3*, questions required summarizing information, defining a word, or inferring character’s point of view; and (d) *Level 4*, questions required associating concepts, connect concepts with life experience or predict outcomes.

Table 3.2

Summary of Modifiers of Unscripted Questions: Cognitive Complexity

Question's cognitive complexity	Question requires:	Example
Level 1	To label, name, identify, or point an object or character	<i>"What is this?"</i>
	To choose between multiple options	<i>"Is this soft or rough?"</i>
	To repeat a word or a sentence	<i>"Could you repeat waterfall?"</i>
	To make animal noise or sounds	<i>"How does the cow say?"</i>
Level 2	Describe the critical attributes of a character, object or event /scene	<i>"What is happening in this picture?"</i>
	Recall previous' day information or recently read text (specific information)	<i>"What happened when the bear found the toy?"</i>
	Recall familiar places, objects, people, event not depicted or describe in the text with no further elaboration	<i>"Have you been in Walmart?"</i>
Level 3	Summarize/make generalizations about what was read	<i>"What is the big thing that happened in the story?"</i>
	Define or explain a term. Communicate critical attributes of a word.	<i>"What is a garden?"</i>
	Infer characters point of view	<i>"What do you think the bear felt when he couldn't find his friend?"</i>
	Predict before to read the story	<i>"What do you think this story is about?"</i>
Level 4	Compare similarities/differences of objects, characters, or print	<i>"What are the differences between these two stores?"</i>
	Demonstrate previous knowledge with no further elaboration	<i>"What plants do you know?"</i>
	Make a logical connection of the new word with other words	<i>"Could a custodian work in the city? Why or why not?"</i>
	Connect concepts discussed in the story with life experiences	<i>"How your garden looks like?"</i>
	Predict about what will happen next in the story or hypothesizing about the outcome of an event	<i>"What do you think he will do to protect his garden?"</i>
	Identify cause-effects connections	<i>"Why do you need an umbrella?"</i>

Note. Coding categories adapted from Gonzalez et al. (2014), van Kleeck, Gillam, and Hamilton (1997), and Zucker et al. (2010)

The categories used for coding the cognitive complexity of the unscripted questions were adapted from Gonzalez et al.'s (2014), van Kleeck et al. (1997), and Zucker et al.'s (2010) coding schemes. Even though this coding scheme is very similar to the one used by Gonzalez et al. (2014), the present study had important differences. First, considering previous research (van Kleeck et al., 1997; and Zucker et al., 2010), the present study implemented a coding scheme that identified four levels of cognitive complexity (instead of the three levels used by Gonzalez et al., 2011). Second, in the present study, questions that asked for definition of words were considered a more challenging task than describing (Level 3), whereas Gonzalez et al. (2014) coded these kind of questions at the same level than questions intended to describe. This decision was made in consideration of previous research (Dickinson & Smith, 1994; van Kleeck et al., 1997; and Zucker et al., 2010) that has identified questions that ask for definition of words as more cognitively challenging questions.

The videos were coded by the author and by another trained doctoral student. To establish inter-rater reliability, the coders coded five videos independently prior to formal coding and disagreements were solved before start coding the rest of the videos. After that, 20% of the remaining videos were coded independently by the two coders and the intraclass correlation coefficient (ICC) was estimated for all codes. The ICC estimates the proportion of the variance in codes that is attributable to differences in the teachers' behavior versus differences between the coders (Gonzalez et al., 2011) and yields inter-rater agreement between the coders. For the present study the ICC ranged

from .957 to .999 for duration codes, and from .946 to 1.000 for frequency codes. All ICC values are shown in Table 3.3.

Table 3.3

Intraclass Correlation Coefficients for Raters Using Frequency and Duration of Unscripted Questions at Different Levels of Cognitive Complexity

Duration Codes		Frequency Codes	
Level of complexity	ICC	Level of complexity	ICC
1	0.999	1	1.000
2	0.968	2	0.946
3	0.984	3	0.992
4	0.957	4	0.966

Note. $N = 7$. Intraclass correlations were calculated with raters treated as random and items (codes) treated as fixed.

Results

Results indicated that teachers asked more unscripted than scripted questions. Specifically, 76% of the questions were unscripted and 24% scripted. Regarding the duration of questions, 78% of the total time was used for unscripted questions and 22% for scripted questions.

Scripted questions included in the curriculum were compared to unscripted questions asked by the teacher in terms of the percentage of questions at each of the four levels of cognitive complexity. Table 3.4 shows the data averaged across observation sessions and teachers. It is important to underscore that in this analysis, all questions included in the curriculum for the lessons in the study were analyzed in terms of their cognitive complexity, whether or not they had been uttered by the teacher. For instance,

according to the curriculum 20% of the *scripted* questions in a lesson may have corresponded to level 4 questions; however, only 10% of the *unscripted* questions asked by a teacher may correspond to level 4 questions.

Table 3.4

Percentage of Questions at Different Levels of Cognitive Complexity for Scripted and Unscripted Questions

Level of Complexity	Scripted Questions				Unscripted Questions			
	Min.	Max.	Mean	SD	Min.	Max.	Mean	SD
1	00	32	23	12	12	50	24	10
2	07	35	16	09	18	40	30	07
3	34	48	40	04	28	51	39	07
4	08	41	20	09	00	15	07	05

Note. $N = 12$. All values are based on three observations of 12 teachers. The teacher who did not have one observation was not considered in the analysis.

As noted earlier, teachers asked much more unscripted than scripted questions, and the present analysis showed that they followed a somewhat different pattern. As it can be seen in Table 4, the percentage of questions for scripted vs. unscripted questions was nearly identical for Level 1 (23% vs. 24%, respectively) and Level 3 questions (40% vs. 39). However, major differences in the percentages of questions for scripted vs. unscripted questions were found for Level 2 (16% vs. 30%, respectively) and for Level 4 (20% vs. 7%, respectively) questions. Teachers asked a larger percentage of Level 2 questions than they were scripted in the lessons, and generated a smaller proportion of Level 4 questions compared to the proportion required in the curriculum.

The descriptive statistics for unscripted questions at different levels of cognitive complexity are presented in Table 3.5. Among the unscripted questions, teachers asked more questions ($M = 17.67$, $SD = 5.58$ questions) intended to summarize information, define words or infer characters point of view (Level 3 questions) and spent more time asking this kind of questions ($M = 172.98$, $SD = 56.79$ seconds). Conversely, questions oriented to associate words with other concepts or with children’s life experience (Level 4 questions) were the least common unscripted questions both in terms of frequency ($M = 3.44$, $SD = 2.7$ questions) or duration of questions ($M = 27.66$, $SD = 23.00$ seconds).

Table 3.5

Descriptive Statistics for Duration and Frequency of Unscripted Questions of Different Levels of Cognitive Complexity

Level of Complexity	Duration Codes (seconds)				Frequency Codes (counts)			
	<i>M</i>	<i>SD</i>	Min	Max	<i>M</i>	<i>SD</i>	Min	Max
1	81.04	66.68	26.89	288.79	11.69	10.78	3.67	46.00
2	103.64	35.46	63.70	147.12	12.38	3.46	8.00	19.33
3	172.98	56.79	82.90	284.87	17.67	5.58	12.33	30.00
4	27.66	23.00	0.00	71.27	3.44	2.70	0.00	9.00

Note. All values are based on three observations per teacher of approximately 18 minutes each on average, except for one teacher who only had two observations.

Relation between teacher’s unscripted questions and children’s vocabulary

outcomes

Given the nested nature of the observations (children nested in classrooms-teachers), multilevel modeling was used to analyze the data. When children are nested in

a classroom the observations are non-independent and traditional fixed-effects models can lead to biases in the estimation of the standard errors, making them too small and producing many spuriously “significant” results (Hox, 2010). Multilevel modeling allows analyzing variables from different levels simultaneously taking into account the various dependencies of the observations in order to calculate the correct standard errors (Hox, 2010). In this case, because the non-independency of the observations was probably due by teachers instead of classroom, teachers were used to define cluster of students.

Of the 100 students who began the main study in the intervention condition, 90 participated in the pre and posttests of all the four measures during the year that the intervention was implemented in their schools—an attrition rate of 10%. Different analyses were conducted to determine if there were differences between students who completed the study and those who dropped out. No differences were found regarding gender, ethnicity, ELL status, and on the PPVT-III, EOWPVT, RDRPVT, and RDEPVT scores at the pretest. The only statically significant difference was that students who stayed in the intervention were, on average, younger ($M = 4.55$, $SD = .30$) than students who did not completed the study ($M = 4.78$, $SD = .11$). All the main analyses were conducted considering only the 90 students in the treatment condition who completed the intervention.

Correlations and descriptive statistics of the different measures for the 90 students who stayed in the study are presented in Table 3.6. The average standard score on the PPVT-III at posttests was 94.98 ($SD = 8.80$) with 25 students scoring 100 or higher. Student’s average standard score on the EOWPVT at posttest was 91.90 ($SD = 9.56$), with

21 students scoring 100 or higher. Regarding the researcher developed measures, students' average score on the RDRPVT at posttest was 16.82 ($SD = 1.59$) on a scale ranging from 1 to of 18 points, and on the RDEPVT was 29.16 ($SD = 4.80$) on a scale ranging from 1 to 36 points.

Table 3.6

Summary of Intercorrelations, Ranges, Means, and Standard Deviations for PPVT-III, EOWPVT, RDRPVT, and RDEPVT Pretest and Posttest Scores

Measure	1	2	3	4	5	6	7	8
1. PPVT-III Pre								
2. PPVT-III Post	.54**							
3. EOWPVT Pre	.00	.12						
4. EOWPVT Post	.34**	.47**	.18					
5. RDRPVT Pre	.40**	.34**	-.02	.35**				
6. RDRPVT Post	.16	.21*	.16	.28**	.26*			
7. RDEPVT Pre	.38**	.30**	.14	.38**	.60**	.32**		
8. RDEPVT Post	.24*	.20	.06	.44**	.39**	.49**	.43**	
Min.	20.00	67.00	61.00	73.00	5.00	10.00	11.00	18.00
Max.	106.00	121.00	109.00	115.00	17.00	18.00	28.00	36.00
<i>M</i>	88.51	94.98	85.60	91.90	12.36	16.82	20.76	29.16
<i>SD</i>	10.92	8.80	9.82	9.56	3.06	1.59	3.98	4.80

Note. $N = 90$. ** $p < .01$; * $p < .05$

Multilevel models were estimated separately for the standardized and researcher developed outcome measures for receptive vocabulary (PPVT-III and RDRPVT) and expressive vocabulary (EOWPVT and RDEPVT). For all of the dependent variables a random intercept model with no predictors was estimated first to determine how much of

the variance of the outcome measure was associated with the grouping structure. For EOWPVT, RDRPVT and RDEPVT the ICC results indicated that between 14% and 23% of the variance in the dependent variable was associated with the teachers and also suggested that the means of the children in the dependent variables from different teachers were significantly different (see Table 7). For PPVT-III, the effect of differences between teachers was not statistically significant ($p > .05$). However, given that the sample size was small affecting the power of the test, and the fact that the ICC still indicated that and 8% of the variance in the outcome measure was associated to the teachers, a multilevel model was used for the main analysis.

Table 3.7

Results for Random Intercept Models with no Predictors for Posttest PPVT-III, EOWPVT, RDRPVT, and RDEPVT Scores and Intraclass Correlation Coefficients

Measures	τ_{00}	p	σ^2	ICC
PPVT-III	6.03	>.05	71.31	.08
EOWPVT	12.82	< .001	80.61	.14
RDRPVT	0.49	< .001	2.07	.19
RDEPVT	5.74	< .001	18.27	.23

Note. $N = 90$

Two models answered the first research question. The first model included measures of how many times (frequency) teachers asked unscripted questions. The second model considered how much time (duration) teachers spent asking this type of questions. Four models were estimated to answer the second research question. In this

case the third and the fourth models included measures of duration and frequency of questions identified as Level 1, Level 2, Level 3, or Level 4 of cognitive complexity. In the fifth and sixth models the duration and frequency of high and low cognitive complexity of questions were included as predictors. Consistent with previous studies that used broader categories of cognitive complexity for conducting the substantive analyses (e.g. Dickinson & Smith, 1994; Hindman et al., 2008), a high cognitive complexity and low cognitive complexity composites were created by aggregating questions Levels 1 and 2, and questions level 3 and 4, respectively. In addition to reducing potential measurement error of categorization this approach allows to compare the results with other studies.

All models included baseline scores on the same measure (PPVT-III, RDRPVT, EOWPVT, and RDEPVT) as a covariate. Because the analyses were based on nonexperimental data (i.e., only participants from the intervention condition), student characteristics (students' age, gender, ELL status, and ethnicity) measured at baseline were included to discard these variables as possible alternative explanations. All models were random intercept models. Fixed and random effect results are presented in Table 3.8 and 3.9, respectively.

Table 3.8

Fixed Effects Results for Multilevel Models Predicting Posttest PPVT-III, EOWPVT, RDRPVT, and RDEPVT Scores

	PPVT-III		EOWPVT		RDRPVT		RDEPVT	
	γ	p	γ	p	γ	p	γ	p
<i>Model 1: Frequency of unscripted questions by cognitive complexity</i>								
Level 1	-0.15	.11	-0.09	.37	0.01	.71	0.06	.46
Level 2	0.57	.12	0.46	.27	0.12	.18	-0.02	.96
Level 3	0.16	.54	0.04	.88	0.04	.58	0.08	.72
Level 4	0.24	.67	1.05	.15	-0.01	.96	0.19	.70
<i>Model 2: Duration of unscripted questions by cognitive complexity</i>								
Level 1	-0.01	.28	-0.01	.44	0.00	.24	0.01	.37
Level 2	0.08	.10	0.06	.29	0.01	.54	-0.04	.38
Level 3	-0.01	.66	0.00	.88	0.00	.64	0.02	.36
Level 4	0.04	.52	0.10	.18	0.00	.85	0.01	.88
<i>Model 3: Frequency of high and low level of cognitive complexity</i>								
High level (L3+L4)	0.30	.27	0.64	.11	0.03	.62	0.24	.21
Low level (L1+L2)	-0.17	.23	-0.04	.82	0.04	.18	0.07	.48
<i>Model 4: Duration of high and low level of cognitive complexity</i>								
High level (L3+L4)	0.04	.26	0.09*	.04	0.00	.64	0.02	.29
Low level (L1+L2)	-0.02	.39	0.00	.88	0.01	.13	0.01	.75
<i>Model 5: Frequency of total unscripted questions</i>								
Total frequency	0.01	.88	0.06	.44	0.02	.09	0.07	.10
<i>Model 6: Duration of total unscripted questions</i>								
Total duration	0.01	.44	0.02	.12	0.00	.25	0.01	.16

Note. All models control for the following covariates: Baseline score on the dependent variable (PPVT-III, EOWPVT, RDRPVT, RDEPVT score), age, gender, ELL status, and ethnicity. * $p < .05$

Table 3.9

Random Effects Results for Multilevel Models Predicting Posttest PPVT-III, EOWPVT, RDRPVT, and RDEPVT Scores

	PPVT-III		EOWPVT		RDRPVT		RDEPVT	
	τ_{00}	σ^2	τ_{00}	σ^2	τ_{00}	σ^2	τ_{00}	σ^2
<i>Model 1: Frequency of unscripted questions by cognitive complexity</i>	0.09	56.04	0.16	78.17	0.24	2.13	4.84*	16.78
<i>Model 2: Duration of unscripted questions by cognitive complexity</i>	0.05	55.64	0.01	76.10	0.45*	2.13	3.95*	16.74
<i>Model 3: Frequency of high and low level of cognitive complexity</i>	0.49	57.68	5.79	78.18	0.17	2.13	1.96	16.88
<i>Model 4: Duration of high and low level of cognitive complexity</i>	.96	57.69	1.93	77.76	0.19	2.13	2.55	16.86
<i>Model 5: Frequency of total unscripted questions</i>	2.59	56.81	5.30	77.88	0.20	2.12	2.38	16.79
<i>Model 6: Duration of total unscripted questions</i>	2.00	56.67	3.32	76.68	2.13	0.29	2.71*	16.84

Note. All models control for the following covariates: Baseline score on the dependent variable (PPVT-III, EOWPVT, RDRPVT, RDEPVT score), age, gender, ELL status, and, ethnicity. * $p < .05$

PPVT-III Scores. As it can be seen Table 3.8, PPVT-III scores at posttest were not predicted by any of the duration or frequency variables of interest in the estimated models. Specific cognitive complexity of unscripted questions (Level 1, 2, 3, or 4 of cognitive complexity); high or low cognitive complexity collapsed; or total duration or frequency of unscripted questions were not statistically significant coefficients.

EOWPVT Scores. The results for models of EOWPVT scores are also shown in Table 3.8. In the model that included duration of high and low cognitive demand unscripted questions, the duration of high cognitive demand questions was a significant predictor of posttest EOWPVT scores ($\gamma = 0.09, p = .04$). This result means that if the teacher increases in 1 second the time she spends asking unscripted questions that are cognitively challenging during SBR this would increase in 0.09 points the posttest EOWPVT scores.

RDRPVT Scores. The results for the models of the Researcher-Developed Receptive Vocabulary test (RDRPVT) are shown in Table 3.8. Posttest RDRPVT scores were not predicted by any of the frequency or duration variables of interest included in the different estimated models

RDEPVT Scores. Regarding the Research-Developed Expressive Picture Vocabulary Test (RDEPVT) none of the duration or frequency variables of interest predicted the posttest scores (see Table 3.8).

Discussion

The aim of the present study was to examine the effect of questions of varying cognitive demand levels on preschoolers' receptive and expressive vocabulary. Specifically, this study examined how the level of abstraction of teachers' questions that go beyond of a scripted curriculum during SBR was associated to children's vocabulary outcomes. The participants were preschool children who took part in an 18-week vocabulary intervention nested in small intervention groups with trained teachers who guided the shared reading instruction.

Regarding the first research question, the overall frequency and duration of unscripted questions was not associated with children's vocabulary outcomes on standardized or researcher-developed measure. That is, more questions or more time spent by teachers asking unscripted questions around SBR did not significantly impact children's vocabulary growth. Although previous research have stated that extratextual talk around SBR, and particularly questions, may improve children's words learning (Ard & Beverly, 2004; Walsh & Blewitt, 2006), the present study results indicate that the amount of questions (in terms of frequency or duration) does not explain children's vocabulary outcomes. Thus, although extratextual conversations may help children to improve their vocabulary growth other factors rather than the quantity or duration of questions may account for the growth.

In relation to the second research question and contrary to the expectations, none of the varying levels of question cognitive complexity, in terms of frequency or duration, significantly predicted children's vocabulary outcomes on standardized or researcher-developed measures. However, when the four levels of cognitive complexity were collapsed into two levels, that is, high and low cognitive demand questions, the duration of high cognitive demand questions predicted children's expressive vocabulary learning, on the EOWPVT, the standardized expressive vocabulary measure.

The above findings can be understood in different ways. To begin with, the lack of significant findings for duration and frequency associations with standardized and researcher developed measures may be accounted for by several methodological characteristics of the study. There is the possibility that limited statistical power

prevented to detect the hypothesized effects. Power is a function of α level, the effect size, and the sample size. The present study sample was from a very high poverty population —69% of the families had an annual income of \$24,000 or less—and it is well known that children from low income families usually experience less opportunities to interact with language, thus presenting low vocabulary knowledge (Hart & Risley, 1995; Hoff, 2003). In this sample children scored, on average, .76 standard deviations below normative standards for receptive vocabulary and almost one standard deviation below normative standards for expressive vocabulary (.96 SD below the mean) at the pretest. It could be that an 18 week intervention was not sufficient to improve children scores at noticeable levels. More intensive or longer interventions could increase the effect size (thereby decreasing the probability of a Type II error). Regarding the sample size, there were only 90 students nested in 13 teachers. A bigger sample size, and particular more nesting units, could improve the power to detect small effects (Hox, 2010).

On the other hand, the positive relation between the duration of highly cognitive complex questions and the EOWPVT is consistent with Gonzalez et al. (2014) work, who found that the duration and frequency of the association questions were related to generalized expressive vocabulary. A possible interpretation of this finding is that elaborative interrogations (e.g. questions that are cognitively demanding) may focus children's attention on previously learned knowledge supporting new associations that will be learned (Martin & Pressley, 1991). Therefore, through questions that demand children to elaborate, the processing of the new information is enriched during encoding

making multiple associations with previous knowledge structures which has been shown to facilitate information retrieval (Anderson & Reder, 1979; Ekuni et al., 2011). In Nagy's (2007) words, this result could be also explained in terms of metalinguistic awareness. By knowing words at a deeper level, children are more attuned to novel words and they could be able to infer meanings incidentally (Nagy, 2007; Nagy & Scott, 2000).

The fact that the positive relationship between high cognitive demand questions and vocabulary was only evident on children's expressive vocabulary and not on receptive vocabulary is not an uncommon result (see Silverman, 2007). It may be the case that extended instruction is most evident on tasks that are more active and possibly more complex than receptive vocabulary tasks. Therefore, the measure that assess vocabulary in a more active manner, such as the EOWPVT, could be more sensitive to differences among children (Silverman, 2007). In addition, the effects of complex questions intended to increase word and concept elaboration could be stronger on measures that target different dimensions of vocabulary depth, which were not assessed in the present study. It is possible that these sort of measures would be more sensitive to the effects of cognitively complex questions on children's vocabulary. There are different ways in which depth of vocabulary knowledge may be operationalized in order to account for the richness of the word meaning. For instance, Proctor et al. (2012) used measures of morphological awareness, awareness of semantic relations, and syntactic awareness intended to assess different dimensions of vocabulary depth. Similarly, Strasser et al. (2013) designed a test to measure vocabulary depth in younger kids. In this

test children had to answer two questions regarding 15 low frequency words. The first was an application question and the second was a definition question intended to measure semantic knowledge. Similarly, Coyne et al. (2009) developed different assessment tasks to capture different levels of words knowledge, from receptive to expressive definitions of target words. Considering the complexity that characterizes vocabulary (Nagy & Scott, 2000) it is possible to think that the effect of extratextual talk that is more analytical in nature could be observed on dimensions beyond vocabulary breadth and more simple expressive vocabulary tasks.

The finding that the positive relationship between high cognitive demand questions and expressive vocabulary knowledge was only evident in relation to the amount of time spent on questions of this type, but not in the number of questions, is an interesting result. Although the time spent by teachers asking unscripted questions that were cognitively demanding is not necessary an index of deep processing (cf. Lockhart & Craik, 1990), more time spent on this type of question may foster more elaboration and therefore more time for word and concept enrichment.

The findings also raise the question about the extent to which scripted instructional practices generalize to other teachers' behaviors. As mentioned, the present work is an extension of Gonzalez et al.'s (2014). In their study, Gonzalez and his colleagues found that the duration of high cognitive demand talk predicted generalized receptive vocabulary, and the duration and frequency of questions of high cognitive complexity predicted generalized expressive vocabulary. Gonzalez et al. did not control for scripted or unscripted questions. In contrast, the present study only focused on the

unscripted questions asked by the teachers. Therefore, another possible interpretation of the lack of positive association between high cognitive demand questions and children's scores on the PPVT-III and the researcher-developed measures could be that in absence of a scripted curriculum specifically designed to impact children's vocabulary, the effect of the intervention is diluted. If this is the case, the present findings indicate that the behaviors scripted in the curriculum only partially generalized to the teachers-generated instructional practices around SBR session. Teachers were not able to generate complex questions of good quality and their high cognitive demand questions only impacted expressive vocabulary learning.

The teachers from the present study participated in a half-day professional development session led by the project researchers (Gonzalez et al., 2011). In this session the teachers learned the rationale of the main study and were introduced to the materials, procedures and basic concepts associated with the intervention. However, during this training the teachers were not specifically trained on how to construct cognitively demanding questions (e.g., inferencing), to differentiate questions according to their cognitive complexity or how to ask questions oriented to develop target vocabulary in their students. Teachers were taught how to implement the intervention, but not how to construct their own questions in order to increase children's vocabulary learning. Therefore, in absence of a curriculum that incorporated questions specifically created to improve learning of target vocabulary words among the students, questions generated by teachers are not as successful as those incorporated in the scripted curriculum, as it was reported in Gonzalez et al.' study (2014).

Implications

The present findings partially support research showing that adult talk that is cognitively challenging around SBR promotes children expressive vocabulary growth (Gonzalez et al., 2014; Hindman et al., 2008). As in Gonzalez et al.'s (2014) study, more time allocated by teachers to ask high cognitive demand questions was related to expressive vocabulary growth measured by a standardized test. However, similar to Justice (2002) and Blewitt et al. (2009), the present study did not find effects of high or low cognitive demand questions on researcher-developed measures of expressive or receptive vocabulary measures. Alike to Zucker et al. (2010) and Blewitt et al. no effects on standardized receptive vocabulary measures were found neither.

The study also contributes some new information by focusing on questions spontaneously generated by teachers. Teacher's use of spontaneous questions was predictive of children's expressive generalized vocabulary, a relatively more active and complex task in comparison to receptive vocabulary (Silverman, 2007). Preschoolers are able to make inferences (Van Kleeck, 2008) and cognitive demanding questions may encourage children's language production and facilitate vocabulary depth. However, the lack of association among teachers' unscripted questions of high cognitive demand and children's outcomes on researcher-developed measures and the PPVT-III could be also be interpreted as lack of transference from the intervention to teachers' regular instructional practices. The present findings suggest that scripted instructional practices may not generalize beyond the curriculum and occur naturally as spontaneous teacher questions. It is possible that the teacher professional development did not cover the

rationale, process or strategies for teachers to develop their own spontaneous questions thereby limiting their cognitively complex questioning to the curriculum only.

Effective reading aloud does not come naturally to teacher or parents (Teale, 2003), but appropriate training can supplement natural practices to incorporate more advanced strategies (Lee, Kinzie, & Whittaker, 2012; Dickinson et al., 2009). As Wasik and Hindman (2011a) highlighted, quality language and literacy preschool experience are critical for young children, and a skilled and knowledgeable teacher can provide children with these learning experiences. Although the transfer of evidence-based strategies into effective classroom instructional practices is challenging, teacher professional development designed to improve children's vocabulary and pre-literacy skills have been reported (Wasik & Hindman, 2011a; Wasik & Hindman, 2011b). To address the gap between research and practice, clear, intensive, and distributed professional development may be necessary. To alter teacher practices, improving teachers' knowledge of best evidence is key. Explicit guidance and feedback that provides teachers with information about implementing the shared reading desired strategies are important factors in professional development efforts for producing enduring changes in teacher's practices (Dickinson et al., 2009). Scripted curriculums are a viable option to make explicit what a teacher should do in the classroom, and its effectiveness in adopting new instructional strategies has been demonstrate (Dickinson et al., 2009; Gonzalez, et al., 2014). As Strasser, Larraín and Lissi pointed out (2013), many parents and teachers may find it difficult to implement general suggestions such us

“ask complex, open-ended questions.” Specific instruction is needed to unlock the full benefits of extratextual conversation around SBR.

Limitations and future directions

One potential limitation of the present study is that did not control if the questions were always related to the target vocabulary. Future studies that examine the effect of unscripted questions may consider controlling for or coding the nature of these questions and identifying the questions in terms of relevance to the target vocabulary. It might also be useful to code child-responses to different question types. Due to limited audio recording, children’s voices were not clear, so it was not possible to code which type of questions might have produced more child generated talk. Previous research has explored the effect of eliciting vs. noneliciting questions on children’s vocabulary growth (Walsh and Blewitt, 2006; Walsh & Rose, 2013), but the results are not conclusive. This kind of analyses would give a more refined characterization of what features of the questions asked by teachers are effective on promoting children’s vocabulary growth.

Although not including information about children’s responses limits the ability to characterize child responses and how they can contributed or not to vocabulary improvement, previous research (Danis, Bernard, & Leproux, 2000; Tompkins et al., 2013; Zucker et al. 2010) has shown that children are more likely to respond at the same level of abstraction than teachers’ questions, highlighting the importance of teacher discourse in shaping children’s responses. Future studies could incorporate child’s talk in response to teacher questioning to examine complete adult-child exchanges and

feedback loops in order to examine how children and the adult-child interaction characteristics may affect the learning of new words.

A second limitation is that only treatment teachers and students were part of the present study. It is possible that the questions scripted in the curriculum influenced the way in which teachers naturally asked questions, but it is not possible to say to what extent the intervention impacted teachers' behaviors. To examine generalizability of the scripted intervention it would be interesting comparing the frequency and duration of unscripted questions in the treatment condition and unscripted, or naturally occurring number and duration of questions in the business-as-usual condition. These comparisons would allow to examine the extent to which questions differed according to the group in which the teachers are and how a scripted curriculum may impact teachers' instructional strategies. In other words. Differences may shed light on some of the indirect benefits of participating in scripted curriculum.

A third limitation of the study was the use of a small sample, 90 students clustered in 13 teachers. Sampling error variance and instability of the estimated parameters can have a major impact on statistical results when sample sizes are small. Also, a small sample size may reduce the power impacting the likelihood of finding significant effects. For this reason, the results of the present study should be considered cautiously. Additionally, the present is a sample that was drawn from a restricted geographic area. Therefore, it is not possible the generalization of the present results to broader populations.

Finally, in the present study the effects of questions of varying cognitive complexity were only measured in terms of simple receptive and expressive vocabulary tasks (i.e, point to the picture that shows the meaning of the word the children heard or name an object, concept, or action, respectively). As Coyne et al. have stated (2009) word knowledge can be measured not only in terms of the number of target words learned, but also considering the quality of words learning. Given that it was hypothesized that elaborative and high cognitive demand questions may have a greater impact on vocabulary depth, futures studies should consider collecting other features of oral language, such as syntax, or morphology or/and measures different levels of semantic knowledge that could account for other vocabulary depth dimensions (e.g., Coyne et al., 2009; Proctor et al., 2012; Strasser et al., 2013).

CHAPTER IV

CONCLUSION

SBR is widely considered an effective and appropriate strategy for improving word learning among non-readers (e.g. Bus et al., 1995; Mol et al, 2008; Mol et al., 2009; Mol & Bus, 2011; NELP, 2008; Scarborough & Dobrich, 1994). However, a growing body of evidence has focused on how different features of SBR impact children's language and literacy skills. It is not only the frequency of reading aloud that matters, but the "what" and "how" of the reading (Teale, 2003). In this context, research about the characteristics of extratextual talk that influence vocabulary acquisition has become an important issue in reading research. Nevertheless, it has been difficult to identify the specific characteristics of extratextual conversation that are more effective for promoting vocabulary learning (Blewitt et al., 2009). The present work is an effort to contribute to this discussion. The studies reported here focused on how the cognitive demand level of extratextual questions around SBR affects preschoolers' word learning.

The first study, a systematic literature review, underscored the lack of studies that have examined the effect of the cognitive demand level of extratextual questions on children's vocabulary growth. For this reason, studies that focused on reading styles and studies that examined extratextual questions and comments together also were incorporated to the review. In general terms, the studies that focused on extratextual questions and comments found that high cognitive demand talk was more effective for improving children word learning, whereas studies that exclusively focused on extratextual questions reported that high and cognitive demand questions did not predict

vocabulary learning or were equally efficient. Only one of these studies (Blewitt et al., 2009) found that a combination of low and high cognitive demand talk was effective to foster children's vocabulary growth. These discrepant results have to be analyzed taking into account that characteristics of the studies reported or the samples examined may account for these differences. For instance, elements such as the design of the studies (correlational vs. experimental), the predictors utilized (questions and comments vs. questions only), the familiarity of the target words, and word exposure are some of the features that should be considered to assess the findings exposed. It also seems plausible that a combination of these factors may have influenced the results. It is possible that the effect of the demand level of questions on children's word learning could be related to children's specific knowledge of the words, strictly controlled in experimental studies that examined questioning, and not in correlational studies that examined adults' talk.

The second study, which was correlational, analyzed the relationship between unscripted, teacher-generated questions of different cognitive demand levels and predominantly low SES preschoolers' receptive and expressive vocabulary on standardized and researcher developed measures. The participants of this study were 13 teachers and 100 children who were part of a larger 18-week scripted shared-reading study intended to improve vocabulary knowledge through teacher-guided shared reading instruction. For the present study, only the teacher's unscripted questions were analyzed. One main result was that the duration of high cognitive demand questions predicted children's expressive vocabulary learning on the standardized expressive vocabulary measure. No effects of high or low cognitive demand questions were found on

standardized receptive vocabulary measures or researcher-developed expressive or receptive vocabulary measures.

These findings added relevant information to the body of literature that explores the effects of extratextual talk, particularly to the group of studies that have examined the influence of the cognitive demand of questions on children's vocabulary growth. The literature review showed that in experimental studies, the combination of low and high cognitive demand questions was the most effective way to foster vocabulary gains when children were exposed to unfamiliar words. The findings from the study reported in the third chapter added to the literature by showing that high cognitive demand questions are potentially efficient for improving word learning. More time spent asking high cognitive questions improved general expressive vocabulary. Unlike Justice's (2002) and Blewitt et al.'s (2009) experimental studies, the study reported in the third chapter is a correlational study in which the participants were teachers who, although they did not have specific training in asking high cognitive demand questions, implemented a scripted curriculum for over 18 weeks. The questions analyzed in the present study were teacher-generated, and the words were not totally unfamiliar for the participants. In this context, it is possible that teachers were able to ask high cognitive questions that positively impacted children's word learning. This findings, however, did not generalize to receptive vocabulary, as found by Gonzalez et al. (2014). It seems that the questions generated by teachers were not as successful as those incorporated in the curriculum.

The differences between the findings of Justice (2002) and Blewitt et al. (2009) and those of the present study also could be explained by the differences observed in the

studies' design, such as word exposure and word familiarity, which were not controlled in the present study. It is still possible that low and high cognitive demand questions may serve for different purposes under different circumstances, as Blewitt et al. (2009) proposed. Whereas low challenging questions may help the child to strengthen the link between label and referent, questions that are more abstract may help development of a deeper understanding of the words. Future studies should control familiarity and word exposure, as well as the training of the teachers, to confirm that high cognitive questions are useful to learn new words. Nevertheless, the finding of this study that the duration of high cognitive demand questions predicted children's expressive vocabulary learning, along with Gonzalez et al.'s (2014) results, open the possibility that with well trained teachers or/and well scripted curriculums, high cognitive questions may play a relevant role on children word learning.

The results of the studies reported in the present work do not completely account for the specific influence that high and low cognitive demand extratextual questions have on children's vocabulary learning, they add new information to this discussion. However, several questions remain unanswered, and more researcher is needed to understand how extratextual questions work for improving children word learning and how teachers and parents can use these tools in befit of children's vocabulary growth. The roles of previous general vocabulary knowledge and target word knowledge on the relationship between extratextual questions of different cognitive complexity and word learning is still unclear. More information also is needed regarding what characteristics of the questions, beyond cognitive complexity, may influence word learning (e.g.

eliciting versus non eliciting questions) and how word exposure may play a role on the effect of extratextual questions. More research also is required to examine whether questions of different types among similar levels of abstraction influence vocabulary learning in different ways (for instance, questions intended to compare information may produce different effects than questions intended to hypothesize subsequent events). Finally, the effects of a combination of questions and comments versus only questions on vocabulary learning also require further research.

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