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Vocabulary and Phonological Awareness in 3- to 4-Year-Old Children: Effects of a Training Program

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Running Head: VOCABULARY AND PHONOLOGICAL AWARENESS IN 3 TO 4 YEAR OLD CHILDREN: EFFECTS OF A TRAINING PROGRAM

Vocabulary and Phonological Awareness in 3- to 4-Year-Old Children: Effects of a Training Program

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Abstract

The impact of a preschool training program that combined a vocabulary instruction strategy with phonological awareness activities and instruction in the alphabetic principle, as well as incidental teaching of basic vocabulary items was evaluated using a pretest-posttest design with a control group. This language and literacy (LL) training targeted three to four year-old English as a second language (L2) learners and monolingual (L1) English speakers (*n* = 63) and was conducted twice a week for two hours, for a total of 24 weeks. Both language groups contained a low socioeconomic status (SES) and a middle SES groups. The children in the control group attended a math intervention (*n* = 17) or general Early Years programs (*n* = 6). The results of analyses, controlling for non-verbal reasoning, show that children in the LL training group significantly outperformed the children in the control group on performance on the posttest measures of standardized vocabulary (PPVT-III; Dunn & Dunn, 1997) and letter-sound identification. It is remarkable that at posttest the English L2 children had scores similar to the range of English L1 children at pretest. That is, with this LL training program, at posttest the English L2 children reached the pretest levels of English L1 children. These are the levels of vocabulary knowledge that native speakers will typically have when they start kindergarten. One of the implications of this research is that only an early provision of a vocabulary training program in which conceptual linkages between words are emphasized in a flexible and rich manner can lead to meaningful changes in vocabulary development. In contrast, teaching words does not meaningfully increase general vocabulary knowledge, a result that is supported by a plethora of research to date.

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Abstract

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Introduction

Oral language proficiency, especially vocabulary knowledge, and phonological awareness are the key prerequisite skills for the acquisition of literacy in monolingual (L1) and bilingual (L2) speakers (August, Carlo, Dressler, & Snow, 2005; Cunningham, 1990; Elbro & Petersen, 2004; Liberman & Shankweiler, 1985; see Phillips, Clancy-Menchetti, & Lonigan, 2008, for a review). In the current study literacy is defined as a psycholinguistic process developing in a community that uses literacy communicatively (August & Hakuta, 1997).

It is well established that phonological processing skills, and especially phonological awareness (PA) skills, are predictive of word level reading in native English L1 (English L1) learners (Adams, 1990; see Schatschneider, Fletcher, Francis, Carlson, & Foorman, 2004, for a review). Similarly, vocabulary and decoding skills are predictive of English L1 and English second language (English L2) text comprehension (August et al., 2005; Cunningham & Stanovich, 1997; Gottardo & Mueller, 2009). The complexity of kindergarten vocabulary correlates with the students' reading achievement two years later ($r = .46$; Scarborough, 1998) and a rich foundation of vocabulary knowledge longitudinally predicts reading comprehension (Senechal, Ouellette, & Rodney, 2006) and reading ability in general (Senechal & LeFevre, 1998; Senechal, LeFevre, Thomas, & Daley, 1998). The training program reported in this paper addresses precursors of reading comprehension, vocabulary and phonological awareness (PA). These precursors map onto components of reading comprehension as seen by the Simple View of Reading (SVR), listening comprehension and decoding, respectively. As such, PA or the ability to parse segments of speech in their parts – for example, sentences in words or words in syllables and sounds (Anthony & Lonigan, 2004) – is predictive of the first stage of reading, decoding. Decoding skills together with vocabulary knowledge, which represents the number of words that one understands (receptive vocabulary) or produces (expressive vocabulary), predict the second stage of reading, reading comprehension (Gough & Tunmer, 1986).

Research on cognitive and contextual factors that are related to reading performance is integrated in this study. Specifically, the development and role of vocabulary will be examined. The relations between PA and reading will be described. Finally, the role of SES in relation to vocabulary, PA and reading will be outlined.

Additionally, two conceptualizations of words are discussed: words as vocabulary knowledge (number of words) and words as concepts. The underlying thesis of the current study is that only by considering words as concepts and addressing conceptual development at a very early stage of development, it is possible to change the vocabulary trajectories of children. It is assumed that, as a result of vocabulary growth, children's reading comprehension will be enhanced in the second stage of reading.

Much of what children know about the world, especially in domains they cannot directly observe, is learned from others (Gelman, 2009; Harris, 2002; Harris & Koenig, 2006). This process is first and foremost mediated by language (Chambers, Graham, & Turner, 2008; Cimpian & Markman, 2009; Gelman, Coley, Rosengren, Hartman, & Pappas, 1998; Prasada, 2000). A word is then linked to a conceptual representation that is more abstract than the entities that happen to be present in the naming context (Waxman & Gelman, 2009), which is to say that words represent concepts. For example, 'a dog' refers to one instance of the abstract concept 'dog', a concept that extends beyond the individual dogs that any of us will observe in our lifetimes. By two years of age, children refer to that abstract set directly, and can do so by means of generic expressions (Cimpian & Markman, 2008; Gelman & Raman, 2003), which are sentences that express a property of an entire category (e.g., 'Dogs have four legs'). This type of category-property mapping cannot be observed directly, nor can it be illustrated for someone else without the use of language (Gelman, 2004). Therefore, as words represent concepts, the following hypothesis is tested in the current study: increasing one's conceptual complexity will lead to increased vocabulary – children will retain new words more easily when they already have a complex network of concepts than when they lack this conceptual complexity.

By age three, English L2 children with limited English proficiency and English L1 children who come from disadvantaged or low socioeconomic status (SES) families perform significantly more poorly on measures of vocabulary knowledge than their English L1 peers belonging to middle SES (Carlo, August, McLaughlin, Snow, Dressler, Lippman, et al., 2004; Dickinson, McCabe, Anastasopoullos, Peisner-Feinberg & Poe, 2003; Hart & Risley, 1995; Pan, Rowe, Spier & Tamis-Lemonda, 2004; Snow, Burns, & Griffin, 1998). Hart and Risley (1995) estimated that four-year-old higher SES children had on average a vocabulary of 1,100 words, children from working class families had vocabularies of about 700 words, and children from lower SES homes knew about 500 words.

By age four, these children from disadvantaged backgrounds perform significantly lower on measures of phonological processing skills than their advantaged peers (see Phillips et al., 2008, for a review). Although phonological awareness skills can be successfully taught before children enter school (Baciu, Gottardo, Grant, Pasquarella, & Gebotys, under view), relatively lower performance on measures of vocabulary knowledge persists over time (Biemiller, 2003; Biemiller & Slonim, 2001; Hart & Risley, 1995; Juel, Biancarosa, Coker, & Deffes, 2003; Oller, Pearson, & Cobo-Lewis, 2005; Verhoeven, 1994; 2000), and is coupled with a similar disparity on standardized cognitive measures (Bradley & Corwyn, 2002; Noble, Norman, & Farah, 2005). Specifically, low SES L1 children demonstrate knowledge of significantly fewer words than their middle SES counterparts (Hart & Risley, 1995; Hoff & Naigles, 2002; Hoff, 2003), as well as less cognitive control, more limited working memory capacity, and generally, significantly lower performance on measures of language, memory and intelligence (Farah, Shera, Savage, Betancourt, Gianetta, Brodsky, Malmud & Hurt, 2006; Hoff, 2003; Hoff-Ginsberg, 1991, 1998; McCall, 1981; see Bradley & Corwyn, 2002, for a review)[1]. Therefore, cognitive performance and children's language, including vocabulary knowledge, are relatively stable from infancy to later ages (Adams, 1990; Campbell & Ramey, 1994; Magnuson, 2005). That is, although all children grow over time on these measures, they have the tendency to maintain the ranking of their performance, such that the gap between the performance of lower SES children and middle SES will remain the same or even increase over time.

Thus it becomes important that English L2 children and English L1 children from disadvantaged backgrounds receive training in skills that can lead to academic success prior to attending school (3 years old), such that the trajectory of their performance is changed early on in their development, when the gap between their performance and that of their more advantaged peers is relatively small. The majority of research on children's acquisition of English as a second language is conducted in the United States, where most of the English L2 children belong to lower SES backgrounds (see *Contextual and environmental factors related to reading development* below). Therefore, it is not yet established if the poorer results for literacy learning for English L2 children compared to English L1 children are due to language status or to SES or to a combination of both language status and SES. In Canada, English L2 children belong to both lower SES and middle SES, permitting the differentiation of the specific distal effects of SES and language status on children's acquisition of literacy pre-requisites (see *Contextual and*

[1] These skills are likely to be influenced by experiential factors and are not underlying cognitive skills or capacities.

environmental factors related to reading development below). Therefore, the current study includes not only English L1 and English L2 children from lower SES backgrounds, but also, for comparison reasons, English L2 and English L1 children from middle SES families.

Two skills related to literacy performance need to be targeted, specifically vocabulary knowledge and phonological awareness. The current study focuses on determining the effectiveness of a language and literacy (LL) training program that includes a strategy of teaching vocabulary, as well as phonological awareness (PA) skills, to children from disadvantaged backgrounds and from English L2 middle SES families. The PA component had been shown to be effective in a previous study (Baciu et al., under review), and was added to this training program for ethical and recruitment reasons. As such, parents of the children in the communities where the program had been previously offered expected their children to learn decoding prerequisites as part of the program.

The vocabulary knowledge and cognitive performance gaps between low SES and middle SES children are explained in part by the amount of talk that the children are exposed to in their families during the first three years of their life (Hart & Risley, 1995), as well as by the quality of verbal interactions in the family (Hoff, 2003; Hoff-Ginsberg, 1991, 1998). Hart and Risley (1995) estimated that the higher SES children were exposed to 30 million spoken words by the time they were 3 years old, whereas the children from working class families were exposed to over 20 million words and the children from lower SES families heard about 10 million words. The very large differences between higher SES and lower SES children on receptive vocabularies (1,100 words versus 500 words) are thus partially explained by the immense differences in the number of words heard by these children in their families by three years of age. In this research, higher SES children had parents working in professional occupations; the working class families were formed by parents working in factories; and the lower SES children had parents that were unemployed.

However, although the number of words known or produced is used to measure vocabulary knowledge, vocabulary knowledge represents a network of concepts about the world (see above; Chambers et al., 2009; Gelman et al., 1998; Prasada, 2000). Listening to and engaging in speech with others is what provides a person with a worldview (Nelson, 1996; Vygotsky, 1978). Language also organizes the representation of objects (Lupyan, 2007) and modulates the structure of concepts in infants during their first year of life (Plunkett, Hu, & Cohen, 2008). Children who are exposed to richer and larger vocabularies in their environments perform significantly better on tests of both vocabulary knowledge and cognitive performance (Hart & Risley, 1995; Hoff-Ginsberg, 1998; Hoff, 2003; see Bradley and Corwyn, 2002, for a review). Similarly, successful vocabulary teaching designed to decrease the gap between lower and higher performing children on the number of words understood and produced, means teaching concepts linked to vocabulary items (building semantic networks), rather than teaching words. This approach of teaching concepts and strategies of processing concepts was utilized in the current study.

The current study examines the effects of a LL training program that combines a vocabulary learning strategy with phonological awareness training with a group of preschool children (3 to 4 years old). Vocabulary performance is linked to children's conceptual knowledge (Elley, 1989; Whitehurst, Falco, Lonigan, Fischel, DeBaryshe, Valdez-Menchaca, & Caulfield, 1988), and researchers established that prior knowledge increases the acquisition of new words in 20 month-old children (Yu, 2008). Knowing domain specific words increases the learning of other domain specific words (Lupyan, 2008); past experience influences the extension of new words (Booth & Waxman, 2002; 2006); and categorization experience within basic types of categories, such as animals or vehicles, facilitates the formation of category representations (Quinn & Tanaka, 2007). Thus, it is clear that language exerts a facilitative effect on conceptual development, but researchers have only begun to explore the facilitative effects of conceptual development on vocabulary acquisition. It was hypothesized in the current study that increasing children's conceptual knowledge by helping children flexibly categorize objects and by providing labels for these concepts and categories, children would increase vocabularies. The phonological awareness (PA) training component was successfully implemented in a previous study with preschool children of the same age: children who participated in the PA training performed significantly better on measures of PA, letter-sound identification and decoding than the control group (Baciu et al., under review). Therefore, it was hypothesized that children participating in this training program would have increased PA skills than children in a control group.

Table 1. Number of children (N) in the LL training groups:

Training groups	English L2	English L1
Low SES	9	20
Middle SES	10	24

Table 2. Number of children (N) in the control condition:

Control condition	English L2	English L1
Low SES	2	7
Middle SES	6	8

In order to examine effects of language status (English L1/English L2), as well as socioeconomic status (low/middle), groups were selected based on these variables. The following table shows the number of children who participated in the language and literacy (LL) training groups (Table 1). These children were compared to children who are matched for demographic variables (SES) and language status (English L2 or English L1) (Table 2).

The results of the current study that combines a vocabulary teaching strategy and phonological awareness training showed that children who participated in the training program obtained significant increases on the standardized measure of vocabulary (PPVT-III; Dunn & Dunn, 1997), when compared to the controls. Additionally, both English L2 and English L1 preschoolers that participated in the training program started school better prepared to take advantage of the literacy instruction than did the controls, with significantly higher scores than the control group of children in labeling sounds of letters, and increased scores on word reading (Dolch words; Zimmer, 2003), rhyme and initial phoneme detection, syllable and final phoneme deletion and knowledge of critical vocabulary items. Therefore, the current study demonstrates that positive, significant changes in pre-literacy occur when children are trained at an early age on relevant prerequisite skills. A vocabulary training program that focuses on organizing words in different categories across various contexts, on story building with various words and on exposure to a rich vocabulary is likely to produce significant increases in overall receptive vocabulary. Further, there is a dearth of research on pre-literacy acquisition with monolingual and bilingual children (Baciu et al., under review; Cheung & Slavin, 2005; Farver, Nakamoto, & Lonigan, 2007; Roberts, 2003) with an increasing number of studies focusing on kindergarten and first grade literacy acquisition (Beck & McKeown, 2007; Coyne, McCoach, & Kapp, 2007; Deffes Silverman, 2007; Roberts, 2008; Silverman, 2007). The current study will fill the gap on research regarding vocabulary and phonological awareness teaching and learning in preschool children. The current study also contributes significantly to a better understanding of the effects of conceptual development on language and to developing a better method of teaching vocabulary to improve the learning trajectory of children coming from disadvantaged backgrounds.

Vocabulary and phonological awareness skills, as the critical predictors of reading development, will be discussed further in the light of similarities and differences in the development of these linguistic and cognitive processes for monolingual and second language learners. The SES effects on these processes will also be presented, in order to disentangle the effect of language status and SES on prerequisites of reading. Various interventions aimed at increasing the vocabulary and/or the phonological awareness performance of children coming from disadvantaged groups due to either their SES or their language status will be presented, as well, in order to understand the specific issues related to vocabulary training. Therefore, the literature review will address linguistic and cognitive processes related to reading development, specifically vocabulary and phonological awareness, with a focus on interventions aimed at increasing the performance of disadvantaged children on these pre-requisites for reading, and on contextual and environmental factors related to reading development.

Literature review

Linguistic and cognitive processes related to literacy development

Literacy development and definitions

Literacy is defined as either a psycholinguistic process or as a social practice of constructing meaning. These definitions correlate with beliefs about effective literacy instruction (August & Hakuta, 1997) and therefore, they will be briefly presented.

As a psycholinguistic process, literacy involves sub-processes such as letter recognition, phonological encoding, decoding of grapheme strings, word recognition, lexical access, comprehension of sentences and so on (August & Hakuta, 1997). This definitional approach tends to support the utility of explicit instruction for these sub-processes, as well as practice to achieve automatic functioning. Researchers in this tradition accept an epigenetic view of reading, assuming that the learner's task is different at different stages of development; hence the teacher's tasks will be different according to the learner's stage of reading development.

The second approach to defining literacy, the social practice view, assumes that "participation in a community that uses literacy communicatively" (August & Hakuta, 1997, p. 54) is the critical prerequisite for becoming literate. Thus instructional practices such as encouraging children to write with invented spelling, exposing children to books by reading aloud, and promoting authentic reading experiences through the use of commercially available books for children rather than basal readers, are associated with this definition of literacy. Basal readers are books with controlled vocabulary and/or phonetically controlled words for each level of reading. Although an understanding of literacy seems to be a key prerequisite for further literacy development, this approach cannot explain individual differences in literacy skill for participants that were exposed to the same social practices. In the current study, literacy is considered a psycholinguistic process that develops continuously under the influence of the environment.

Learning literacy skills involves going through two main stages: learning to decode the print, otherwise referred to as learning to read; and reading to learn, that is, to use "the products and principles of the writing system to get at the meaning of the written text" (Snow, 1998, p. 42; Chall, 1996). The current study will address some of the pre-requisite skills for both stages of becoming literate, as it focuses on teaching strategies to expand vocabulary (which correlates more with reading to learn) and on expanding phonological awareness skills (which correlates with learning to decode a written text).

Vocabulary development in monolingual children

At every stage of reading development, oral language abilities, specifically vocabulary, are highly reliable correlates of reading ability (Dickinson et al., 2003; Gallagher, Frith, & Snowling, 2000; Koda, 1989; Snow, Burns, & Griffin, 1998). Researchers differ in the way they assess oral language skills. Vocabulary knowledge is almost exclusively used as a proxy for oral language skills in research (Whitehurst & Storch, 2002; see Whitehurst & Lonigan, 2001, for a review). However, some researchers argue for a comprehensive view of language that includes narrative, semantic and syntactic processing skills (Dickinson et al., 2003; NICHD, 2005). For example, researchers in the National Institute of Child Health and Human Development Early Child Care Research Network (NICHD) contended that extensive oral language abilities predict a larger variance in reading comprehension than vocabulary alone, when reading comprehension was measured by the Woodcock-Johnson passage comprehension (WJPC) test (Woodcock & Johnson, 1989). Various reading comprehension tests measure different skills. For example, WJPC loads highly on word decoding (Catts, Hogan, & Adolf, 2005; Hoover & Tunmer, 1993; Keenan, Betjemann, & Olson, 2008). This means that comprehensive oral language abilities correlate highly with decoding skills, rather than directly with comprehension skills. Oral language abilities, but especially vocabulary, directly influence phonological awareness (Metsala, 1999; Ouellette, 2006; Walley, Metsala, & Garlock, 2003), which in turn, exerts influences on word decoding skills. Other oral language abilities, such as syntactic and morphological awareness, do not influence decoding skills above and beyond PA (Gottardo, 2002; Storch & Whitehurst, 2002). Since WJPC is actually a measure of word decoding more than it is of reading comprehension, and since vocabulary alone influences decoding through PA, the results of NICHD are not conclusive for considering the impact of other oral language skills in the explanation of reading comprehension. Researchers acknowledge the role of a variety of cognitive skills in reading comprehension (August et al., 2005; Cunningham & Stanovich, 1997; Gottardo & Mueller, 2009); however, the current study is not intended to address these skills. Therefore, in this study, general vocabulary knowledge will be employed as the proxy for oral language measures, as supported by the vast majority of research in literacy development (see Whitehurst & Lonigan, 2001, for a review).

In the early stages of reading, growth in lexical knowledge is believed to exert some influence on the development of phonological awareness, as knowing a larger number of words facilitates a more specific phonological representation of words in working memory (Metsala, 1999; Ouellette, 2006; Walley et al., 2003). In the later stages of reading, vocabulary correlates with reading comprehension (Catts et al., 2005; Cunningham & Stanovich, 1997; Nation & Snowling, 2004; Ouellette, 2006; Scarborough, 1998; Senechal, et al., 2006).

Again, researchers differ in the manner they conceptualize the role of oral language skills on early reading development. For example, a group of researchers demonstrated that code related skills, such as phonological awareness and letter-sound identification, are mediators between oral language skills and decoding (Storch & Whitehurst, 2001; 2002; Whitehurst & Lonigan, 1998), therefore oral language skills exert an indirect role on early reading acquisition (decoding). In contrast, other researchers found evidence of a direct role of oral language skills on early reading acquisition (decoding), independent of phonological awareness skills (Catts, Fey, Zhang, & Tomblin, 1999; NICHD, 2005; Share & Leikin, 2004). For example, NICHD

(2005) found direct and indirect paths on their model between oral language competence at 54 months and first grade word recognition. However, Storch Braken (2005) shows that the NICHD model lacks a concurrent path between preschool oral language ability and preschool code-related skills in favor of a longitudinal direct path between preschool oral language skills and Grade 1 reading abilities. This model then did not take into consideration the amount of variance explained by broad language skills measured at 54 months in both Grade 1 letter-word knowledge and phonological awareness (code-related skills). Other models indicated that oral language ability contributed 30% of the variance in Grade 1 reading skills through its effect on both preschool code-related skills and kindergarten oral language ability (see a comparison between Storch & Whitehurst, 2002, model and the NICHD, 2005 model in Storch Braken, 2005).

As vocabulary is word knowledge, which translates into the ability to auditorily recognize a form of a word and to understand its meaning, researchers argue that two aspects are important in describing one's lexical knowledge: the breadth and the depth of their word knowledge (August et al., 2005; Ouellette, 2006). The breadth of vocabulary represents the number of words that one knows. The depth of word knowledge stands for how well a word is known, thus representing the extent to which one knows various connotations (e.g., various understandings of the word in various phrases or contexts; *to talk* means *to discuss*, but also *to communicate*), syntactic constructions (e.g., the constructions that are specific and legal to words in sentences, such as to talk *about*, to talk *with*, but not to talk *on*), morphological options (e.g., the specific ways that words change by adding suffixes or prefixes to them; he talk*s*, talk*ing*, talk*er*), as well as a rich array of semantic associations, such as synonyms and antonyms, for each specific word. These two aspects of vocabulary are differentially related to reading (see

Nagy & Scott, 2000, for a review). Ouellette (2006) demonstrates that it is the breadth of vocabulary knowledge, which is also known as receptive vocabulary, that predicts reading decoding performance, after controlling for age and nonverbal intelligence in Grade 4 students. However, it is both the breadth and the depth of vocabulary knowledge that predicts variance in reading comprehension in the same group of children, after controlling for their age and nonverbal intelligence (Ouellette, 2006).

Vocabulary knowledge and socio-economic status (SES)

There is marked variability across four-year-old children in their breadth of vocabulary at school entry (Biemiller & Slonim, 2001; Hart & Risley, 1995; Molfese, Modglin, & Molfese, 2003; Pan et al., 2004), and this variability tends to be maintained throughout the children's life span (Biemiller & Slonim, 2001; Cunningham & Stanovich, 1997). These individual differences in vocabulary growth were shown to be reliably related to demographic variables, with lower SES children demonstrating significantly lower performance on vocabulary measures than their higher SES counterparts (Hart & Risley, 1995; Snow, Burns, & Griffin, 1998).

In addition, the vocabulary gap between advantaged and disadvantaged children is already established in the primary years of schooling (kindergarten to grade 2; Biemiller, 2003; Biemiller & Slonim, 2001; Graves, Brunetti & Slater, 1982; Hart & Risley, 1995; White, Graves, & Slater, 1990). Further, research conducted with older disadvantaged school-aged children (grade 3 and higher) who were monolingual English speakers shows that the magnitude of vocabulary learning depends on the overall receptive vocabulary before training started (Beck & McKeown, 1983; Cunningham & Stanovich, 1998; Hart & Risley, 1995; McKeown, Beck, Omanson, & Perfetti, 1983; Nagy & Herman, 1987; Shefelbine, 1990). The initial gap in vocabulary between disadvantaged children and advantaged children (i.e. children coming from middle SES families) remains, therefore, the same or even increases over time (Biemiller, 2003; Hart & Risley, 1995; Juel et al., 2003; Senechal et al, 1995; Stanovich, 1986). This concept was coined the Matthew effect in relation to reading (Stanovich, 1986). In terms of vocabulary development, children who have high initial overall vocabulary learn more words than children who have initial lower overall vocabulary; the rich become richer (Senechal et al, 1995; Stanovich, 1986; see Hargrave & Senechal, 2006, and Roberts, 2008, for two exceptions). The Matthew effect is also reported in research conducted with five-year-old kindergartners (Coyne, McCoach, & Kapp, 2007). For example, Coyne and colleagues (2007) utilized a direct instruction approach which, although successful in teaching specific words, favored the students that had initial higher overall receptive vocabulary as measured by PPVT-III (Dunn & Dunn, 1997). This research with older and younger school-aged children demonstrates that the attempt to generalize the effects of specific word learning to children's vocabularies is not effective: the initial gap between advantaged and disadvantaged children is further increased by strategies that focus on breadth of vocabulary knowledge which focus on teaching specific words to children. This research shows the need for effective strategies to increase vocabulary size in children from disadvantaged families, as well as the need for an early delivery of this effective type of training, since already in kindergarten the gap between advantaged and disadvantaged children in vocabulary knowledge is large and has yet to be successfully reduced.

As there is general consensus that precursors to literacy begin early in infancy (Scarborough, 2002; Whitehurst & Lonigan, 2001), and that early literacy in preschool is related to literacy achievement in school (Aram & Levin, 2004; Levin, Ravid, & Rapport, 2001) and even to attainment of higher education (Cunningham & Stanovich, 1997), it becomes important to look at the family variables known to correlate with the development of literacy. Family socioeconomic status (SES) seems to be one of the critical variables associated with attaining literacy, as children from low SES communities generally reach a lower level of literacy than their peers from middle or high SES communities. This relationship seems to hold true for different societies and across decades (Aram & Levin, 2001, Bowey, 1995; Clements, Reynolds & Hickey, 2004; Dickinson & Snow, 1987). The role of SES in the development of literacy and pre-literacy skills is examined in the *Contextual and environmental factors related to reading development* section.

Vocabulary development in bilingual children

If vocabulary plays such an important role in reading acquisition in monolingual children, what is the role of vocabulary in reading for second language learners? There is considerable controversy about the level of second language oral proficiency needed to support reading in that language (August & Hakuta, 1997). For example, Wong Fillmore and Valadez (1986) and Cummins (1984) maintain that second language reading in English should not be introduced until a fairly high level of English L2 oral proficiency has been achieved. Other researchers have argued that instruction focused on second language comprehension can be helpful to learners at all levels of L2 oral proficiency (Anderson & Roit, 1996; Gersten, 1996), and that, in fact, support of L2 reading comprehension can generate gains in oral skills in the second language (Elley, 1981).

Researchers have also shown that English L2 older school-aged children have lower English vocabulary than English L1 children of a similar SES, due to more limited exposure to English (see the Miami study; Oller & Pearson, 2002; Umbel, Pearson, Fernandez, & Oller, 1992). Despite rapid growth in vocabulary acquisition in the early elementary grades, English L2 children continue to lag behind their peers on English vocabulary acquisition across the elementary grades (August, Carlo, Lively, Lippman, Mclaughlin, & Snow, 1999; Geva & Farnia, 2005; Gottardo, Collins, Baciu & Gebotys, 2008; Snow, Burns, & Griffin, 1998; Verhoeven, 1994; 2000), in terms of both the breadth and depth of lexical knowledge. Therefore, preschool English L2 learners are considered at-risk for academic problems (August et al., 2005; Gerber & Durgunoglu, 2004; Lonigan, 1994).

In the studies cited above, language status was confounded with SES as the research was conducted in the United States, where the English L2 children are mostly of low SES background (see below the discussion on language status and SES in the United States) or in the Netherlands (Dutch L2 children are mostly of low SES background in the Netherlands and the children of "guest workers"; "Guest workers" are the workers who work in the jobs that Dutch people would not typically want, menial jobs or hard physical labour). Therefore, the studies from the USA and Netherlands fail to describe the performance of English L2 children of middle SES background, since these English L2 learners are considered a homogeneous group with low income and low levels of parental education. As such, low educational level and low income are confounded with language status (LS) in these studies. In order to disentangle socio-economic status and language variables, it is important to examine literacy development in English L2 learners from families with a range of demographic variables (Baciu et al., under review). As Canadian immigrants are selected based on education and personal wealth among other factors (Citizen and Immigration Canada, 2010), it is possible to separate SES and language status in Canadian samples of children. In Canada English L2 children often belong to families who are poor due to their recent immigration status, as it is well known that education received in other countries is not immediately recognized on the Canadian job market, and, as a result, parents may not obtain in Canada an equivalent job to that held in the country of origin for a while

(Weber, 2005). However, their parents have a broad range of educational levels. This situation provides the opportunity to research the following questions: Are there differences in pre-literacy achievement and L2 vocabulary learning between English L2 children from low SES (e.g., low educational level) versus middle SES (university and above levels of education) backgrounds? Also, are there differences in pre-literacy skills between English L2 children and English L1 speakers when SES is controlled for?

Vocabulary interventions with older school-aged children

How has vocabulary teaching been studied? Two direct and two indirect or incidental strategies have been employed to date in teaching vocabulary to older school-aged, English L1 children. The two direct strategies are: 1) teaching the meanings of new words either by providing definitions, or by providing definitions and offering word contexts (Beck & McKeown, 1983; Beck, Perfetti, & McKeown, 1982; McKeown et al., 1983); and 2) teaching generalizing and transferring strategies, such as contextual analysis or morphemic analysis, that promote the acquisition of new word meanings (Freyd & Baron, 1982; Graves & Hammond, 1980; Otterman, 1955; see Bauman, Kame'enui & Ash, 2003 for a review). Contextual analysis is a strategy used to infer the meaning of a word by analyzing the semantic and syntactic cues present in the passages that precede and follow the word, whereas morphemic analysis implies inferring the meaning of a new word that has the same root as a known word. The two incidental or indirect strategies of vocabulary teaching are shared story-book reading (Bus, van Ijzendoorn, & Pellegrini, 1995; Hargrave & Senechal, 2006; Justice & Ezell, 2000; Hammett Price, van Kleeck, & Huberty, 2009; Witehurst et al., 1998) and a curriculum that provides "high-quality linguistic input programs" (Justice, Mashburn, Pence, & Wiggins, 2008, 985). A high-quality linguistic input curriculum adheres to social-interactionist principles in that the "enhancement of the verbal interactions among teachers and children is an integral component" (Justice et al., 2008, 985), as teachers are more knowledgeable conversational partners who offer socially embedded, mediated interactions to children who are associated with accelerated outcomes for the latter (Bruner, 1983; Chapman, 2000). An in-depth discussion of these direct and indirect strategies follows.

As an example of the first type of direct strategy, which involves providing definitions and a variety of contexts for targeted words, Beck and McKeown (1983) conducted a "rich" (623) vocabulary instruction that included word definitions, sentence generation and oral production and evaluated the performance of English L1 grade four students on targeted word learning before and after the intervention. The authors demonstrated that the children participating in the intervention program showed significantly greater gains in word learning and comprehension of texts containing the target words than a control group of children. However, the gains on targeted words did not generalize to the overall vocabulary for these children.

The second direct type of strategy for teaching words is teaching generalizing and transferring strategies for learning new words, such as contextual or morphemic analysis (Bauman et al., 2003). Most of the researchers that utilized the contextual strategy combined it with providing concurrent definitional information, therefore this approach is known as the definitional approach with contextual analysis (Bauman, Edwards, Font, Tereshinski, Kame'enui, & Olejnik, 2002; Bauman, Edwards, Boland, Olejnik, & Kame'enui, 2003; Kame'enui, Carnine & Freschi, 1982; Nash & Snowling, 2006). For example, Nash and Snowling compared two approaches of teaching new vocabulary items to 7 to 8 year old English L1 children: a definitional approach and a definitional approach combined with a strategy for deriving meaning from written context. The authors found that both approaches resulted in statistically equivalent performance in vocabulary knowledge of the targeted words immediately after the intervention was provided, but the children in the contextual analysis approach performed significantly better on a measure of expressive vocabulary knowledge three months after the intervention (Nash & Snowling, 2006). However, the children in both of the interventions did not show significant improvements on the British receptive vocabulary measure analogue to the PPVT-III (Dunn & Dunn, 1989). These results show again that teaching words is not the most effective strategy for decreasing the vocabulary gap between children.

When using the morphemic analysis strategy, which is another direct strategy for generalizing and transferring knowledge for vocabulary learning, researchers reported that students participating in the intervention group outperformed the control group on measures of spelling and instructed morphemic elements. However, the trained group did not demonstrate superior performance on tests of new words, general vocabulary, or comprehension (Otterman, 1955). A similar trained group did not obtain higher performance than the control group on use of suffixes to new derived words in another study (Freyd & Baron, 1982). Graves and Hammond (1980) compared yet another similar trained group that learned the meaning of prefixes to either a definitional strategy group or to a control group of grade seven English L1 children and found that students could use the newly acquired knowledge of prefixes as a generative tool for understanding the meaning of novel words. No results were reported for general vocabulary performance in this study.

Finally, Bauman and colleagues (2002) compared the performance of grade five students in vocabulary learning and reading comprehension across four groups: three intervention groups and one instructed control group. Specifically, the dependent measures were student's ability to learn the words presented during instruction, to infer meanings on uninstructed transfer words

(words that can be generated or inferred based on the instructed words), and students' comprehension of tests containing morphologically and contextually inferable words. The three types of instruction were morphemic analysis only, contextual analysis only, and combined morphemic and contextual analyses. The instructed control group read, discussed and responded to a trade book for instructional sessions of similar length and frequency as the three intervention groups. Although a standardized, multiple-choice vocabulary knowledge measure tested students' performance before the instruction started, overall vocabulary knowledge was not assessed in posttest. The researchers reported significant immediate and delayed (5 weeks) increases in trained words for the three interventions compared to the control group, as well as significant immediate, but not delayed increases in the transfer words for the same comparisons. None of these interventions enhanced students' comprehension of text containing instructed or transfer words. The training effects in this study did not interact with students' vocabulary knowledge in pretest (Bauman et al., 2002). Bauman and colleagues (2003) compared morphemic and contextual analysis instruction to a textbook vocabulary instruction on learning textbook vocabulary and inferring the meanings of novel affixed words. They reported similar results for the same research design with the same age group, namely, that the training groups did not differ on a comprehension measure that included words that were derived using a morphological strategy, although the children in the morphemic and contextual analysis group were more successful at inferring the meanings of these words on a delayed, but not immediate test.

As shown above in the studies where overall vocabulary knowledge was assessed in both pretest and posttest, the rich instruction approach, the definitional approach with contextual analysis, and the morphemic analysis approach of teaching vocabulary were not successful in closing the gap between disadvantaged and advantaged older children on overall vocabulary performance, and, as a result, these strategies were not successful in closing the reading comprehension gap between these two categories of children (see Bauman et al., 2003, for a review). One of the explanations for this failure is that these interventions attempted to increase the breadth of vocabulary knowledge, or the depth of vocabulary knowledge, without considering words as concepts, in other words, without providing direct instruction on higher order methods of flexible comparing, classifying and synthesizing categories of words. These strategies focused on teaching a few root words at a time, by providing their definitions and contexts that are typical for the specific word. Most studies show an increase of only one word per week in vocabulary knowledge, as shown above. However, in order to decrease the immense gap between vocabularies of children from advantaged and disadvantaged backgrounds (Hart & Risley, 1995), it is likely that more than one word per week needs to be learned by children from disadvantaged backgrounds.

Not only direct strategies have been developed over the past two decades of vocabulary research, but also indirect or incidental strategies of teaching vocabulary. These incidental strategies are: shared storybook reading (Bus, van Ijzendoorn, & Pellegrini, 1995; Hargrave & Senechal, 2006; Justice & Ezell, 2000; Hammett Price, van Kleeck, & Huberty, 2009; Witehurst et al., 1998; see Scarborough & Dobrich, 1994) or “high-quality linguistic input programs” (Justice et al., 2008, 985). Researchers have also utilized shared storybook reading together with explicit teaching of vocabulary (Chow, McBride-Chang, Cheung, & Chow, 2008; Coyne, Simmons, Kame’enui, & Stoolmiller, 2004; Roberts, 2008). Most of these studies are conducted with younger children, for example, with 2 year olds (Whitehurst et al., 1998) or with 5 year olds (Chow et al., 2008). Therefore, these studies are discussed in the section below.

Vocabulary interventions with younger school-aged children

Interventions conducted with younger school-aged children (kindergarten and grade 1) utilize the same two direct and two indirect approaches to teaching vocabulary knowledge as with older school-aged children. As such, for direct approaches, words are taught either by providing their definitions and various contexts for the words (Beck & McKeown, 2007; Biemiller & Boote, 2006; Boyer-Crane, Snowling, Duff, Fieldsend, Carroll, Miles, Gotz & Hulme, 2008; Hargrave & Senechal, 2006; Deffes Silverman, 2007), or by teaching morphemic and contextual analysis strategies to children (Silverman, 2007). For example, Beck and McKeown (2007) argue that children who have limited vocabularies should be instructed with "sophisticated words of high utility for mature language users that are characteristic of written texts" (p. 253), the so-called Tier 2 words (Beck, McKeown, & Kucan, 2002). These words are domain general and are more sophisticated or more refined labels for concepts that young children already have mastered, are less likely to be taught directly or incidentally through grade-level materials, but are encountered in later elementary school curricula. For example, *immense* is a refinement on the concept of very big, and *stranded* is a more sophisticated variant of the concept of being stuck. Beck and McKeown (2007) used the definitional and contextual approach to teach Tier 2 words to kindergarten and grade 1 English L1 children from a low SES background (82% of the children were eligible for free or subsidized lunch). At the end of the training program, children in the training group made significantly higher gains on instructed words than the children in the comparison group of the same SES background. However, no results were reported for gains in standardized measures of vocabulary knowledge, as the researchers did not measure general vocabulary knowledge. The question of whether this type of vocabulary training program is successful in increasing general vocabulary to close the gap between disadvantaged and advantaged children remains unanswered for this sort of vocabulary teaching approach.

In contrast, Boyer-Crane and colleagues (2008) compared a "phonology with reading program" (422) to an oral language program, both delivered to kindergartners (age 4 and older) coming from an English L1 background. The oral language program included direct instruction to develop vocabulary (word teaching in various contexts), inferencing, expressive language and listening skills. The children who participated in the oral language program showed significantly increased performance on target vocabulary and expressive grammar than the children in the phonology and reading program. Again, no gains in the overall measure of vocabulary were reported in this study, as the researchers did not report on measuring general vocabulary at all.

Additionally, the above-mentioned studies were conducted with English L1 children. Fewer studies have included English L2 learners. The same two direct strategies of teaching vocabulary that were employed for older school-aged children from English L1 backgrounds were utilized in research with grade 3 and older English L2 children (Kieffer & Lesaux, 2007; Solari & Gerber, 2008) and with kindergarten and grade 1 English L2 children (Biemiller & Boote, 2006; Coyne, McCoach, & Kapp, 2007; Hargrave & Senechal, 2006; Silverman, 2007; Deffes Silverman, 2007). Results of these studies are discussed below.

For example, Biemiller and Boote (2006) argue that instruction should focus on words that are partially learned, such that between 20% and 70% of a target group of students know these words, as the gains would be maximized on them. When using this approach with kindergarten, grade 1, and grade 2 students with both English L1 and L2 background, Biemiller and Boote (2006) reported that children gained words from pretest to posttest, with grade 1 children showing the largest gains. Effects were maintained four weeks after the program ended.

Again, this study did not report overall vocabulary gains between pretest and posttest. The effect of language status on word learning was not reported either.

Solari and Gerber (2008) compared the performance of 5 and 6 year old students on phonological awareness (PA), word-level reading, and listening comprehension (LC), across three instructional groups: PA only (the treatment control), PA concentration with LC, and LC concentration with PA. Although a pretest assessment of general vocabulary was obtained, general vocabulary knowledge was not assessed at posttest. The researchers reported that all students showed significant improvement in PA and word decoding skills from pretest to posttest. Additionally, students in the LC concentration showed significant increases on LC from pretest to posttest, above and beyond the students in the other two instructional groups. Research with monolingual students showed a predictive relationship between LC and reading comprehension (see Nation & Snowling, 2004, for a review). However, Solari and Gerber (2008) did not directly measure reading comprehension.

Coyne and colleagues (2007) compared two types of word teaching strategies, extended and embedded instruction, on kindergartners' immediate gain and eight-week delayed gain on target word definitions and on understanding target word use in novel contexts. The extended or rich vocabulary instruction is the type of instruction that includes both contextual and definitional information, with multiple exposures to target words in varied contexts (see rich vocabulary instruction above; Becket al., 2002; Stahl, 1986). The embedded instruction consists of providing simple explanations of target words in the context of storybook reading activities (Biemiller & Boote, 2006; Elley, 1989; Senechal, 1997). The participants were from low SES backgrounds, belonging to both English L1 and L2 families, but no language effects were reported in this research. Receptive vocabulary moderated students' response to instruction in both training programs, with students who were at greater risk for language and reading disabilities due to their lower initial receptive vocabulary scores demonstrating fewer gains on word learning than the students with higher initial receptive vocabulary scores. Again, the students with higher initial general vocabularies learnt more words than the children with lower initial general vocabularies (Matthew effect; Stanovich, 1986). Therefore, the gap in general vocabulary knowledge between the performance of children with lower vocabularies and children with higher vocabularies became even bigger at posttest than at pretest.

Hargrave and Senechal (2006) utilized the dialogic reading format followed by explicit teaching of words encountered in text with English L1 and L2 children coming from families with lower parental education (high school or less). They demonstrated that targeted word learning was successfully attained for children participating in this training program, compared to children in the control group. Once again, no results were reported for the children's overall receptive vocabulary on pretest and at posttest, as well as for overall receptive vocabulary gains.

Roberts (2008) provided storybooks for home reading before classroom storybook reading and vocabulary instruction in English to English L2 preschoolers (age 4 to 5) coming from lower SES backgrounds. The books sent home were either L1 or English language books. As such, two instructional groups were compared, but there was no control group of children. Monolingual and bilingual children in both instructional groups knew significantly more taught words at posttest compared to pretest. Roberts (2008) did not find evidence for Matthew effects in classroom vocabulary learning related to initial knowledge of storybook vocabulary: there were no differences in vocabulary gain scores based on low, medium, or high initial storybook vocabulary knowledge. However, the author reported correlations between the overall English receptive vocabulary (overall vocabulary knowledge) and gains on storybook specific vocabulary, correlations that provide evidence for Matthew effects for vocabulary learning related to initial levels of overall vocabulary knowledge. Additionally, growth in overall vocabulary knowledge was approximately a third of the growth of the storybook specific vocabulary knowledge. As the overall vocabulary growth was of smaller magnitude than the growth in specific vocabulary knowledge, and as growth data from a control group that did not participate in storybook reading was not available, it cannot be determined if this growth is meaningful enough to decrease the gap between disadvantaged and advantaged children in vocabulary knowledge.

As shown above, the vocabulary interventions conducted to date with older or younger school-age children, although successful in teaching specific words, are not conclusive for obtaining general vocabulary gains, as the overall vocabulary was not reported for any of the phases of the interventions. The studies that measured overall general vocabulary and used any of the above interventions did not report gains on this measure (Coyne, McCoach, & Kapp, 2007) or did not report the relative gains of children in the experimental condition in relation to the gains of the children in a control condition (Silverman, 2007). As Silverman (2007) argues, she did not report the gains on overall vocabulary, as the children in the training conditions did not learn all the words that they were taught and their rate of learning was of 1 word/week. To show increases on a general vocabulary measure, children need to learn many more words per week than they learnt during this instruction (Silverman, 2007). It is very probable that the lack of reporting on the general vocabulary knowledge in other research cited above is due to the same reasoning: children did not learn all the words that they were taught and their rate of learning new words was much smaller than what the researchers know is needed to show growth on a measure of overall vocabulary knowledge. It is thus necessary to establish the extent to which children coming from disadvantaged families or who have low English vocabulary and who attend a vocabulary training program at such an early stage of literacy development can close that initial gap in vocabulary immediately after the training program is completed.

Conceptual approaches to vocabulary knowledge

Given the research showing discrepancies in language skills between low and higher SES children, it is relevant to understand the effects of SES on vocabulary growth, specifically the effects on both the breadth and the depth of vocabulary knowledge. Not only do children with limited vocabularies know few words, but they also have narrower knowledge of the words with which they are familiar (Curtis, 1987) and are less able to use contextual clues to extract word meaning (McKeown, 1985). Even when the word meaning is identified, these children are less able to identify the correct use of the word in subsequent contexts (McKeown, 1985), which shows a weak semantic network to anchor the new word in order to use it correctly in further contexts. Therefore, not only breadth, but also depth of vocabulary is reduced in children who come from less disadvantaged backgrounds. Additionally, the SES disparities presented above affect not only the breadth of vocabulary performance, but are also documented in performance on tests of more general intellectual and academic competence. Poverty and low parental education have been found to associate with lower performance levels on tests of IQ and school achievement later in childhood (Alexander, Entwisle, & Dauber, 1993; Duncan, Brooks-Gunn, & Klebanov, 1994; Hoff, 2003; Zill, Collins, West, & Hausken, 1995; see Bradley and Corwyn, 2002, for a review).

The fact that intellectual and vocabulary development correlate in the same SES monolingual samples suggests that vocabulary is not only a collection of words that children can understand and produce, but, more importantly, vocabulary represents a means to organize the concepts about the world, with higher vocabularies and increased depth of vocabulary knowledge signifying higher intellectual performance. As Vygotsky (1978) and Nelson (1996) argued, major transitions in cognitive development are associated with children's acquisition of cultural representational systems, especially language. Words guide the formation and organization of concepts, and language mediates learning about the world, or concept formation. For example, children use several distinct kinds of observation when constructing concepts, such as perceptual clues (Quinn & Eimas, 1997) and others' actions on the world (Meltzoff, 2007), but, more importantly, explicit assertions (Harris & Koenig, 2006), and implicit cues from language (Cimpian & Markman, 2005; Gellman et al., 1998). Word learning supports the early acquisition and organization of conceptual knowledge in infancy: naming or labelling objects highlights commonalities between objects and thus, supports learning of categories of objects (car, animal, etc). By nine months of age, this effect is specific to words rather than to nonverbal sounds, as tones do not facilitate categorization (Balaban & Waxman, 1997). By 15 to 18 months of age, this effect supports learning of completely novel categories of objects (Booth & Waxman, 2002).

Word learning is also demonstrated to be a source of support for inductive inference (Cimpian & Markman, 2005; Gelman & Markman, 1987). When preschool children were introduced to a novel object and learnt a novel, but nonobvious fact about it, the pattern of induction to other objects differed based on the presence or absence of a word naming this object: in the absence of the word, the preschoolers extended the fact only to objects with a strong perceptual resemblance to the object (e.g., from a sparrow to a bat); however, when the objects were named, the children extended the fact to test objects that shared a name with the initial novel object (e.g., from sparrow to flamingo, as they were both named as birds), although the perceptual similarity was low. The same effect was documented with 2-year-olds (Gelman & Coley, 1990) and 13-month-old infants (Graham, Kilbreath, & Welder, 2004).

Another demonstration of the role of words in knowledge transmission is provided by generic sentences. These sentences express a property of an entire category (e.g., Horses eat grass), a property that is nonobvious perceptually. Children have shown generalization of these generically conveyed properties to novel, even atypical, members of the category (Chambers et al., 2008; Gelman, Star, & Flukes, 2002) and to classify novel objects as belonging in the category based on these generically conveyed properties (Hollander, Gelman, & Raman, 2009). For example, Gelman and colleagues (2002) showed that 4-year-old children generalized a novel property (e.g., having a sticky tongue) to more instances of a category (e.g., bird) if this property was provided in generic format (e.g., Birds have a very sticky tongue) than in non-generic indefinite format (e.g., Some birds have a sticky tongue), similar to the findings reported by Chambers and colleagues (2008). Hollander and colleagues (2009) showed that 4- and 5-year-old children classified new targets based on their highlighted features significantly more if these features were presented in generic than in non-generic format (e.g., "Bants have stripes" versus "This bant has stripes"). Further, from early on (3 years of age) children can use contextual and semantic information to construe sentences as generic (Cimpian & Markman, 2008) and the differences between children's interpretation of properties learned from generics and non-generics are conceptual, rather than statistical, in nature (Cimpian & Markman, 2009). These studies show that word learning supports the foundations of conceptual structures in infancy and preschool age.

However, conceptual information guides early word learning, as well. To illustrate, Kemler Nelson and colleagues (Kemler Nelson, 1995, 1999; Kemler Nelson, Frankenfield, Morris, & Blair, 2000; Kemler Nelson, Russell, Duke, & Jones, 2000), as well as Booth and Waxman and colleagues (Booth & Waxman, 2002; Booth, Waxman & Huang, 2005) and Diesendruck, Markson, and Bloom (2003) showed how conceptual information provided in words further guided word extension in young children. For example, 2-year-olds used significantly more frequently a novel word for new objects that maintained critical features to the demonstrated function than to objects that did not maintain these features (Kemler Nelson, Russell et al., 2000). The novel word named an object which performed a new function. Further, a conceptual distinction between animate kinds and artefacts influenced word learning prior to the infants' second birthday, when these infants had not mastered a large productive vocabulary yet (Booth et al., 2005).

To continue, the link between word knowledge and cognitive performance is also indirectly tested in the research literature: children with limited vocabulary knowledge had narrower knowledge of the words that they knew (lack of depth of vocabulary knowledge; Curtis, 1987), and were less able to derive word meaning from the context, or to use words in appropriate contexts (McKeown, 1985). In addition, the frequency of using taxonomic, rather than functional classification strategy, was predicted by social class in Zimbabwean children (Mpofu & Van de Vijver, 2000). As such, children from higher socio-economic status families used significantly more taxonomic rather than functional classification strategies. Taxonomic classification refers to conceptual linkages of objects via a superordinate construct (e.g., peas, carrots and cabbage are vegetables; Lucariello & Nelson, 1985; Nelson, 1986). By contrast, functional classification refers to objects' use and is achieved earlier in cognitive development (e.g., we eat peas, carrots and cabbage; Nelson, 1988).

Additionally, LeVine (1980) showed that the frequency of using paradigmatic responses, rather than syntagmatic responses, increased with level of education. Paradigmatic responses, such as “a cat is an animal”, provide information about how a target item fits into a hierarchical taxonomy, whereas syntagmatic responses, such as “ a cat has four legs, two eyes and a tail”, provide information about the appearance, location or use of an item. Finally, this increase in utilization of paradigmatic responses is attributed to cognitive advances (Anglin, 1993; Vygotsky, 1978).

The relation between SES and vocabulary knowledge

As vocabulary development guides and organizes cognitive development, the following hypothesis was developed for the current study: teaching children various ways of organizing words in categories, as well as higher order cognitive processes, such as comparison, analysis and synthesis, will lead to higher vocabularies than teaching children words. Children in this training group will be able to find a place in their existing network of words for the new words encountered with much less exposure than is usually needed for word learning (Beck and McKeown, 2001; Biemiller & Boote, 2006; McKeown & Beck, 2003). Therefore, although vocabulary knowledge and cognitive development are highly influenced by the social class that the children belong to in the first three years of their life, it might be that increasing the vocabulary of children belonging to the lower SES backgrounds by providing a vocabulary training program focused on teaching concepts and ways of processing the world early on in children’s development, could break the chain of association between SES and language and academic performance. Similarly, if English L2 children learn well organized networks of words in English, rather than disparate words only, they will stand a better chance to improve their general vocabularies.

On the same note, Scarborough, Charity and Griffin (2003) proposed that children coming from low SES families lack the knowledge of critical vocabulary concepts in the domains of space relations, time/order relations, quantity and logic relations, that put them at a disadvantage for engagement in classroom instruction and further learning. When these children start reading, they transition linguistically from a colloquial language to a more abstract, formal and decontextualized language with unfamiliar terms, sentence construction and discourse requirements. As a result of encountering this linguistic complexity, reading becomes a difficult skill to attain for them. The current training program also included the specific vocabulary items that were demonstrated by Scarborough et al. (2003) to be unknown to low SES learners, but essential for school success. These items and concepts were taught in an incidental teaching format (e.g., when teaching grapheme-sound correspondences, space relations such as "on top", "below" were targeted as well).

In the current study, the children participating in the literacy program were taught to compare words and objects that denominate objects, to classify them based on various categories (e.g., wild versus domestic animals, but also animals that live in a cold climate, in a warm climate and in a hot climate), as well as to construct stories by stringing pictures of various objects. Exposure to this level of language and cognitive complexity was hypothesized to increase the children's ability to retain words that were encountered during the training program and outside of it, without focusing on word definitions or word contexts.

Phonological processing skills

The strong association between phonological processing abilities and reading attainment is widely accepted now (Brady & Shankweiler, 1991; Goswami & Bryant, 1990; Liberman & Shankweiler, 1985; Rack, Hulme, & Snowling, 1993; Wagner & Torgesen, 1987). Researchers agree that the phonological processing skills significantly related to literacy acquisition are phonological awareness (PA), verbal memory capacity and verbal information processing speed (Wagner & Torgesen, 1987; Wagner, Torgesen, & Rashotte, 1994). Other researchers have added phonological learning tasks to these three known phonological processes, arguing that the ability to learn new words is correlated with reading ability (Carroll & Snowling, 2004). Since PA is the most important predictor of reading success (Perfetti, Beck, Bell, & Hughes, 1987; Stanovich, Cunningham, & Cramer, 1984; Wagner & Torgesen, 1987), PA, as well as the relationship between PA development and reading development are further discussed below.

Phonological awareness

The strong association between phonological awareness and reading attainment in an alphabetic orthography is widely accepted now for monolingual speakers (Bryant, MacLean, Bradley, & Crossland, 1990; Bradley & Bryant, 1983; Lundberg, Frost, & Petersen, 1988; Stanovich, 1992) and for bilingual speakers (Dickinson et al., 2003; Gottardo, 2002; Gottardo, Yan, Siegel, & Wade-Woolley, 2001; Seymour, Aro, & Erskine, 2003). Early phonological awareness skills, specifically detecting rhymes or phonemes, are significantly related to learning to read, even after variability due to intelligence, vocabulary, memory and social class is statistically controlled (Bryant, et al., 1990; Wagner & Torgesen, 1987). A child's performance on phonological awareness tasks in kindergarten is the best predictor of reading success at the end of first and second grade (Lonigan, Burgess, & Anthony, 2000; Wagner, Torgesen & Rashotte, 1994). Phonological processing skill in Spanish correlated with English reading acquisition performance (Gottardo, 2002) and phonological awareness in Chinese predicted English reading performance (Gottardo et al., 2001). These two languages, Spanish and Chinese, have different scripts and relations to English.

There is disagreement in the research literature on how to best conceptualize phonological awareness. Consequently, current definitions of PA can be viewed on a continuum of generality from highly exclusive to highly inclusive of different types of phonological skills (Anthony & Lonigan, 2004), with quite different implications for training phonological skills in children.

The most stringent definition equates PA with the conscious reflection on abstract representations of speech (Anthony & Lonigan, 2004). For example, Morais (1991a) included only phoneme level skills when describing phonological awareness as tasks that involve the manipulation of the phonemes require reflection on abstract representations (Liberman, Cooper, Shankweiler, & Studdert-Kennedy, 1967). Thus, this definition would equate phoneme awareness, which is the ability to consciously reflect on phonemes, with phonological awareness. This metalinguistic ability develops alongside general metacognitive control processes during middle childhood (Tunmer & Rohl, 1991). The important implication derived from this construal of phonological awareness is that it cannot be trained during preschool years.

A second definition of PA includes all subsyllabic skills in the construct of phonological awareness (Anthony & Lonigan, 2004). The argument is that because subsyllabic units of onset and coda rhyme are psychologically based (Treiman, 1983, 1985), the cognitive operations involving these word units also require conscious awareness of abstract representations of speech. Hence, phonological awareness is equated with subsyllabic awareness and can be measured by detection or manipulation of onsets, rhymes, vowels or codas, most of which can be more than one phoneme in length. Tasks that involve larger linguistic units (e.g., syllables or words) are excluded, as they reflect sensitivity to acoustic qualities of speech. Once more, this view of phonological awareness is not very helpful for training preschoolers, as this metalinguistic ability develops during early school years.

A third definition maintains that phonological awareness is the capacity to consciously isolate word segments (Morais, 1991b), such as syllables, onsets, rhymes, codas and phonemes. This construal excludes the ability to make judgments of phonological similarity or dissimilarity at any level of word structure, likening phonological awareness with segmental awareness. As this last ability is linked with the development of cognitive analytic abilities and experience or instruction in the alphabetic principle (Morais, 1991b; Morais & Mousty, 1992), it is possible to train this skill in school-aged children, but not preschool children.

Finally, Stanovich (1992) claimed that the construct of phonological awareness should not be related to the idea of consciousness, as this construct is hard to operationalize. Instead, he viewed phonological sensitivity as being along a continuum from a shallow sensitivity, which is awareness of large phonological units, to a deep sensitivity, which is awareness of small phonological units. Supporters of this last definition describe phonological sensitivity as a single ability taking on different forms during its course of development (Adams, 1990; Anthony & Lonigan, 2004; Bradley, 1988; Bryant et al., 1990; Goswami & Bryant, 1990; Treiman & Zukovski, 1991, 1996). Therefore, in early stages, phonological sensitivity manifests as the detection of large phonological units, such as words, syllables, onsets and rhymes. In later stages, it manifests as manipulation of phonemes. During their development, children are increasingly sensitive to smaller units: they achieve syllable sensitivity earlier than subsyllabic sensitivity, and they achieve subsyllabic sensitivity earlier than phonemic sensitivity (Anthony, Lonigan, Driscoll, Phillips, & Burgess, 2003; Liberman, Shankweiler, Fischer, & Carter, 1974). Results from a meta-analysis conducted by Anthony and Lonigan (2004) reaffirm that rhyme sensitivity, phonemic awareness, and segmental awareness were best characterized as manifestations of the same phonological ability, thus supporting this conceptualization of phonological awareness.

This implies that phonological sensitivity is "a single ability that can be measured by different tasks (e.g., detection, elision, blending) that differ in linguistic complexity (e.g., syllables, rhymes, onsets and phonemes)" (Anthony and Lonigan, 2004, 51). Thus phonological awareness can be indexed by a variety of measures if administered at the proper point in a given child's development. Considering that pre-readers' phonological sensitivity is an early manifestation of the same ability that plays an important role in learning to read, it is important and plausible to identify early phonological deficits and remedy them before the children experience reading failure and its associated behavioral, social, academic and psychological difficulties (Brown, Palincsar, & Purcell, 1986; Lonigan, Anthony, Bloomfield, Dyer, & Samwel, 1999). Therefore, the relationship between phonological awareness and literacy will be examined next.

It is known that children who come to school with little awareness of speech sounds are more at risk of developing literacy problems than other children (Elbro, Borstrom, & Petersen, 1998; Liberman, 1973; Shankweiler, 1994; Stanovich, 1986). A child's performance on phonological awareness tasks in kindergarten is the best predictor of reading success at the end of first and second grade (Perfetti et al., 1987; Stanovich et al., 1984; Wagner & Torgesen, 1987). Moreover, children with reading disabilities and those at risk for reading failure consistently perform more poorly on phonological processing tasks than their typically developing peers (Adams, 1990; Rosner & Simon, 1971; Stanovich, 1986; Vellutino & Scanlon, 1987). Although the research has evidenced the strong correlation between phonological awareness with reading and spelling skills, the nature of this relationship is not clear in the literature. There are three theoretical positions regarding the developmental origins of the phoneme awareness that can be linked to the three theoretical positions defining the relationship between phonological awareness and reading abilities: the accessibility position, the phonological sensitivity approach and the comprehensive language approach (Dickinson et al., 2003).

The accessibility position states that phonemic segments are pre-formed units that are present and functional from early infancy, but initially, they are available only for basic speech processing tasks, and become accessible at a conscious level only when reading experience with an alphabetic orthography takes place (Rozin & Gleitman, 1977; Liberman, Shankweiler, & Liberman, 1989). This position can be viewed as adevelopmental (Walley et al., 2003), as phonemic segments are not believed to undergo any substantial change in their essential nature. But there is evidence that, before reading ability and independently of it, it is possible to develop phonological awareness, which, in turn, facilitates subsequent literacy acquisition (Bradley & Bryant, 1983, 1985; Lundberg et al., 1988; Schneider, Kuspert, Roth, & Vise, 1997).

The phonological sensitivity approach posits that general linguistic abilities, especially vocabulary, provide the critical basis for the emergence of phonological sensitivity, which thereafter is the key language skill in reading acquisition (Bowey & Patel, 1988; Chaney, 1992, 1994; Metsala, 1999; Whitehurst & Lonigan, 2001). For example, Metsala (1999) proposed the "lexical restructuring model" in which rapid expansion of vocabulary forces the representation of increasingly small segments in words. At the very outset of language acquisition, children need to discriminate relatively few unique words, hence quite holistic representations of phonological forms will suffice (Metsala, 1999; Walley et al., 2003). After some threshold of vocabulary development has been achieved, smaller units of words can be represented in the phonological loop, although such representations are also held to be word specific, in that words that are encountered many times or acquired early are more likely to become restructured than rarer or later encountered words (Metsala, 1999). This model is supported by evidence that spoken word recognition varies with lexical characteristics that are associated with vocabulary growth and that word recognition contributes to variations in phoneme awareness, which, in turn, are related to early reading ability (Walley et al., 2003). Further, the psycholinguistic grain size theory (Ziegler & Goswami, 2005) states that as languages vary in phonological structure and in the consistency of phonology-orthography representation, there will be developmental differences in the grain size of lexical representations and reading strategies across various orthographies. Larger units such as whole words, syllables and onset and coda rimes, are the most accessible phonological units for the beginner reader, and the awareness of these units depends on phonological similarity at the lexical level (Metsala & Walley, 1998). For example, the rime is a salient grain size in some languages, such as English, German, French, but the body or onset-vowel unit is salient in other languages, such as Korean (Ziegler & Goswami, 2005).

In line with the lexical restructuring model and with the psycholinguistic grain size theory, some issues regarding the development of phonological awareness in a second language need to be discussed: Is there a certain level of language-specific vocabulary necessary for phonological awareness development in a second language? Can phonological awareness transfer from one language to another, and in what conditions? We have addressed the first issue in the *Vocabulary* section above and the second one in the section regarding phonological awareness in second language learners.

The last position regarding the emergence and development of phonological awareness is the comprehensive language approach (Dickinson et al., 2003), which states that a variety of oral language skills are critical in emergent literacy and play an important role in subsequent reading achievement. As such, vocabulary and phonological awareness are the critical factors in emergent literacy and subsequent reading achievement, with both aspects of children's language being closely related to each other; print knowledge is also related to vocabulary and phonological awareness skills. Dickinson et al. (2003) found that among 3- and 4-year-old children included in a Head Start program, vocabulary played a role equal to that of phonological awareness in predicting print knowledge. Children who showed a deficit specific to phonological awareness also showed an altered pattern of association between vocabulary and phonological awareness, and between these language skills and early literacy. That is, among children with the lowest phonological awareness scores, the relationship between language and literacy was modified such that vocabulary predicted word decoding skills less than in children with typically developing phonological awareness. The same relation held true for children displaying very limited vocabulary development. An implication of this research is that vocabulary and other language skills should not be seen as capacities that are needed only for the development of phonological awareness, but rather as one of the two critical skills to successful reading (Storch & Whitehurst, 2002; Dickinson et al., 2003).

The three different approaches regarding the emergence of phonological awareness correlate with three different views of the causal relationship between phonological awareness and subsequent reading and writing skills. Thus, the accessibility approach explains that reading is the factor that develops phonological awareness, specifically phonemic awareness (Perfetti, 1985). This position also correlates to some degree with all of the first three definitions of phonological awareness (e.g., phonological awareness as conscious reflection on abstract representations of speech, at the level of either phonemes, subsyllabic units or word segments). The phonological sensitivity approach sees phonological awareness as the cause for literacy development, whereas the comprehensive language approach describes a bi-directional link between phonological awareness and literacy development, as the first is leading the second in early stages of reading, but finer levels of phoneme awareness are achieved as a result of learning to read during later stages of reading, at least in an alphabetic orthography (Durgunoglu & Oney, 1999; Wagner, Torgesen, & Rashotte, 1994). The implications of these findings for training pre-literacy skills are discussed later in this thesis document.

Training in phonological awareness has generally been shown to be more effective when it is combined with the teaching of the alphabetic principle (Baciu et al., under review; Byrne & Fielding Barnsley, 1993; Cunningham, 1990; Elbro & Petersen, 2004; Hatcher, Hulme, & Ellis, 1994; Hatcher et al., 2004). Findings of the National Reading Panel (2000) support this view: the mean effect size on reading for training programs that combined phonological awareness and letter-sound knowledge ($d = .67$) was larger than that for phonological awareness training alone ($d = .38$) (Bus & van IJzendoorn, 1999). These programs were very helpful for low SES kindergarteners (Aram & Biron, 2004; Baker & Smith, 1999; Ball & Blachman, 1991; Schneider, Roth, & Ennemoser, 2000). However, the training studies aimed at preventing reading difficulties have mostly been conducted with monolingual children (Farver et al., 2007; Gerber & Durgunoglu, 2004).

There seems to be a dearth of research on training prerequisites of reading acquisition in preschool English L2 children (Farver et al., 2007; Gerber & Durgunoglu, 2004). Thus, Cheung and Slavin (2005) found only 13 studies of beginning reading programs for English L2 learners. In one of these studies, D'Angiulli, Siegel, and Maggi (2004) showed that literacy-intensive instruction was beneficial for English L2 children, despite economic disadvantage. Manis, Lindsey, and Bailey (2004) showed that foundational skills in a first language, such as phonological processing, became important cognitive resources for students as they transitioned to reading in their L2. In addition, similar processes and trajectories are related to early reading in English L1 and L2 speakers (Chiappe, Siegel, & Gottardo, 2002; Lesaux, & Siegel, 2003; Lesaux, Rupp, & Siegel, 2007). Specifically, phonological awareness skills that are predictive of reading success in monolingual readers seem to be important predictors of reading success in English L2 learners as well. However, most studies of early literacy in L2 speakers have dealt with students ages five and older. The current study is conducted with 3 to 4 year old children and aims at preventing reading problems due to underdeveloped vocabulary and phonological awareness skills in lower SES children and second language learners.

Contextual and environmental factors related to reading development

The preschool years are pivotal to the development of general language skills and vocabulary acquisition for native speakers (Paul, 2000). As mentioned previously, one of the critical variables related to the development of precursors to reading in preschool years is family SES. Specifically, children from low SES communities generally reach a lower level of literacy than their peers from middle or high SES communities (Baydar, Brooks-Gunn & Fursenberg, 1993). This relationship seems to hold true for different societies and across decades (Aram & Levin, 2001; Bowey, 1995; Bus, 2001; Clements et al., 2004; Dickinson & Snow, 1987). Low SES children are at-risk for delays in vocabulary development and show consistently flatter trajectories for vocabulary growth than their higher SES peers (Hart & Risley, 1995). The concept of socio-economic status has had " a central and longstanding role" (Gottfried et al., 2003) in the social sciences. SES is considered to affect child development directly (proximal factor) or to influence proximal variables like parenting beliefs and practices, thereby affecting child development indirectly (distal factor) (Bornstein, 2002; Eccles, 1993). More research is needed to examine which specific features of SES influence specific aspects of parenting and child development (Bornstein, Hahn, Suwalsky, & Haynes, 2003).

SES is "a multidimensional construct that is indexed by three quantitative factors" (Bornstein et al., 2003, p. 31), namely educational achievement, occupational status and financial income of parents. Education seems to be the most common indicator of SES (Ensminger & Fothergill, 2003; Entwisle & Astone, 1994), as it is associated with many lifestyle traits, suggests level of acquired knowledge and cultural tastes (Liberatos, Link, & Kelsey, 1988) and is stable in adulthood (Gottfried et al., 2003; Hollingshead, 1975). Maternal education correlates with SES as a whole ($r = .69$; Bradley et al., 1989), and maternal and paternal education are also highly correlated (Kalmijn, 1991).

Occupational status, a second element of SES, is "illustrative of the "skills and power" that people bring to their labour force participation as they function productively in the society" (Bornstein et al., 2003, p. 31). Although researchers have assumed that it is also normally stable throughout adulthood (Hauser, 1994; Hollingshead, 1975; Otto, 1975), occupation is a somewhat problematic indicator of SES (Entwisle & Astone, 1994), as many women, particularly new mothers, self-exempt from labour force participation (Gottfried et al., 2003), and men's and women's occupations have different prestige and remunerate differently (Crompton, 1993).

Income, the third main component of SES, provides families with the resources they must have to meet the physical and intellectual needs of their children. There is conflicting evidence as to whether income is reliably or meaningfully associated with parenting or child development (Blau, 1999; Duncan & Brooks-Gunn, 1997). Moreover, income exhibits short-term variation (Duncan, 1988), and maternal income may be especially unreliable (Gottfried et al., 2003).

SES seems to have a differential effect on distinct outcomes for children, generally exhibiting a stronger effect on children's school and cognitive achievement than on their social and emotional development (Duncan & Brooks-Gunn, 1997; Haveman & Wolfe, 1995). It is also known that income effects are strongest during the preschool and early school years (Duncan et al., 1994; Duncan, Yeung, Brooks-Gunn, & Smith, 1998; Smith, Brooks-Gunn, & Klebanov, 1997). But how does SES differentially influence these various school and cognitive outcomes?

The specific mechanisms by which the SES variable exerts its influence on developmental outcomes has been less systematically explored, despite the repeatedly documented relation between these two variables (Raviv, Kesenich, & Morrison, 2004). Developmental outcomes result from an interaction of both proximal and distal environmental factors (Brofenbrenner & Morris, 1998). There is inconsistency in the way that distal variables are defined. For example, distal factors such as SES or neighborhood characteristics are hypothesized to shape psychological or developmental outcomes via environmentally transmitted influences on proximal factors in the home (Huston, McLoyd & Coll, 1997). Gottfried et al. (2003) consider that distal variables refer to "the global or descriptive aspects that characterize the environment, but do not measure the specific experiences that impinge on or interact with the child that may affect development" (202). In this case, distal variables are SES, parents' occupation, education and so on, and they affect the child's development through the proximal variables.

Proximal variables, which "focus on the process or detailed aspects of the environment, include cognitively enriching and stimulating materials and activities, the variety of experiences, parental involvement, social and emotional supports and physical environment" (Gottfried et al., 2003, p. 203). They also include family relationships, which comprise the quality of family interactions and the social climate in the home (Gottfried et al., 2003). Again, different researchers have used different proximal variables among the ones listed above to mediate the relationship between SES and children's outcomes. In the proposed study the focus is on the effects of family SES on children's educational attainment and, therefore, only the related research is described. Specifically, the direct relationships and the mediators between SES and children's cognitive and language competencies, particularly vocabulary development, during the preschool years are discussed, as vocabulary development seems to be one of the critical predictors of early literacy.

Two main perspectives of the relation between SES and children's development have emerged. One focuses on the effect of income on a family's ability to invest resources into children's development (the investment perspective), whilst the other accentuates the effect of income through parents' emotional well-being and parenting practices (the family stress perspective) (Yeung, Linver, & Brooks-Gunn, 2002). For an example of the second perspective, and colleagues (2004) found that children's expressive language, verbal comprehension and receptive verbal conceptual skills, as measured by Reynell Expressive Language (Reynell, 1991), Reynell Verbal Comprehension (Reynell, 1991), and Bracken Basic Concepts Scale (Braken, 1984) at 36 months, were correlated with maternal education and income-to-needs-ratio measured when the children were 1 month of age. These effects were mediated by the maternal sensitivity and subscales measuring cognitive stimulation taken from Home Observation for Measurement of the Environment (HOME; Caldwell & Bradley, 1984) at 36 months of age of children. The impact of maternal sensitivity as a proximal intervening variable in the relation between SES and language competencies is supported by research that explains how life stressors may lead to more coercive and irritable parenting, which is in turn associated with less favorable academic and emotional outcomes (Hoff-Ginsberg & Tardif, 1995; McLoyd, 1990). The role of cognitive environment provided by the parent as a mediator in the relation between SES and language development is also supported by research showing that maternal education influences the amount and richness of the language stimulation provided to the child (Hoff-Ginsberg & Tardif, 1995). These variables are known to stimulate language development. Similarly, maternal education correlates with a greater number of resources being allocated to the provision of learning experiences and materials, aspects of the home environment that have been shown to affect language abilities of preschool children (Becker & Thomes, 1986; Mayer, 1997).

The financial capital that families can offer to their children, as it is measured by income, is also variable in immigrant families, due to the transition to a new society. This measure is not therefore considered the most reliable in predicting the overall SES impact on children's well-being in these families (Fuligni & Yoshikawa, 2003). As such, other variables, specifically parental education, are likely to be better estimates of SES in immigrant families.

To conclude this section on what psychological experiences are afforded to children by families varying in SES, it seems that SES is a "central construct that permeates virtually every aspect of a child's development, a marker variable that tells us where and what to look for in the more immediate environments of children"(Gottfried et al., 2003, 37). It is impressive that a measure of the infants' family SES relates to various aspects of their development at the completion of high school.

It is difficult to assess the role of a families' SES for children who learn a second language. That is because their SES characteristics need to be considered in the light of the fact that these families have made a transition to a new society, hence many of their SES features, such as educational level and occupational skills, were developed in their countries of origin rather than in their country of residence. As a result, traditional SES indicators may not have the same meaning for immigrant families as they do for Canadian born families, at least in terms of the environmental features and socialization processes that these factors are thought to capture.

Education seems to be the most common indicator of SES (Ensminger & Fothergill, 2003; Entwisle & Astone, 1994), as it is associated with many lifestyle traits, suggests a level of acquired knowledge and is stable in adulthood (Gottfried et al., 2003; Hollingshead, 1975; Liberatos et al., 1988). Maternal education correlates with SES as a whole ($r = .69$; Bradley et al., 1989), and maternal and paternal education are also highly correlated (Kalmijn, 1991). However, for second language learners, the absolute educational level of parents can be both an underestimate and an overestimate of the cognitive stimulation and achievement socialization that takes place in the family (Fuligni & Yoshikawa, 2003). The fact that the same level of education could lead to significant variations in cognitive and literacy skills in different countries can result in an underestimation of the human capital among these families. In contrast, the education levels of parents can overestimate the direct involvement of immigrant parents in their children's schooling and instruction (Fuligni & Yoshikawa, 2003). On average, immigrant parents have less familiarity and comfort with the English language, making it more difficult to provide their children with extensive exposure to English on their own (Zhou, 1997). Therefore, in order to obtain the most accurate assessment of the parenting resources available to children in immigrant families, both the absolute and the relative level of educational attainment in the countries of origin should be considered, which is the case for the current study.

In summary, SES is defined by either the family income, by the occupation of one parent or of both parents, by educational level attained by the mother, or by a combination of these three measures. However, it might be more difficult to assess SES by using the family income measure in immigrant families to determine its impact on their children's school readiness skills. To assess SES in this study, the absolute and relative level of education attained by the parents in their country of origin was evaluated, combined with a measure of the occupation that those parents had held in their countries of origin and in Canada.

To summarize, researchers have found that in general English L2 school-aged children who do not receive specialized early literacy instruction showed lower phonological awareness and vocabulary scores than their English L1 peers. However, it is not yet determined whether SES or language status or both are critical variables in the development of these pre-literacy skills in children before they enter school. Further, it is possible that SES and language status exert a differential effect on PA and vocabulary. Additionally, researchers found that teaching words to children does not produce significant increases in general vocabulary knowledge. The new approach to vocabulary learning in this study is to teach children ways to use higher order cognitive skills such as synthesis, analysis and comparison, when working and with words, through the use of flexible categorization of words.

The current study, which lasted 22 weeks and was conducted for two days a week, two hours a day, examined the efficacy of a language and literacy training program for vocabulary and phonological awareness for children who belong to low SES, English L1 and L2 families, and middle SES, English L1 and L2 families. The main comparison examined children who received LL training versus children who did not receive training, but belonged to similar language status (English L1 versus English L2) and SES status groups. It was hypothesized that the children who participated in the LL training program would perform significantly better on untrained and trained vocabulary, due to the specificity of this LL training program, and on phonological awareness, and reading measures, due to the findings of other research (Baciu et al., under review), than the children in the control group. Additionally, it was hypothesized that language status and SES were not barriers for training vocabulary and phonological awareness due to the smaller gap between the performance on these skills between higher and lower SES children at such a young age (i.e., three to four years old). Therefore, the gains from pretest to posttest for the trained children would not be different based on the variables of interest, SES or language status.

As such, the present study can help in answering some of the questions related to training pre-literacy skills in young English L2 children, such as: Are training programs equally effective regardless of language status or SES? Can this explicit training of early literacy skills be successful in children with little or no prior experience with their L2? What factors are related to vocabulary attainment in young second language learners?

Method

Participants

Sixty-three preschool, children 3- to 4- year old, who were trained in the experimental group were included in the data analyses. The training programs were run at local community centres in medium sized cities in South-Western Ontario, Canada. The children in both experimental and control conditions were recruited from the following four groups: low-income inner city families that had an L1 other than English; low-income families that spoke English as their L1; middle-class families that had an L1 other than English; and middle-class families that spoke English as their first language. The children received training in mixed language and mixed SES groups, for recruitment reasons, as well as for more naturalistic conditions reasons, as in a typical classroom setting[2], children of various SES and language status take part in the instructional activities. Advertisements of the language and literacy (LL) training program and of the math-training program were available two months ahead of the registration day at each of the community centers that the programs were conducted. Additionally, these advertisements were

[2] In medium-sized cities in Canada, most school catchment areas include a mix of SES neighbourhoods.

sent by mail to parents of three- to four-year-old children who were included in a community centre database. A large majority of children was referred by friends or relatives of children who had previously participated in the study. The children were registered to the LL training program on a first-come, first-served basis. When the quota of children for the LL training program was reached (i.e., 20 children plus four due to attrition considerations), the children were registered in the math-training program. A few parents opted to have their children included in the math-training program, even though space was available in the LL training program. The children or their parents were not reimbursed for their time in the study. Their benefits for participating in the study were considered to be learning of prerequisite skills for reading and for math, respectively.

To accommodate 63 children, the training program was offered in five different groups across three years (see Table 1 for a description of the LL training group of children by language status and SES). This resulted in three cohorts of children participating in the LL training group, with 10 children in the first year, 27 children in the second year and 26 children participating in the third year. There were no significant differences in performance on the language and cognitive skills assessed in this study between the LL trained groups across the three cohorts, and therefore their data were collapsed.

Measuring SES is a difficult task, especially in a mixed language status group of children. Educational level is the most stable of the SES indicators during a person's life (i.e., it does not change with immigration status in the case of English L2 populations). Maternal education is the highest correlate to children's performance in academic related activities and maternal and paternal education correlate highly. Therefore, a categorical variable was established for SES, with two levels: low SES and middle SES.

The answers to the following questions from the Parent Home Questionnaire were taken into consideration for determining the SES level of each of the children: “What was the last school grade completed by the child’s father/ mother?”, “What country is the child’s father/mother from?” SES was considered of middle level if both of the parents had at least a college degree, and of low level, if one of the parents had a high school degree or less. As such, children whose one parent graduated from high school and the other parent graduated from college/university were considered to belong to a low SES background. The same method of establishing low and middle SES status was used for English L2 children and English L1 children, for consistency of coding for the two language samples. However, parental education level was consistent within families. In only six English L1 families and six English L2 family one parent, the mother, was a high school graduate and the father a college/university graduate. These families were considered of low SES background.

Out of the 63 children included in the LL training group, 44 were English L1speakers, with 20 of them of low SES (13 had both parents who were graduates of high school or less; six had the mother a graduate of high school, and the father a graduate of college in Canada); and 24 were of middle SES (nine had one parent with a college education, while the other parent had a university education; nine had both parents as university graduates or higher; seven had both parents with a college degree). Nineteen children were English second language learners, with nine of them being of low SES (three children had both parents who were graduates of high school or less, six had the mother a graduate of high school, and the father a graduate of college), and ten children being of middle SES (two had one parent with a college education, while the other parent had a university education; seven had both parents as university graduates; one had both parents with a college degree).

Twenty-three children were included in the control group (see Table 2 for a description of the control group of children by language status and SES). To control for the Hawthorne effect (Troia, 1999), seventeen of these children attended a math program in the same community centre as the LL training group, for 16 weeks. Six of the control children participated in Early Years programs in the same community centre as the LL training group. Such programs included typical preschool readiness activities, such as circle time activities where children learn to talk about weather, the day of the year, sing songs and are read a book and learn some letter names. The control group was recruited in the last two years of the LL training groups, resulting in two cohorts of children in the control group, with six participants in the first year and 17 in the second year. As there were no significant differences between the control groups across the two cohorts, their data were collapsed. Out of the 23 children in the control group, 15 were English L1speakers, of which seven children were of low SES (three children had both parents who were graduates of high school or less; four had the mother a graduate of high school, and the father a graduate of college in Canada), and eight of middle SES (four had one parent with a college education, while the other parent had a university education; two had both parents as university graduates; two had both parents with a college degree). Eight children in the control group were English L2, with 2 children being of low SES (both parents of grade 12 or less education) and six being of middle SES (one child had a parent who had a Master's degree, while the other parent finished high school, and five children had both parents who were university graduates or higher).

Other questions from the Parent Home Questionnaire were of particular interest for the current study. An examination of the answers to the following questions: "What languages are spoken in your home?", "Which people speak these languages?" and "What language is spoken most frequently in your house?" revealed that all the English L2 children spoke a language other than English at home and were exposed to adults speaking only their native language at home. The English L2 participants spoke one of several languages at home including Chinese, Punjabi, Romanian, Spanish, Urdu, Arabic, Japanese, Gujarati, Tamil, Somali, Russian, Malayalam, and Farsi.

Eleven children who were initially included in the LL training program did not have complete posttest or did not participate in the entire training program. Therefore, their data were excluded from the analyses. There is no significant difference between their pretest data and the pretest data of the children who participated in the LL training group or in the control group.

Measures (see Table 3)

Raw scores were entered into analyses, for all measures, except the Parent Home Questionnaire, as the standardized scores were available for only a few of the measures. For all the measures, except for the Parent Home Questionnaire and Non-Verbal Reasoning, children received a score of 1 if they answered correctly the test item, and a 0, if they answered it incorrectly.

Parent-Home Questionnaire. The Parent-Home Questionnaire, described above, was used to assess family SES in the country of origin, as well as in Canada. For example, answers in the questionnaire provided information regarding parental education and occupation in their country of origin, as well as in Canada (see Appendix 1). For details of coding procedures, the above paragraphs provide information on coding for SES. Additionally, language status was coded as English L1 if both parents spoke English at home with their child for at least 80% of the time, and as English L2, if both parents spoke with their child another language than English for at least 80% of the time. Due to the fact that children lived in Canada, it was expected that they would speak some English with their caregivers, however, 80% is considered more than the 50% probability to speak any of the two languages that they might have been exposed to by their parents or by their larger environment. Again, families were very consistent in terms of the language spoken at home: in all families, either both parents spoke English with their child for 100% of their time, or both parents spoke another language than English with their child for 100% of the time. The languages spoken in the English L2 sample were: Chinese, Punjabi, Romanian, Spanish, Urdu, Arabic, Japanese, Gujarati, Tamil, Somali, Russian, Malayalam, and Farsi.

Oral language measures. Oral language proficiency was measured using two vocabulary tasks and a grammatical knowledge task. The first task tested receptive vocabulary using the Peabody Picture Vocabulary Test – III (PPVT-III) (Dunn and Dunn, 1997). The participant selected the correct picture to match the orally presented word (e.g., show me swinging; show me candle) from an array of four pictures. There are 204 test items in this test. Reported reliabilities from the norms for English-speaking children at age 3 are 0.94.

The second task was derived using the commonly used words in school (Scarborough et al., 2003) (see Appendix 2). These words represent concepts such as space relations, time/order relations, quantity and logic relations (e.g., “between”, “beginning”, “a few of”, “same”. It tested receptive vocabulary by asking the children to perform an action (e.g., Put the chair on top of the book). There are 51 items in this test. This is an experimental test and its reliability for the current sample is .94.

Grammatical knowledge was measured using the Grammatical Morphemes subtest of the Test of Auditory Comprehension of Language-3 (TACL-3) (Carrow-Woolfolk, 1999). The sentences were orally presented to the child (e.g., show me The girl is jumping; show me The circle is around the car). The child must then select the picture that best matched the sentence from an array of three pictures. There are 46 items in this test. The reported reliability from the norms for English L1 children at age 3 is 0.83.

Table 3. Measures with their measured construct

Construct measured	Measure
1. SES	Parent Home Questionnaire
2. Phonetic and sight word reading	Dolch words (May & Rizzardi, 2002)
3. Phonological awareness	Phoneme detection
4. Phonological awareness	Rime detection
5. Phonological awareness	Sound blending
6. Phonological awareness	Syllable and phoneme elision
7. General vocabulary	PPVT-III (Dunn and Dunn, 1997).
8. Specific vocabulary items	Scarborough vocabulary (Scarborough, 2003)
9. Letter and letter-sound knowledge	Letter and letter-sound naming
10. Non-word repetition (verbal short-term memory)	Non-word repetition (CTOPP, 2001)
11. Real word repetition (verbal short-term memory)	Short list repetition
12. Non-verbal reasoning	Block Imitation Design (WPPSI, Wechsler, 1989)

Reading Measures. A battery of pre-primer sight words, Dolch words, was used to test English word reading skills (May & Rizzardi, 2002). These words are very frequent in children's books; some of them do not follow phonetic decoding rules (e.g., "four", "blue"), but some of them follow phonetic decoding rules (e.g., "red", "and", "big"). The children were asked to read each word at a time. They were encouraged to use a sound-by-sound decoding strategy that was used to teach them to read during the LL training program. There are 40 items in this test. This is an experimental test and its reliability for the current sample is .94.

Phonological processing measures. The following four measures were administered to assess phonological awareness: phoneme detection, rhyme detection, syllable and phoneme elision, and sound blending. The phoneme detection task contained 15 items and required the participants to select the non-word in a list of three non-words that started with a different phoneme from the other two non-words (based on Bradley & Bryant, 1983; Stanovich et al., 1984). The children were asked to select the illustrated item that matched with the non-word. The non-words were used to control for known vocabulary effects. The items, which were English-like non-words, were represented as "silly creature" names with accompanying "creatures" illustrations. The examiner pointed to each creature when presenting the Non-word items to the children. The children were asked to select which of the three creatures began with a different sound (e.g., Which creature starts with a different sound: nad, nam, sler?). They were cued to listen for the beginning of the word. The use of a pointing response eliminated the need for verbal retrieval of the non-word item. All fifteen items were administered to all of the participants. This task yielded a moderately high internal consistency reliability coefficient for a mixed languages sample in previous research with 6 year-old children ($\alpha = 0.72$; Gottardo et al., 2008). For the current sample, the reliability of this measure is .14, a very low reliability.

A rhyme detection task containing 15 items and using non-words was administered in the same way. The children were asked to select which of the three creatures had a "different sounding" name (e.g., Which creature has a different sounding name: nad, gad, sler?). They were cued to listen for the end of the word (Gottardo, 2002). The reliability of this measure for the current sample is .57, a reliability that is low.

Selected items from the Auditory Analysis Test (AAT), an elision task, were administered to the participants (Rosner & Simon, 1971). The participants were asked to delete syllables and single phonemes from initial and final positions in words to form another word (Say cowboy. Say it without "boy". Say gate. Say it without the /g/. Say please. Say it without the /z/). There are 30 items in this test. The reliability of this measure for the current sample is .91.

Sound blending was assessed using the subtest with the same name from Woodcock Diagnostic Reading Battery (WDRB, Woodcock, 1997). Children were asked to form a word when two or more phonemes of the words were given (e.g., "If you put "p" and "en" together, what will you get?"). There are 33 items in this test. The reported reliability for this subtest is 0.92. The reliability of this measure for the current sample is .88.

Verbal memory. Verbal memory was assessed with a word repetition task and a non-word repetition task. In the first task, the children were asked to repeat eight pairs of words. The first two pairs were formed by two monosyllabic words each (e.g., "dog-clock"), the next two pairs contained two bi-syllabic words each (e.g., "table-mother"), the following two pairs contained two tri-syllabic words each (e.g., "cereal-telephone"), and finally, the last two pairs were formed by two four syllable words each. High frequency words were used for each of the eight pairs. The reliability for this measure is .64.

The Non-Word Repetition Test from the Comprehensive Test of Phonological Processing (CTOPP) (Wagner, Torgesen, & Rashotte, 1999) was also used to measure verbal memory as well, while controlling for the familiarity of words. The children were asked to repeat a non-word in this test. Due to the young age of the children in the current study, the non-word stimuli were presented by the examiner to the children, rather than being presented on an audiotape, as the standardized procedure for older children requires. The children were told that they would be hearing some "made-up" words and would have to repeat these words. The stimuli consisted of

18 Non-words varying in length from two to four syllables. Six items of each syllabic length were presented in a fixed random order to prevent frustration if the child had difficulty with the longer items. All stimuli were presented to the children once. Two training items, one single-syllable item and one four-syllable item, were presented orally by the examiner at the beginning of testing in order to familiarize the children with the task. Responses were scored as correct if the child repeated the non-word as it was presented by the examiner, without omitting syllables or phonemes. Some variability was allowed in terms of vowel and consonant pronunciation. For example, some children responded by producing the sound /t/ instead of the sound /c/. Since these children were consistently mispronouncing the /c/ sound, their responses were considered correct. There are 33 items in this test. This task yielded a moderately high internal consistency reliability coefficient for a mixed languages sample of six-year-old children ($\alpha = 0.70$). The reliability for the current sample is .70 as well.

Letter names and letter-sounds. The children were asked to name all 26 letters of the English alphabet, presented in fixed random order. Then they were asked to provide the sounds for each letter. Letter knowledge is considered a significant predictor of phoneme awareness gains for the normally developing children (Jorm & Share, 1983).

Non-verbal reasoning. Nonverbal reasoning was assessed using the Block Design subtest of the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) (Wechsler, 1989). The children were asked to imitate a block pattern that was presented to them using blocks that were red, white, or red and white. There are 14 items in this test, and each of them could be presented in an individual response trial or in a trial in which standardized assistance is provided to the participant. If the child responds correctly in the first trial, a score of two points is awarded. However, if the child responds correctly only in the second trial or exceeds the amount of time offered for each trial, a score of 1 is awarded. Starting with item eight, if the child responds correctly in the first trial and in less time than what is allotted for that trial, a score of 3 or 4 points is awarded.

Procedure

The study included a pretest-posttest design with a control group. The LL training program lasted 22 weeks and was conducted for two days a week, two hours a day. The program was offered in 44 sessions, with an adult to child ratio of three to fifteen in the experimental groups. Training was conducted by the first author, and four trained senior undergraduate students, graduate students and trained staff from the community centres for each session. Each of the instructors received 28 hours of training, with 20 hours provided before the implementation of the training program, and eight hours provided during the program. Trained graduate students and the first author tested the children. The graduate students received 12 hours theoretical training and 16 hours practical training, when they first observed a trained tester while testing and then tested while being supervised by the first author. Training reviews were conducted every session after the first week of training. The children were assessed individually before and after the implementation of the program on the phonological and oral language measures described above. At each time, the children received the battery of tests during two sessions, with each session lasting approximately 60 minutes with frequent breaks. For the experimental and the control groups, the testing was conducted at the community centre or in their day care center 22 weeks after their pre-test. The testers were senior undergraduate students and graduate students who received extensive training before administering the tests. During the students' training, special consideration was given to discriminating between the ability to answer the test items and attention, due to the young age of the children. All tasks were administered in a fixed random order, such that one or two receptive tasks was administered initially, followed by expressive tasks and non-verbal intelligence.

Training program – Language and Literacy

The LL training program was designed as a readiness preschool program and was tailored to meet the needs of children who came from impoverished first and second language environments. Teacher-led group activities alternated with free-group activities where most of the children received some one-to-one instruction. During free-group activities, individual probes were conducted for the concepts taught in the previous and current sessions to determine individual achievement. For example, three probes were conducted for receptively identifying each of the letter-sounds taught or maintained in a session (e.g., show me S, show me M, show me A) or for receptively identifying items that were same or different (e.g., give me the two that are the same). Decisions regarding supplemental instruction for each child were made based on these data.

The program consisted of metalinguistic exercise units, the teaching of vocabulary, including common vocabulary items (Scarborough et al., 2003) and vocabulary within thematic categories. It began with activities that promoted general listening skills through listening games that included verbal and non-verbal sounds. Even though general listening skills are not subsumed under phonological awareness or vocabulary, the very young children in the sample had limited English skills and lacked experience in a group setting. Therefore, learning to listen and follow simple commands (e.g., stop, sit) required initial training that included basic listening. Phonological awareness activities began with a focus on beats by clapping, dancing and marching syllables in words, including children's names. Syllables were counted in different activities (e.g., selecting toys to tidy up into three boxes, one each for one-, two- and three-syllable words).

The next unit focused on identification of rhymes (nursery rhymes; modified nursery rhymes where the rhyme was missing, e.g., the children were asked: "What is wrong with Jack and Jill /Went up the mountain?"). Games requiring rhyming judgments and rhyme production (e.g., "what rhymes with 'spoon'?") concluded the section on rhymes.

Phonemes were introduced next, with attention given to initial sounds of words. The sounds were introduced in relation with their corresponding letter, as instruction in phonological awareness coupled with the alphabetic principle was found to lead to significant gains in reading outcomes (Bradley & Bryant, 1985; Cunningham, 1990). Children learned that new words resulted when the initial phoneme was omitted or a new initial phoneme was added to the existing word. Phoneme blending games completed the phonological awareness training. Upon teaching a group of letter-sounds, the children were introduced to reading books with phonetic words containing only those letter-sounds.

Most children coming to the program were never a part of a group program before, and, as such, they needed to learn some routines needed for learning and playing in a group format. Additionally, due to the mixed language status composition of the training group, complex vocabulary activities could not be introduced at the beginning of the program, as some of the English L2 children needed to first understand basic English vocabulary. Therefore, vocabulary training started in the eighth week of the program. Children were taught to categorize different objects and words using various criteria. For example, initially children were taught to sort animals by the domestic and wild categories, then by the habitats where they could be found (hot versus cold habitats). Further, children were taught to sort vegetables and fruits, as well as vehicles. Definitions for categories were presented and enforced each time that the children were asked to sort items (e.g., domestic animals are animals that live around the house and that people take care of them; wild animals are animals that live in the forests, in the desert or in the jungle, and have to take care of themselves). Body parts and the structure of our bodies were targeted as well, and this thematic unit was linked to types of clothing that people need to wear on different climates (habitats) and with animals specific to these habitats (e.g., when we are cold, we need to protect our bodies with many layers of thick and warm clothing; similarly, animals that live in the cold habitats, such as the polar bear, have thicker furs than animals that live in warmer habitats, such as the koala bear). Surprise items for each category were introduced to check children's understanding of conceptual definitions (e.g., a vacuum cleaner is not a vehicle, although it has wheels, because it doesn't take us places). Children were asked to frequently switch from one criterion of categorizing to another one for the same item (e.g., domestic versus wild categorizing of animals switched with habitat – cold versus warm – categorization).

Additionally, children were taught to build stories, adding a picture at a time to the story built by the previous child, and repeating the entire story built by previous children. For example, the first child would start the story with a picture: "First, there was a monkey". Then, a second child would draw a second picture: "first, there was a monkey. Then, the monkey took the bus to visit her friend, the lion.". The process of adding a sentence to the story with each picture drawn continued until all the five children in the group had a chance to bring their own contribution. Beginning, end and middle of the story were emphasized, such that the children could recognize a logical flow in the story. Appendices 3 and 4 are two sample lessons used in the program.

Some vocabulary items were taught through incidental teaching of other skills (e.g., "put P on top of the Bingo board") and different games (lotto, "Bingo", modified) in addition to the strategies mentioned above. These vocabulary items are the words considered to be missing from low SES preschool children's language repertoire (Scarborough vocabulary). A checklist was used each session to assess children's skills when performing in the group and individually.

Control group – training math

The math training program was designed as a control group of children for the literacy training program. In this program the children were taught to identify larger and smaller quantities, one to one correspondence through counting objects, shapes, colours, and numbers and to form simple and complex patterns. Games and songs were adapted to teach number sense (e.g., an adaptation of "Snakes and Ladders" with numbers written for each step of the maze), or quantity representation (e.g., an adaptation of "If you're happy and you know it" with "Show me (number) for each of the instructions of the song). Similar to the LL Training Program, the children were taught specific vocabulary items through incidental teaching of other skills (see above).

Results

The mean age for the entire sample was 42.23 months (SD = 3.65). There were no significant age differences between the LL training and the control group, $F(1, 85) = 2.11, p = 0.15$. There were no significant age differences between the three cohorts of participants in the LL training group, $F(2, 62) = 0.78, p = 0.93$, and between the two cohorts of children in the control group, $F(1, 22) = 0.80, p = 0.38$. Therefore, the data were collapsed across the three cohorts for the LL training group and across the two cohorts for the control group.

The sample was divided in three ways in order to describe the differences between the children across the three main variables, which were training condition, language status, and SES: a) the control group versus the training group; b) the English L1 group versus the English L2 group; and c) the low socio-economic status (SES) versus the middle SES group. These categories are mutually exclusive. Means and standard deviations for the control and LL training groups by language status (LS) and SES are reported for all measures for pretest, posttest and growth scores from pretest to posttest in Table 4, 5 and 6. The English L2 control group ($n = 8$), and especially the low SES, English L2 control ($n = 2$), were quite small in this study, therefore the results regarding the English L2 control group need to be considered with caution.

A MANCOVA was conducted for each of the pretest, posttest, and growth from pretest to posttest scores for all the measures, in order to examine: a) Differences between the control and the LL training group by LS and SES in pretest; b) Differences between the control and the LL training group by LS and SES in posttest; and c) Differences between the control and the LL training groups by LS and SES in growth from pretest to posttest. The scores on the non-verbal intelligence measure at pretest and at posttest, respectively, were used as a covariate, as research demonstrates that non-verbal intelligence consistently predicts performance on PA, vocabulary and word reading performance (Baciu et al., under review; Gottardo & Geva, 2005).

Correlations between pretest (longitudinal) and posttest (concurrent) scores of possible predictors of posttest performance on general vocabulary knowledge, PA and word reading were calculated. Based on these correlations, longitudinal and concurrent predictors of general vocabulary knowledge, phonological awareness and word reading were selected and regression analyses were conducted. Descriptive statistics are presented before inferential statistics in order to better describe the groups of children.

Examination of mean tables

Means and standard deviations for the control and the LL training groups, for the English L1 and English L2 groups, and for the low and middle SES were computed and reported in Tables 4, 5, and 6. These values are reported to assist the reader in better understanding the performance of these groups of children at pretest and posttest. A visual examination of the data suggests differences between groups of children, but specific significance levels are not determined in this section. The significance analysis follows in the MANCOVA sections.

The children performed generally at floor level on word reading (Dolch), initial and final phoneme deletion and initial phoneme detection on pretest, and on final phoneme deletion and initial phoneme detection on posttest.

Differences between the control group and the training group. Means and standard deviations for the control group and the LL training group were computed in order to examine differences between these groups between their pretest and posttest scores. Table 4 presents these means and standard deviations.

For the general vocabulary (PPVT-III), letter-sound and letter identification, reading words (Dolch), syllable and initial phoneme deletion, the control group performed better than the training group on pretest. The children in the control and trained groups performed similarly on pretest measures of rhyme and initial phoneme detection, final phoneme deletion, sound blending, specific vocabulary items (Scarborough), and word repetition. The LL training group children performed better than the control group of children on pretest scores of grammatical knowledge (TACL-3). On posttest, however, the trained group performed better than the control group on general vocabulary (PPVT-III), grammatical knowledge (TACL-3), letter-sound identification, sound blending, initial and final phoneme deletion, and non-word repetition, and performed similarly to the control group on specific vocabulary items (Scarborough), rhyme and initial phoneme detection, syllable deletion, word repetition. The control group continued to perform better than the LL training group on posttest scores of letter identification. Further analysis of group differences by language status (English versus English L2) and by SES (low versus middle) were performed.

Differences between the two language status groups. Means and standard deviations for the pretest and posttest scores of the participants by language status were examined in order to examine effects of language status. Table 5 displays these means and standard deviations for each measure, for all the participants by language status. The two language status groups considered were English L1speakers and English as-a-second language (English L2) speakers.

For general vocabulary (PPVT-III), specific vocabulary items (Scarborough), grammatical knowledge (TACL-3), letter-sound identification and sound blending, the English L1 group obtained higher scores than the English L2 group on pretest. For the rest of the measures, except the letter identification, where the English L2 children performed better than the English L1 speakers, the two language groups performed similarly.

On posttest, the English group obtained higher scores than the English L2 group on general vocabulary (PPVT-3), specific vocabulary items (Scarborough), grammatical knowledge (TACL-3), and sound blending, word reading (Dolch), rhyme detection, syllable and initial phoneme deletion. For the rest of the measures, the English L2 group performed similarly to the English-speaking group.

Differences between the two SES groups. In order to examine differences between the pretest and the posttest scores of the participants grouped by their level of SES, means and standard deviations were computed for each measure, for all the participants by SES. Table 6 exhibits these means and standard deviations. The two SES groups were formed based on parents' educational status, taken from the Parent Home Questionnaire.

The visual inspection of these pretest means and standard deviations shows that the low SES group obtained lower scores than the middle SES group on sound blending, syllable deletion, letter and letter-sound identification, and word reading (Dolch). For the rest of the measures, the low SES group performed similarly to the middle SES group. On posttest, the low SES group performed similarly to the middle SES group on syllable deletion and sound blending, and continued to perform similarly to the middle SES group on general vocabulary (PPVT-3), specific vocabulary items (Scarborough), initial phoneme detection, initial and final phoneme deletion, word repetition and non-word repetition. For the rest of the measures, the middle SES group obtained higher scores than the low SES group.

As a result of possible confounds related to LS and SES in this sample and due to the large differences on performance between: a) pretest and posttest; b) the control and the LL training group; c) the English L1 and English L2 groups; and d) the low SES and the middle SES groups, multivariate analyses of covariance (MANCOVA) were conducted on children's performance on all the measures. The means and standard deviations for the control and LL training group by language and by socio-economic status were computed (see Table 7). The test of equality of covariance matrices was reported for each measure, as well. The results of this test showed that for three of the measures, specifically word reading, initial phoneme deletion, and letter identification, the covariances were not equal across groups. Therefore, for those measures, significance levels and F values were reported without equal variances assumed. For the rest of the measures, the test of equality of covariance matrices showed non-significance: the measures had equal variances across the groups.

Table 4. Means and standard deviations for the control and training groups (n = 86)

		Control condition (n = 23) pretest	Control condition (n = 23) posttest	Training condition (n = 63) pretest	Training condition (n = 63) posttest
Word reading (Dolch)	Mean	.61	1.22	.06	1.68
	SD	2.51	3.55	.30	4.17
Initial phoneme detection	Mean	4.91	5.74	5.08	5.98
	SD	2.02	1.84	2.17	2.11
Rime detection	Mean	5.65	7.17	5.87	7.14
	SD	1.85	2.64	2.52	2.83
Syllable deletion	Mean	2.17	3.17	1.49	3.29
	SD	3.27	3.64	2.60	3.06
Initial phoneme deletion	Mean	.43	.74	.03	1.19
	SD	1.70	2.20	.25	2.60
Final phoneme deletion	Mean	.09	.52	.16	1.11
	SD	.42	1.24	.90	2.12
Sound Blending (Woodcock)	Mean	4.48	7.83	4.81	10.52
	SD	4.78	4.67	4.60	4.96
Vocabulary (PPVT-III)	Mean	46.74	53.78	42.83	62.19
	SD	16.83	12.86	18.74	18.98
Specific vocabulary items (Scarborough)	Mean	21.13	30.91	21.60	30.63
	SD	13.14	13.35	13.23	13.05
Grammatical Knowledge (TACL-3)	Mean	11.61	16.43	12.81	17.84
	SD	7.38	8.68	8.09	8.25
Letter-sound Identification	Mean	3.30	4.65	2.05	10.29
	SD	5.90	6.39	5.23	7.19
Letter Identification	Mean	9.00	12.74	8.00	11.94
	SD	9.00	9.47	8.64	8.72

Table 4 (contd.) Means and standard deviations for the control and LL training groups (n = 86)

		Control condition (n = 23) pretest	Control condition (n = 23) posttest	Training condition (n = 63) pretest	Training condition (n = 63) posttest
Word Repetition	Mean	5.69	6.22	5.37	6.25
	SD	1.45	1.24	1.49	1.06
Non-word Repetition (CTOPP)	Mean	8.83	8.56	8.13	9.71
	SD	3.06	2.67	3.07	2.56

Table 5. Means and standard deviations for the English L1 and English L2 groups (n = 86)

		English L1 (n = 59) pretest	English L1 (n = 59) posttest	English L2 (n = 27) pretest	English L2 (n = 27) posttest
Word reading (Dolch)	Mean	.27	1.98	.07	.63
	SD	1.58	4.76	.39	.69
Initial phoneme detection	Mean	5.29	6.14	4.48	5.44
	SD	2.23	2.17	1.78	1.65
Rime detection	Mean	5.97	7.71	5.48	5.93
	SD	2.61	2.85	1.63	2.14
Syllable deletion	Mean	1.76	3.54	1.48	2.63
	SD	3.00	3.12	2.31	3.19
Initial phoneme deletion	Mean	.02	1.42	.00	.30
	SD	1.10	2.86	.00	1.10
Final phoneme deletion	Mean	.17	.98	.07	.89
	SD	.93	2.02	.39	1.76
Sound Blending (Woodcock)	Mean	5.46	10.54	3.11	8.19
	SD	4.94	5.29	3.38	3.92
Vocabulary (PPVT-III)	Mean	50.76	66.64	28.81	45.30
	SD	16.99	16.23	9.98	11.51
Specific vocabulary items (Scarborough)	Mean	25.68	35.02	12.28	21.29
	SD	12.80	11.91	8.42	10.30

Table 5 (contd.) Means and standard deviations for the English L1 and English L2 groups (n = 86)

		English L1 (n = 59) pretest	English L1 (n = 59) posttest	English L2 (n = 27) pretest	English L2 (n = 27) posttest
Grammatical Knowledge (TACL)	Mean	14.32	19.83	8.48	12.30
	SD	8.24	7.37	5.24	8.11
Letter Identification	Mean	7.54	12.12	9.85	12.22
	SD	8.49	9.11	9.09	8.51
Letter-sound Identification	Mean	3.03	9.10	.96	8.07
	SD	6.32	7.91	1.89	6.16
Word Repetition	Mean	5.72	6.31	4.89	6.11
	SD	1.32	1.04	1.67	1.25
Non-word Repetition (CTOPP)	Mean	8.44	9.34	8.04	9.53
	SD	2.82	2.58	3.59	2.76

Table 6 Means and standard deviations for the low and middle SES groups (n = 86)

		Low SES (n = 37) pretest	Low SES (n = 37) posttest	Middle SES (n = 49) pretest	Middle SES (n = 49) posttest
Word reading (Dolch)	Mean	.00	.38	.37	2.45
	SD	.00	.68	1.75	5.11
Initial phoneme detection	Mean	4.78	5.75	5.22	6.04
	SD	1.96	2.03	2.24	2.05
Rime detection	Mean	5.86	6.43	5.78	7.69
	SD	2.36	2.66	2.37	2.75
Syllable deletion	Mean	.92	3.00	2.24	3.45
	SD	2.13	2.80	3.10	3.49
Initial phoneme deletion	Mean	.05	.81	.20	1.27
	SD	.33	2.08	1.17	2.78

Table 6(contd.) Means and standard deviations for the low and middle SES groups (n = 86)

		Low SES (n = 37) pretest	Low SES (n = 37) posttest	Middle SES (n = 49) pretest	Middle SES (n = 49) posttest
Final phoneme deletion	Mean	.00	.89	.24	1.00
	SD	.00	1.79	1.05	2.05
Sound Blending (Woodcock)	Mean	3.81	9.86	5.41	9.76
	SD	3.73	5.16	5.12	4.93
Vocabulary (PPVT-III)	Mean	43.14	59.84	44.43	60.02
	SD	16.72	16.06	19.45	19.30
Specific vocabulary items	Mean	20.76	30.51	22.01	30.85
(Scarborough)	SD	12.46	9.64	13.73	15.23
Grammatical Knowledge (TACL)	Mean	12.14	16.30	12.76	18.35
	SD	7.28	7.92	8.37	8.61
Letter Identification	Mean	6.81	9.73	9.37	13.98
	SD	7.53	8.21	9.41	9.00
Letter-sound Identification	Mean	1.16	6.46	3.31	10.53
	SD	3.03	5.63	6.55	8.10
Word Repetition	Mean	5.51	6.14	5.42	6.33
	SD	1.35	.89	1.59	1.25
Non-word Repetition (CTOPP)	Mean	8.57	9.40	8.12	9.36
	SD	3.21	2.29	2.97	2.87

Table 7. Means and Standard Deviations for the LL training and control groups by SES and LS on word reading, oral language, and verbal memory (English is English L1 and ESL is English L2) (n = 86)

		Control condition				Training condition				
		English Low SES $n = 7$	English Middle SES $n = 8$	ESL Low SES $n = 2$	ESL Middle SES $n = 6$	English Low SES $n = 19$	English Middle SES $n = 25$	ESL Low SES $n = 9$	ESL Middle SES $n = 10$	Equal covariances assumed
Word reading (Dolch) (pretest)	Mean	.00	1.75	.00	.00	.00	.08	.00	.20	
	SD	.00	4.20	.00	.00	.00	.28	.00	.63	no
Word reading (Dolch) (posttest)	Mean	.00	3.00	.05	.50	.42	3.40	.56	.80	
	SD	.00	5.78	.71	.84	.77	6.25	.73	.63	
Initial phoneme detection (pretest)	Mean	4.00	5.63	4.00	5.33	5.05	5.72	5.00	3.60	
	SD	2.77	1.30	.00	1.97	1.87	2.49	1.66	1.71	yes
Initial phoneme detection (posttest)	Mean	6.29	5.63	5.50	5.33	5.73	6.56	5.44	5.49	
	SD	1.50	2.56	.71	1.51	2.40	2.04	1.87	1.84	
Rime detection (pretest)	Mean	5.86	5.25	6.00	5.83	6.00	6.20	5.56	5.10	
	SD	2.91	1.17	1.41	1.47	2.67	2.90	1.51	1.97	yes
Rime detection (posttest)	Mean	6.86	8.13	5.00	7.00	6.68	8.60	5.89	5.50	
	SD	3.44	2.36	1.41	2.19	2.89	2.63	1.69	2.59	
Syllable deletion (pretest)	Mean	.14	3.50	.50	3.33	1.26	2.04	.89	1.10	
	SD	.38	4.31	.71	3.08	2.66	2.98	1.83	2.03	yes
Syllable deletion (posttest)	Mean	1.71	4.50	2.00	3.50	3.95	3.44	2.22	2.60	
	SD	2.63	3.89	.00	4.72	2.91	3.27	2.54	3.24	
Initial phoneme deletion (pretest)	Mean	.00	1.25	.00	.00	.11	.00	.00	.00	
	SD	.00	2.81	.00	.00	.46	.00	.00	.00	no
Initial phoneme deletion (posttest)	Mean	.14	2.00	.00	.00	1.26	1.72	.56	.30	
	SD	.38	3.51	.00	.00	2.62	3.21	1.67	.95	

Table 7 (contd.) Means and Standard Deviations for the LL training and control groups by SES and LS on word reading, oral language, and verbal memory (English is English L1 and ESL is English L2) (n = 86)

		Control condition				Training condition				
		English Low SES $n = 7$	English Middle SES $n = 8$	ESL Low SES $n = 2$	ESL Middle SES $n = 6$	English Low SES $n = 19$	English Middle SES $n = 25$	ESL Low SES $n = 9$	ESL Middle SES $n = 10$	Equal covariances assumed
Final phoneme deletion (pretest)	Mean	.00	.00	.00	.33	.00	.40	.00	.00	
	SD	.00	.00	.00	.82	.00	1.41	.00	.00	yes
Final phoneme deletion (posttest)	Mean	.43	.25	.00	1.17	1.05	1.32	1.11	.70	
	SD	1.13	.71	.00	1.94	2.07	2.41	1.83	1.89	
Sound Blending (pretest)	Mean	1.29	7.38	5.00	4.17	5.42	6.04	2.11	3.00	
	SD	2.56	5.55	7.07	3.37	3.59	5.65	2.67	3.50	yes
Sound Blending (posttest)	Mean	4.00	8.63	10.50	10.33	12.53	11.48	8.67	6.00	
	SD	4.36	4.87	2.12	2.58	4.61	4.72	2.91	4.78	
Vocabulary (PPVT-III) (pretest)	Mean	50.00	58.38	30.00	33.00	47.53	51.00	31.44	23.70	
	SD	15.47	15.42	4.24	7.24	17.31	17.78	10.89	10.16	yes
Vocabulary (PPVT-III) (posttest)	Mean	57.57	61.50	49.50	40.50	67.79	69.96	47.11	45.70	
	SD	13.19	9.87	9.19	5.54	13.85	19.38	14.99	11.58	
Specific vocabulary items (Scarborough) (pr)	Mean	21.43	27.75	16.50	13.50	24.58	27.04	13.11	9.95	
	SD	12.58	13.54	23.33	7.48	12.69	13.13	6.66	7.88	yes
Specific vocabulary items (Scarborough) (pt)	Mean	34.00	35.88	24.50	22.83	32.32	37.08	25.33	16.07	
	SD	10.94	12.94	9.19	15.57	9.47	13.64	7.65	7.82	
Grammatical knowledge (TACL-3) (pretest)	Mean	12.57	14.12	4.00	9.67	13.89	15.20	9.89	7.40	
	SD	8.12	7.97	5.66	5.13	7.54	9.18	5.21	5.32	yes
Grammatical knowledge (TACL-3) (posttest)	Mean	16.00	20.63	15.50	11.67	19.32	21.04	10.33	13.80	
	SD	9.42	6.19	9.19	9.91	6.95	7.44	5.92	9.27	

Table 7 (contd.) Means and Standard Deviations for the LL training and control groups by SES and LS on word reading, oral language, and verbal memory (English is English L1 and ESL is English L2) (n = 86)

		Control condition				Training condition				
		English Low SES $n = 7$	English Middle SES $n = 8$	ESL Low SES $n = 2$	ESL Middle SES $n = 6$	English Low SES $n = 19$	English Middle SES $n = 25$	ESL Low SES $n = 9$	ESL Middle SES $n = 10$	Equal covariances assumed
Letter Identification	Mean	5.29	11.13	10.50	10.00	5.84	8.32	9.22	10.20	
(pretest)	SD	7.78	9.88	14.85	8.65	6.74	9.38	8.12	10.65	no
Letter Identification	Mean	10.29	13.38	11.50	15.17	8.37	15.08	11.78	11.00	
(posttest)	SD	11.34	8.60	14.85	8.70	7.14	9.31	7.38	9.30	
Letter-sound	Mean	.57	7.63	1.50	1.33	1.26	3.60	1.33	.30	
Identification (pretest)	SD	1.51	8.26	2.12	2.81	3.91	7.27	2.06	.95	yes
Letter-sound	Mean	.86	7.75	2.50	5.67	8.21	12.52	8.00	10.70	
Identification (posttest)	SD	.90	7.92	3.54	7.06	5.74	8.65	4.98	6.34	
Word repetition	Mean	6.29	5.37	5.50	5.50	5.36	5.94	5.22	4.10	
(pretest)	SD	1.38	1.51	2.12	1.52	1.21	1.31	1.48	1.79	yes
Word repetition	Mean	5.86	6.50	6.50	6.17	6.11	6.52	6.33	5.80	
(posttest)	SD	.90	1.20	.71	1.84	1.05	1.00	.05	1.48	
Pseudeoword	Mean	9.57	8.38	7.50	9.00	7.95	8.52	9.33	6.40	
Repetition (pretest)	SD	3.70	3.34	.71	2.68	3.05	2.24	3.54	4.09	yes
Pseudeoword	Mean	9.00	8.00	10.00	8.33	8.85	10.16	10.55	9.24	
Repetition (posttest)	SD	2.08	3.38	.00	2.88	2.39	2.43	2.30	3.26	

The multivariate analysis of variance

In order to compare children's pretest scores with their posttest scores across language status and SES, three multivariate analyses of covariance (MANCOVA) were conducted for the 64 trained children who completed pretests, the literacy training program, and posttests; and for the 23 control children who completed pretests and posttests. The control group was comprised of the math intervention group (n = 17) and of the children who were enrolled in day care or Early Year programs (n = 6). The analyses were conducted to assess any differences between pretest and posttest and to identify differences between the LL training and the control group by language status and SES at each time point and on growth between the two time points. Significance levels between $p = .10$ and $p = .05$ will be discussed due to the relatively small sample size and in some cases to large effect sizes that are not significant at traditionally accepted significance levels of $p \leq .05$.

Thus, the three MANCOVAs conducted were: 1) a 2 (LL training vs. control condition) x 2 (SES: low versus middle) x 2 (language status: English L1 versus English L2) mixed MANCOVA for the pretest scores, with the non-verbal intelligence pretest scores as a covariate; 2) a 2 (LL training vs. control condition) x 2 (SES: low versus middle) x 2 (language status: English L1 versus English L2) mixed MANCOVA for the posttest scores, with the non-verbal intelligence posttest scores as a covariate; and 3) a 2 (LL training vs. control condition) x 2 (SES: low versus middle) x 2 (language status: English L1 versus English L2) mixed MANCOVA for the difference between posttest and pretest scores, with the non-verbal intelligence posttest scores as a covariate. The posttest scores of non-verbal intelligence were considered as a covariate as children showed a relatively large increase on this measure at posttest when compared to their pretest scores. For all three MANCOVAs, children's performance on measures of phonological awareness skills (rhyme and initial phoneme detection, syllable, initial and final phoneme deletion and Sound Blending (WDRB)), oral-language skills (general vocabulary: PPVT; specific vocabulary items: Scarborough vocabulary and grammatical knowledge: TACL), reading (Dolch phonetic words and Dolch sight words), verbal short term memory (non-word repetition, short list word repetition), and letter-sound knowledge was analyzed. Between-subjects factors were training/control condition; SES (low SES and middle SES); language status (English L1 versus English L2) and interactions between these factors.

The first MANCOVA analyzed the performance of the entire sample at pretest by training condition, language status and SES in order to detect differences among the children on pretest measures. The second MANCOVA analyzed the performance of the entire sample at posttest, whereas the third MANCOVA analyzed the performance of the entire sample on growth between pretest and posttest. Growth from pretest to posttest was calculated by subtracting the pretest scores from the posttest scores for each measure. These three MANCOVA are presented in detail below.

The MANCOVA for the pretest scores. There was a significant effect of pretest non-verbal reasoning in the pretest model of covariance, $F(14, 64) = 5.58, p < 0.001$, therefore this covariate was kept in the analysis. There were no differences between the control group and the LL training group in pretest scores, $F(14, 64) = 0.407, p = 0.97$: children in both groups performed the same on the pretest measure of reading words (Dolch words), syllable deletion, initial phoneme and final phoneme deletion, rhyme and phoneme detection, sound blending, general vocabulary (PPVT), specific vocabulary items (Scraborough vocabulary; unstandardized), grammatical knowledge (TACL –III), letter and letter-sound identification, and word and non-word repetition (see Table 8). The means and standard deviations for these measures at pretest are presented in Table 7.

Main language effects were examined next. The two language groups considered were English L1 children and English L2 children. On pretest, there was a significant multivariate main effect of language status, $F(14, 64) = 3.41, p < 0.001$. As such, there was a significant univariate language effect on general vocabulary (PPVT), $F(1, 77) = 41.97, p < 0.001$, with the English L1 children knowing significantly more words at pretest ($M = 50.76$, $SD = 16.99$) than the English L2 children ($M = 28.81$, $SD = 9.98$); on grammatical knowledge (TACL), $F(1, 77) = 12.42, p = 0.001$, with English L1 children outperforming the English L2 children ($M = 14.32$, $SD = 8.24$, and $M = 8.48$, $SD = 5.24$, respectively); on specific vocabulary items (Scarborough vocabulary), $F(1, 77) = 18.93, p < 0.001$, with English L1 children outperforming the English L2 children ($M = 25.68$, $SD = 12.80$, and $M = 12.28$, $SD = 8.42$, respectively). Main SES effects and interactions were examined next. There were no significant main effects of SES and no significant interactions at pretest scores for any of the measures.

The MANCOVA for the posttest scores. The non-verbal reasoning scores on posttest were introduced as a covariate, and there was a significant effect of posttest non-verbal reasoning in the posttest model of covariance, $F(14, 64) = 5.33, p < 0.001$, therefore this covariate was kept in the analysis. Unlike for the pretest scores, there was a multivariate main effect of training, $F(1, 77) = 2.13, p = 0.02$, with the trained group ($M = 10.29$, $SD = 7.19$) outperforming the control group on letter-sound identification ($M = 4.65$, $SD = 6.39$) (univariate effect). Additionally, on posttest, there was a multivariate main effects of language status, $F(1, 77) = 2.13, p = 0.02$. The univariate effect of language status on general vocabulary was significant, $F(1, 77) = 24.79, p < 0.001$, the English L1 group continuing to perform significantly better than the English L2 group on this measure. English L1 children knew on average 66.64 words ($SD = 16.23$) at posttest, while the English L2 children knew on average 45.30 words (SD = 11.51). The univariate effect of language status on grammatical knowledge was significant, $F(1, 77) = 12.21, p = 0.001$. The univariate effect of language status on specific vocabulary items (Scarborough vocabulary) was significant, $F(1, 77) = 19.55, p < 0.001$. Additionally, there was a significant main effect of language status on rhyme detection, $F(1, 77) = 6.10, p = 0.016$, with English L1 children outperforming the English L2 children, $M = 7.71$, $SD = 2.85$, and $M = 5.93$, $SD = 2.15$, respectively. There were no significant main effects of SES and no significant interactions on posttest (see Table 9). The means and standard deviations for these measures at pretest are presented in Table 7.

The MANCOVA for the growth scores between pretest and posttest. The non-verbal reasoning scores on posttest were introduced as a covariate, and there was a significant effect of posttest non-verbal reasoning on growth between pretest and posttest model of covariance, $F(14, 64) = 2.47, p = 0.007$. Therefore, this covariate was kept in the analysis.

There was a main multivariate effect of training on the growth from pretest to posttest, $F(1, 77) = 10.05, p = 0.002$. The univariate effect of training on general vocabulary (PPVT), $F(1, 77) = 10.05, p = 0.002$, was significant, with the LL training group learning significantly more untrained words ($M = 19.87$, $SD = 11.06$), compared to the control group ($M = 8.61$, $SD = 7.91$). The univariate effect of training on letter-sound identification, $F(1, 77) = 19.14, p < 0.001$, was significant, with the LL training group learning significantly more letter-sounds ($M = 8.25$, $SD = 5.78$) than the control group ($M = 2.00$, $SD = 4.13$). There were no other main effects (language status or SES) or interaction effects for the growth scores between pretest and posttest (see Table 10).

In sum, there was a significant language effect at pretest on vocabulary knowledge, grammatical knowledge and specific vocabulary knowledge, with English L1 children outperforming the English L2 children. There was a significant effect of language status at posttest, with English L1 children outperforming the English L2 children. There was a main effect of training on letter-sound identification, with the training group of children performing significantly better than the control group of children. Finally, there was a significant effect of training on growth from pretest to posttest on general vocabulary knowledge and on letter-sound identification, with LL trained group of children learning significantly more untrained words and more letter-sounds than the control group of children.

Table 8. MANCOVA on pretest scores (n = 86)

	Non-verbal reasoning (covariate)	Training	Language	SES	T*LS	T*SES	LS*SES	T*LS*SES
Word reading (Dolch)	$F(1,77) = 3.22$ $p = .077$							
Initial phoneme detection								
Rime detection	$F(1,77) = 12.02$ $p = .001$							
Syllable deletion	$F(1,77) = 26.03$ $p < .001$							
Initial phoneme deletion	$F(1,77) = 7.19$ $p = .009$							
Final phoneme deletion								
Sound Blending (Woodcock, 1997)	$F(1,77) = 16.40$ $p < .001$							
General vocabulary (PPVT-III)	$F(1,77) = 38.72$ $p < .001$		$F(1,77) = 41.97$ $p < .001$					
Specific vocabulary items (Scarborough)	$F(1,77) = 30.50$ $p < .001$		$F(1,77) = 18.93$ $p < .001$					
Grammatical knowledge (TACL-3)	$F(1,77) = 29.00$ $p < .001$		$F(1,77) = 12.42$ $p = .001$					
Letter identification	$F(1,77) = 13.71$ $p < .001$							
Letter-sound identification	$F(1,77) = 11.09$ $p = .001$							
Word repetition	$F(1,77) = 4.66$ $p = 0.34$		$F(1,77) = 3.08$ $p = .083$					
Non-word repetition (CTOPP)	$F(1,77) = 17.89$ $p = .006$							

T = training; LS = language status; SES = socio-economic status.

Table 9. MANCOVA on posttest scores (n = 86)

	Non-verbal reasoning (covariate)	Training	Language	SES	T*LS	T*SES	LS*SES	T*LS*SES
Word reading (Dolch)								
Initial phoneme detection	$F(1,77) = 13.44$ $p < .001$							
Rime detection	$F(1,77) = 7.25$ $p = .009$		$F(1,77) = 6.10$ $p = .016$					
Syllable deletion	$F(1,77) = 28.06$ $p < .001$							
Initial phoneme deletion	$F(1,77) = 4.35$ $p = .04$							
Final phoneme deletion	$F(1,77) = 15.86$ $p < .001$							
Sound Blending (Woodcock, 1997)	$F(1,77) = 16.32$ $p < .001$							
General vocabulary (PPVT-III)	$F(1,77) = 19.53$ $p < .001$		$F(1,77) = 24.79$ $p < .001$					
Specific vocabulary items (Scarborough)	$F(1,77) = 19.14$ $p < .001$		$F(1,77) = 19.55$ $p < .001$					
Grammatical knowledge (TACL-3)	$F(1,77) = 8.99$ $p < .001$		$F(1,77) = 12.21$ $p = .001$					
Letter identification	$F(1,77) = 13.71$ $p = .004$							
Letter-sound identification	$F(1,77) = 17.76$ $p < .001$	$F(1,77) = 11.49$ $p = .001$						
Word repetition	$F(1,77) = 6.37$ $p = .014$							
Non-word repetition (CTOPP)	$F(1,77) = 5.63$ $p = .02$							

T = training; LS = language status; SES = socio-economic status.

Table 10. MANCOVA on growth scores from pretest to posttest ($n = 86$)

	Non-verbal reasoning (covariate)	Training	Language	SES	T*LS	T*SES	LS*SES	T*LS*SES
Word reading (Dolch)								
Initial phoneme detection	$F(1,77) = 3.26$ $p = .075$							
Rime detection								
Syllable deletion	$F(1,77) = 7.08$ $p = .009$							
Initial phoneme deletion	$F(1,77) = 3.75$ $p = .057$							
Final phoneme deletion	$F(1,77) = 16.36$ $p < .001$							
Sound Blending (Woodcock, 1997)								
General vocabulary (PPVT-III)		$F(1,77) = 10.05$ $p = .002$						
Specific vocabulary items (Scarborough)								
Grammatical knowledge (TACL-3)								
Letter identification								
Letter-sound identification	$F(1,77) = 5.42$ $p = .023$	$F(1,77) = 19.13$ $p < .001$						
Word repetition								
Non-word repetition (CTOPP)								

T = training; LS = language status; SES = socio-economic status.

Regression and factor analyses

Zero-order correlations were calculated for the entire sample for posttest scores of general vocabulary (PPVT-III), specific vocabulary items (Scarborough), grammatical knowledge (TACL-3), letter and letter-sound identification, verbal short-term memory (word and Non-word repetition), word reading, syllable deletion, initial and final phoneme deletion, rhyme detection, phoneme detection, sound blending, and non-verbal intelligence. These correlations are displayed in Table 11. Since four of the six phonological awareness variables, syllable deletion, initial phoneme deletion, sound blending and rhyme detection, correlated moderately, a composite variable was formed with them. The composite variable was calculated to reduce the number of variables entered into regression analyses and was obtained by adding the scores attained by each child on these measures. On the other two of these PA measures, final phoneme deletion and phoneme detection, the children continued to perform close to floor levels on posttest, therefore these scores were not entered in the composite variable.

Performance on the general vocabulary (PPVT-III) test showed moderate significant correlations with performance on non-verbal reasoning, $r(86) = .391, p < .01$, on the PA composite, $r(86) = .538, p < .01$, on Letter-Sound Identification, $r(86) = .391, p < .01$, on the other oral language measures: specific vocabulary items (Scarborough), $r(86) = .656, p < .01$, and grammatical knowledge (TACL-3), $r(86) = .694, p < .01$, and with performance on word repetition, $r(86) = .412, p < .01$. Performance on the word reading (Dolch) test showed moderate significant correlations with performance on the PA composite, $r(86) = .506, p < .01$, letter-sound identification, $r(86) = .615, p < .001$, non-verbal intelligence, , $r(86) = .635, p < .01$, general vocabulary, , $r(86) = .316, p < .01$, specific vocabulary items, , $r(86) = .377, p < .01$, and non-word repetition, $r(86) = .353, p < .01$.

However, due to the large effect of language status on both the pretest and posttest scores of oral language (significant; see Table 8 and 9), on word repetition (approaching significance; see Table 8) and rhyme detection (significant; see Table 9), significant quantitative and qualitative differences were expected between the two language groups, English L1 and English L2 children, in predicting general vocabulary, word reading and the PA composite. Therefore, the sample was split into the two language groups and correlations were calculated between the variables mentioned above in posttest and in pretest, in order to determine possible longitudinal and posttest predictors for general vocabulary (PPVT-III), word reading (Dolch) and the composite PA. These correlations are displayed in Table 12 for the English L1 group of children, and in Table 13, for the English L2 group of children. Longitudinal predictors of general vocabulary, word reading and the PA composite provide early information regarding a child's future development, and therefore, are useful in discriminating between children who will be at risk for reading difficulties and children who will properly develop reading abilities. Concurrent predictors of general vocabulary, word reading and the PA composite provide a one-time synopsis of those skills, and therefore help signal deficits in other skills in which deficits are not as easy to be noticed (e.g., grammatical errors are easier to be noticed than vocabulary deficits).

A series of exploratory factor analyses was employed to reduce the number of variables and create constructs for use in the regression analyses. Factor analyses were conducted separately for the English L1 and the English L2 group to determine pretest factor loadings for measures related to posttest general vocabulary.

Factor analysis, regression, and hierarchical regression analyses predicting longitudinal general vocabulary (PPVT-III) for the English L1 group. Table 12 contains the correlations of pretest and posttest scores with posttest general vocabulary, posttest word reading and posttest

PA for the native English-speaking group of children. An examination of Table 12 reveals that the general vocabulary (PPVT-III) posttest scores for the English L1 children were moderately correlated with the pretest scores on the following variables: non-verbal reasoning, $r(59) = .598$, $p < .01$, letter identification, $r(59) = .393$, $p < .01$, letter-sound identification, $r(59) = .535$, $p < .01$, specific vocabulary items, $r(59) = .497$, $p < .01$, grammatical knowledge, $r(59) = .647$, $p < .01$, word repetition, $r(59) = .311$, $p < .05$, and non-word repetition, $r(59) = .392$, $p < .01$. Therefore, these variables were entered in a factor analysis in order to extract the pretest factors predicting the posttest performance on general vocabulary (PPVT-III) for the English L1group and to reduce the number of variables entered in the regression analysis. Factors with rotated eigenvalues greater than 1 were extracted. Promax rotation was employed due to the overlapping nature of these variables. According to the criterion of acceptance and examination of the Scree-plot, the principal component analysis with a Promax rotation with Kaiser normalization provided a two factor solution for the variables entered: a general cognitive-linguistic, and an associative learning language factor. Factor loadings greater than .50 were considered meaningful. The first factor loaded on the non-verbal reasoning, oral language (specific vocabulary items and grammatical knowledge) and verbal memory (word and non-word repetition) variables, therefore it was considered a general language and cognitive factor. The second factor loaded on letter and letter-sound identification and was considered a paired associate learning factor. The rotated eigenvalues for Factors 1 and 2 were 3.145 and 1.215 respectively, which explained 62.28 % of the variance in these measures. Table 14 displays variable loadings for this two-factor solution.

These two factors were then introduced in a regression as longitudinal predictors of the general vocabulary (PPVT-III) for the English L1 group. The model containing these two factors predicted 53.8 % of the variance on the posttest performance of general vocabulary, with both factors predicting significant performance on the general vocabulary test. Table 15 summarizes the results of this regression analysis.

Factor analyses, regression and hierarchical regression analyses predicting longitudinal general vocabulary (PPVT-III) for the English L2 group. An examination of Table 13 reveals that the general vocabulary (PPVT-III) posttest scores for the English L2 children were not correlated with the pretest scores of any of the English tested variables. However, the same pretest variables that were considered for the factor solution for the English L1 group were entered in a factor analysis for the English L2 group, in order to compare the two language group solutions. The first factor loaded on the letter-sound identification, specific vocabulary items and verbal memory (word and non-word repetition) variables; the second factor loaded on letter identification and non-verbal reasoning; the third factor loaded on the grammatical knowledge variable. More difficult to define than the factors for the English L1 sample, factor 1 seemed to load on semantic and phonological processing components; factor 2 seemed to load on non-verbal reasoning and paired associate learning components; and factor 3 seemed to load on syntactic processing components. The rotated eigenvalues for Factors 1, 2 and 3 were 2.612, 1.478 and 1.045 respectively, which explained 73.36 % of the variance in these measures. Table 16 displays variable loadings for this three-factor solution.

These three factors were then introduced as longitudinal predictors of the general vocabulary (PPVT-III) for the English L1 group. As expected from the non-significant results from the correlation matrix, the model containing these three factors could not predict variance on the performance of general vocabulary. Table 17 summarizes the results of this regression analysis.

Table 11. Correlations for the entire sample on posttest scores for: word reading, syllable deletion, initial and final phoneme deletion, rhyme detection, phoneme detection, sound blending, general vocabulary, specific vocabulary items, grammatical knowledge, letter and letter-sound identification, word and pesudoword repetition, and non-verbal intelligence (*n* = 86)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Word reading (Dolch)															
2. Syllable deletion	.416**														
3. Initial phoneme deletion	.555**	.407**													
4. Final phoneme deletion	.201	.424**	.279**												
5. Rhyme detection	.247*	.322**	.249*	.344**											
6. Initial phoneme detection	.199	.219*	.167	.259*	.379**										
7. Sound blending	.344**	.531**	.392**	.317**	.391**	.088									
8. General vocabulary (PPVT-III)	.316**	.397**	.310**	.272*	.384**	.359**	.468**								
9. Specific vocab. Items (Scarborough)	.377**	.463**	.423**	.330**	.402**	.252**	.444**	.656**							
10. Gramm. Knowledge (TACL-3)	.245*	.380**	.335**	.243*	.315**	.330**	.388**	.694**	.667**						
11. Letter Identification	.478**	.288***	.258*	.238*	.221*	.163	.279**	.260*	.238*	.344**					
12. Letter-sound identification	.635**	.443**	.527**	.266*	.249*	.309**	.432**	.391**	.273*	.345**	.587**				
13. Word Repetition	.301**	.371**	.169	.264*	.242*	.213*	.375**	.412**	.344**	.372**	.238*	.265*			
14. Non-word Repetition (CTOPP)	.353**	.351**	.191	.291**	.138	.189	.351**	.252*	.370**	.272*	.365**	.365**	.384**		
15. Non-verbal reasoning (WPPSI-3)	.140	.525**	.254*	.412**	.314**	.359**	.454**	.391**	.427**	.462**	.330**	.400**	.310**	.239*	
16. PA composite	.506**	.767**	.637**	.453**	.630**	.258*	.866**	.538**	.580**	.480**	.353**	.552**	.410**	.369**	.539**

**. Correlation is significant at .01 level (2-tailed).
*. Correlation is significant at .05 level (2-tailed);

Table 12. Correlations for the English L1 group on pretest and posttest scores (n = 59)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Word reading post																	
2. PA post	.528**																
3. General vocab. post	.307*	.544*															
4. Specific vocab. items pre	.115	.459**	.497**														
5. Specific vocab. items post	.407**	.536**	.576**	.666**													
6. Gram. Knowledge pre	.156	.436**	.674**	.560**	.613**												
7. Gram. Knowledge post	.248	.530**	.648**	.558**	.635**	.639**											
8. Letter identification pre	.702**	.482**	.393**	.185	.324*	.213	.423**										
9. Letter identification post	.538**	335**	.366**	.312*	.310*	.306*	.498**	.769**									
10. Letter-sound id. Pre	.656**	.547**	.535**	.257*	.459**	348**	.448**	.711**	.451**								
11. Letter-sound id. Post	.687**	.674**	.523**	.296*	.415**	.325*	.506**	.646**	.626**	.667**							
12. Word Repetition pre	.261*	.290*	.311*	.316*	.408**	.246	.254	.202	.294*	.188	.195						
13. Word Repetition post	.364**	.506**	.344**	.345**	.373**	.392**	.404**	.255	.259	.393**	.384**	.326*					
14. Non-word Repet. pre	.145	.226	.392**	.347**	.440**	.255	.343**	.267*	.247	.221	.200	.234	.289*				
15. Non-word Repet. post	.424**	.408**	.522**	.381**	.476**	.308*	.361**	.402**	.421**	.266*	.386**	.300*	.341**	.425**			
16. Non-verbal reason. pre	.244	.460**	.598**	.625**	.576**	.598**	.609**	.361**	.301*	.461**	.431**	.322*	.480**	.349**	.388**		
17. Non-verbal reason. post	.150	.530**	.561**	.438**	.564**	.543**	.639**	.368**	.297*	.390**	.537**	.163	.369**	.261*	.356**	.703**	
18. General vocab. pre	.320*	.523**	.695**	.497**	.576**	.637**	.538**	.428**	.334*	.622**	.402**	.367**	.396**	.359**	.277*	.632**	.529**

**. Correlation is significant at .01 level (2-tailed).
*. Correlation is significant at .05 level (2-tailed);

Table 13. Correlations for the English L2 group on pretest and posttest scores (n = 27)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Word reading post																	
2. PA post	.204																
3. General vocab. post	.029	.162															
4. Specific vocab. items pre	.198	.160	.247														
5. Specific vocab. items post	-.064	.508**	.363	.485*													
6. Gram. knowledge pre	.222	.116	.062	.165	-.047												
7. Gram. knowledge post	.007	.104	.545**	.356	.468*	-.096											
8. Letter identification pre	.526**	.436**	-.007	.421*	.117	.136	-.125										
9. Letter identification post	.606**	.510**	.161	-.186	.184	.119	.133	.502**									
10. Letter-sound id. pre	.048	.048	-.123	.324	.115	-.021	-.009	-.009	-.050								
11. Letter-sound id. post	.633**	.066	.048	.287	-.178	.019	-.039	.348	.484*	.484*							
12. Word Repetition pre	.230	.083	.260	.637**	.416*	-.090	.178	.219	.183	.400*	-.040						
13. Word Repetition post	.184	.178	.281	.466*	.313	-.061	.323	.204	.207	.197	-.016	.595**					
14. Non-word Repet. pre	.006	.172	.201	.548**	.439*	-.034	.315	.189	.128	.000	-.070	.622**	.616**				
15. Non-word Repet. post	.363	.390*	.157	.183	.376	-.216	.221	.146	.231	.178	.334	.375	.472*	.279			
16. Non-verbal reason. pre	.155	.574**	.155	.222	.222	.165	.103	.496**	.474*	-.098	-.118	.148	.054	.240	-.147		
17. Non-verbal reason. post	.171	.633**	.054	.221	.194	.402*	.173	.415*	.412*	-.023	.004	-.032	.194	.334	.002	.696**	
18. General vocab. pre	.191	.307	.268	.444**	.274	.538**	.170	.094	.333	.254	-.206	.181	.057	.116	-.059	.425**	.348

**. Correlation is significant at .01 level (2-tailed).
*. Correlation is significant at .05 level (2-tailed);

Table 14. Two-factor solution for the pretest variables that can predict general vocabulary in posttest for the English L1 group (*n* = 59)

	Component	
	1	2
1. Non-verbal reasoning (Block Imitation, WPSSI-3)	**.771**	.162
2. Specific vocabulary items (Scarborough)	**.905**	-.158
3. Grammatical knowledge (TACL-3)	**.797**	-.031
4. Word repetition	**.524**	.024
5. Non-word repetition	**.496**	.116
6. Letter identification	-.056	**.950**
7. Letter-sound identification	.071	**.885**

Table 15. Regression analysis examining pretest factors related to general vocabulary on posttest for the English L1 group (*n* = 59)

General vocabulary (PPVT-III) on posttest				
Model		Beta	t (n = 59)	Significance
Total R^2	.538			
Factor (1): General cognitive-linguistic factor		.589	5.97	.000
Factor (2): Associative learning factor		.263	2.67	.010

Table 16. Three-factor solution for the pretest variables that can predict general vocabulary in posttest for the English L2 group ($n = 27$)

	Component		
	1	2	3
1. Letter-sound identification	**.749**	-.458	.294
2. Specific vocabulary items (Scarborough)	**.835**	.192	.155
3. Word repetition	**.853**	.040	-.229
4. Non-word repetition	**.565**	.314	-.404
5. Non-verbal reasoning (Block Imitation, WPSSI-3)	-.013	**.851**	.182
6. Letter identification	.119	**.767**	.248
7. Grammatical knowledge (TACL-3)	-.010	.369	**.863**

Table 17. Regression analysis examining pretest factors related to general vocabulary on posttest for the English L2 group ($n = 27$)

General vocabulary (PPVT-III) on posttest Model		Beta	t ($n = 27$)	Significance
Total R^2	Not significant			
Factor 1		.147	.718	.480
Factor 2		.153	.727	.474
Factor 3		-.073	-.351	.729

Hierarchical regression analyses predicting concurrent general vocabulary (PPVT-III) for the English L1 group. To test the concurrent predictors of posttest general vocabulary, an examination of the correlations of this variable with the other posttest variables was conducted. As the correlations between posttest scores of general vocabulary and non-verbal reasoning, $r(59) = .561, p < .01$, letter-sound identification, $r(59) = .523, p < .01$, non-word repetition, $r(59) = .522, p < .01$, and grammatical knowledge, $r(59) = .648, p < .01$ were moderate and significant, these variables were selected for the regression analyses examining the posttest scores on general vocabulary. As the number of these variables was not very large on posttest compared to pretest, and as comparable regression models were sought for the two language groups, a factor analysis would not have accurately reflected the concurrent factors predicting general vocabulary knowledge.

A preliminary regression analysis was conducted to determine if the above four variables predicted variance on the posttest scores of general vocabulary (PPVT-III). Then, these variables were introduced in a stepwise manner in a hierarchical regression analysis, starting with the variable that most generally influences vocabulary, namely non-verbal reasoning, and ending with the most specific predictor of vocabulary, namely letter-sound identification, as a measure of paired associative learning. The model containing posttest scores on non-verbal reasoning, letter-sound identification, non-word repetition, and grammatical knowledge predicted 49.8 % variance in the posttest scores of general vocabulary (PPVT-III). Only grammatical knowledge on posttest significantly predicted unique variance on performance on the posttest general vocabulary. The results of this hierarchical regression analysis are summarized in Table 18.

Hierarchical regression analyses predicting concurrent general vocabulary (PPVT-III) for the English L2 group. Based on the results of the correlation between posttest scores of general vocabulary and grammatical knowledge, $r(27) = .545, p < .01$, this variable was selected for the regression analyses examining the posttest scores on general vocabulary. Additionally, in order to compare this model for the English L2 group with the English model for the same dependent variable, letter-sound identification and grammatical knowledge on posttest were entered in the hierarchical regression predicting general vocabulary (PPVT-III) on posttest, with non-verbal reasoning being entered in the first step, non-word repetition and grammatical knowledge as the second step, and letter-sound identification in the last step. As in the case of the English L1 group, only grammatical knowledge on posttest significantly predicted performance on the posttest general vocabulary in the third step of the hierarchical regression. The first model, containing non-verbal reasoning only, and the fourth model, containing all four predictors, were not significant; therefore beta, *t* test values, and significance values are not reported for these models. The results of this hierarchical regression analysis are summarized in Table 19.

Table 18. Hierarchical regression analysis examining posttest variables related to general vocabulary on posttest - English L1 group (n = 59)

General vocabulary (PPVT-3)		Model		Coefficients		
Posttest		Total R^2	Significance	Beta	t (n = 59)	Significance
Step 1	Non-verbal reasoning	.315	.000	.561	5.119	.000
Step 2	Non-verbal reasoning	.476	.000	.216	1.678	.099
	Grammatical knowledge			.455	3.525	.001
	Non-word repetition			.151	1.421	.161
Step 3	Non-verbal reasoning	.498	.000	.157	1.179	.244
	Grammatical knowledge			.412	3.152	.003
	Non-word repetition			.116	1.084	.283
	Letter-sound identification			.185	1.534	.131

Table 19. Hierarchical regression analysis examining posttest variables related to general vocabulary on posttest - English L2 group (n = 27)

General vocabulary (PPVT-3)		Model		Coefficients		
Posttest		Total R^2	Significance	Beta	t (n = 27)	Significance
Step 1	Non-verbal reasoning	.003	.789			
Step 2	Non-verbal reasoning	.300	.039	-.040	-.228	.822
	Grammatical knowledge			.544	2.992	.007
	Non-word repetition			.036	.203	.841
Step 3	Non-verbal reasoning	.304	.081			
	Grammatical knowledge					
	Non-word repetition					
	Letter-sound identification					

Hierarchical regression analyses predicting concurrent PA for the English L1 group. An examination of the correlation table for the English L1 children (Table 12) revealed that the composite PA in posttest correlated moderately with the posttest scores on general vocabulary (PPVT-III), $r(59) = .544, p < .01$, specific vocabulary items (Scarborough), $r(59) = .536, p < .01$, grammatical knowledge (TACL-3), $r(59) = .530, p < .01$, letter-sound identification, $r(59) = .674, p < .01$, word repetition, $r(59) = .506, p < .01$, non-word repetition, $r(59) = .408, p < .01$, and non-verbal reasoning, $r(59) = .530, p < .01$. Based on the results of these correlations, variables were selected for the hierarchical regression analyses examining statistical predictors of the PA composite on posttest. As such, due to sample size restrictions, only one oral language and one verbal memory measure were selected for the regression analysis, the general vocabulary and the non-word repetition measure, as both are standardized measures. The model containing general vocabulary (PPVT-III), non-word repetition (CTOPP), non-verbal reasoning, and letter-sound identification was then tested. The model predicted 52.9% of the variance in posttest phonological awareness. Only letter-sound identification significantly predicted performance on the phonological awareness in the last step of the hierarchical analysis, although non-verbal reasoning predicted variance in the first step and second step of the regression (see Table 20). The variance explained by non-verbal reasoning and general vocabulary was no longer significant when the letter-sound identification measure was entered in the last step of the hierarchical regression. Non-word repetition (CTOPP) was not significant in the model.

Hierarchical regression analyses predicting concurrent PA for the English L2 group. An examination of the correlation table for the English L2 children (Table 13) revealed that the composite PA in posttest correlated moderately with the posttest scores on specific vocabulary items (Scarborough), $r\ (27) = .508, p < .01$, letter identification, $r\ (27) = .510, p < .01$, non-word repetition, $r\ (27) = .390, p < .05$, and non-verbal reasoning, $r\ (27) = .633, p < .01$. Based on the results of these correlations and in order to compare this English L2 model with the English model of predicting PA on posttest, the same variables were entered in the hierarchical regression analysis following the same steps as for the English group in examining statistical predictors of the PA composite on posttest (see Table 21). The last model in the hierarchical regression predicted 55.6% of the variance in posttest PA, with non-verbal reasoning and word repetition being significant in the model. Letter-sound identification and general vocabulary on posttest were not significant predictors of posttest PA in the model.

Hierarchical regression analyses predicting longitudinal PA for the English L1 group. An examination of the correlation table for the English L1 children (Table 12) revealed that the PA composite at posttest correlated moderately with the pretest scores on general vocabulary (PPVT-III), $r(59) = .544, p < .01$, specific vocabulary items (Scarborough), $r(59) = .459, p < .01$, grammatical knowledge (TACL-3), $r(59) = .436, p < .01$, letter identification, $r(59) = .482, p < .01$, letter-sound identification, $r(59) = .547, p < .01$, and non-verbal reasoning, $r(59) = .460, p < .01$. The variables that had moderate and significant correlations with the posttest PA composite were selected for the hierarchical regression analyses. Due to sample size restrictions ($n = 59$), only one oral language measure was selected for the regression analysis, the general vocabulary measure, as it is a standardized measure. The non-word repetition measure on pretest was not significantly correlated with the PA on posttest, and the word repetition measure correlated only marginally with the PA composite, therefore no verbal memory variables were introduced in the hierarchical regression. The model containing general vocabulary (PPVT-III), non-verbal reasoning, and letter-sound identification was then tested. The model predicted 37.1% of the variance in phonological awareness. Similarly to the posttest predictors of posttest PA, only letter-sound identification significantly predicted performance on the phonological awareness in the last step of the hierarchical analysis, although non-verbal reasoning predicted variance in the first and second step of the regression (see Table 22). The variance explained by non-verbal reasoning and general vocabulary was no longer significant when the letter-sound identification measure was entered in the last step of the hierarchical regression.

Hierarchical regression analyses predicting longitudinal PA for the English L2 group. An examination of the correlation table for the English L2 children (Table 13) revealed that the composite PA in posttest correlated moderately with the pretest scores on letter identification, $r(27) = .436, p < .01$, and non-verbal reasoning, $r(27) = .574, p < .01$. Based on the results of these correlations and to compare the two language status models (English and English L2), variables were selected for the hierarchical regression analyses examining pretest statistical predictors of the PA composite on posttest. The model containing general vocabulary (PPVT-III), non-verbal reasoning, and letter-sound identification was then tested in a stepwise fashion, with non-verbal reasoning entered in the first step, general vocabulary in the second step, and letter-sound identification in the last step. The model predicted 33.7% of the variance in posttest phonological awareness. Non-verbal reasoning on pretest significantly predicted performance on the phonological awareness composite on posttest (see Table 23). General vocabulary (PPVT) and letter-sound identification were not significant in the hierarchical regression model.

Table 20. Hierarchical regression analysis examining posttest scores of variables related to Phonological Awareness on posttest for the English L1 group ($n = 59$)

PA on posttest		Model		Coefficients		
		Total R^2	Significance	Beta	t ($n = 59$)	Significance
Step 1	Non-verbal reasoning	.281	.000	.530	4.723	.000
Step 2	Non-verbal reasoning	.398	.000	.292	2.271	.027
	General vocabulary			.309	2.365	.022
	Non-word repetition			.183	1.584	.119
Step 3	Non-verbal reasoning	.529	.000	.143	1.182	.242
	General vocabulary			.180	1.490	.142
	Non-word repetition			.109	1.036	.305
	Letter-sound identification			.461	3.889	.000

Table 21. Hierarchical regression analysis examining posttest scores of variables related to Phonological Awareness on posttest scores for the English L2 group ($n = 27$)

PA on posttest		Model		Coefficients		
		Total R^2	Significance	Beta	t ($n = 27$)	Significance
Step 1	Non-verbal reasoning	.394	.001	.627	3.948	.001
Step 2	Non-verbal reasoning	.551	.000	.620	4.304	.000
	General vocabulary			.065	.443	.662
	Non-word repetition			.381	2.629	.015
Step 3	Non-verbal reasoning	.556	.001	.618	4.216	.000
	General vocabulary			.067	.450	.658
	Non-word repetition			.405	2.599	.017
	Letter-sound identification			-.074	-.481	.635

Table 22. Hierarchical regression analysis examining pretest scores of variables related to Phonological Awareness on posttest scores for the English L1 group (n = 59)

PA on posttest		Model		Coefficients		
		Total R^2	Significance	Beta	t (n = 59)	Significance
Step 1	Non-verbal reasoning pretest	.211	.000	.460	3.907	.000
Step 2	Non-verbal reasoning	.299	.000	.218	1.512	.136
	General vocabulary			.382	2.646	.011
Step 3	Non-verbal reasoning	.371	.000	.179	1.289	.203
	General vocabulary			.193	1.225	.226
	Letter-sound identification			.344	2.504	.015

Table 23. Hierarchical regression analysis examining pretest scores of variables related to Phonological Awareness on posttest scores for the English L2 group (n = 27)

PA on posttest		Model		Coefficients		
		Total R^2	Significance	Beta	t (n = 27)	Significance
Step 1	Non-verbal reasoning pretest	.330	.002	.574	3.506	.002
Step 2	Non-verbal reasoning pretest	.334	.008	.543	2.950	.007
	General vocabulary pretest			.073	.399	.693
Step 3	Non-verbal reasoning pretest	.337	.022	.558	2.893	.008
	General vocabulary pretest			.051	.258	.799
	Letter-sound identification pretest			.061	.340	.737

Hierarchical regression analysis predicting word reading (Dolch) for the English L1 group. An examination of the correlation table for the English L1 children (see Table 12) revealed that word reading posttest scores for the English L1 children were moderately correlated with the posttest scores on the following variables: PA composite, $r(59) = .528, p < .01$, general vocabulary, $r(59) = .307, p < .05$, specific vocabulary items, $r(59) = .407, p < .01$, letter identification, $r(59) = .538, p < .01$, letter-sound identification, $r(59) = .687, p < .01$, word repetition, $r(59) = .364, p < .01$, and non-word repetition, $r(59) = .424, p < .01$. Based on the results of the correlations, variables were selected for the regression analyses examining statistical predictors of posttest scores on word reading. Due to sample size restrictions ($n = 59$), only one oral language measure and one verbal memory measure were selected for the regression analysis, the general vocabulary and the non-word repetition measure, as both are standardized measures. The hierarchical regression model with general vocabulary in the first step, non-word repetition in the second step, PA composite in the third step, and letter-sound identification and letter identification in the fourth step accounted for 53.4 % of the variance in the performance of word reading. Only letter-sound identification significantly predicted performance on the posttest word reading in the last step of the hierarchical analysis, although general vocabulary predicted variance in the first step, non-word repetition in the second step, and the composite PA in the third step of the regression analysis (see Table 24). The variance explained by general vocabulary in the first step was no longer significant when non-word repetition was entered in the second step, which, in turn, was no longer significant when the PA composite was entered in the third step, which was then no longer significant when letter-sound identification measure was entered in the last step of the hierarchical regression.

Hierarchical regression analysis predicting word reading (Dolch) for the English L2 group. An examination of the correlation table for the English L2 children (Table 13) revealed that word reading posttest scores for this group of children were moderately correlated with the posttest scores on the following variables: letter identification, $r(27) = .606, p < .01$, and letter-sound identification, $r(27) = .633, p < .01$. Based on the results of the correlations and in order to compare the two language status (English and English L2) regression models, the same variables as for the English L1 group were selected for the hierarchical regression analysis examining posttest statistical predictors of posttest scores of word reading. The first three hierarchical regression models, containing general vocabulary, general vocabulary and non-word repetition, and general vocabulary, non-word repetition and the PA composite, respectively, were not significantly predicting variance on posttest word reading. In the last step of the regression, when letter-sound identification and letter identification were introduced, the model predicted 54.9 % of the variance on posttest word reading, with both these variables being significant. Table 25 summarizes the results of this hierarchical regression analysis.

To summarize, for the English L1 group of children, general vocabulary knowledge at posttest was longitudinally predicted by two factors. Factor one, considered a general language and cognitive factor, loaded on oral language and verbal memory variables, whereas factor two, considered a paired associate learning factor, loaded on letter identification and letter-sound identification. There were no English longitudinal predictors for posttest general vocabulary knowledge in the English L2 group of children. The concurrent predictors of posttest general vocabulary knowledge was the same for the two language status groups, namely, grammatical knowledge.

The longitudinal predictors of posttest PA were letter-sound identification for the English L1 sample, and non-verbal reasoning, for the English L2 sample. The concurrent predictors of posttest PA were letter-sound identification for the English L1 sample, and non-verbal reasoning and word repetition for the English L2 sample. The concurrent predictor of posttest word reading was letter-sound identification for the English L1 sample, and letter identification and letter-sound identification for the English L2 sample.

Table 24. Hierarchical regression analysis examining posttest scores of variables related to word reading on posttest scores for the English L1 group (n = 59)

Word reading (Dolch) posttest		Model		Coefficients		
		Total R^2	Significance	Beta	t (n = 59)	Significance
Step 1	General vocabulary (PPVT-III)	.094	.018	.307	2.438	.018
Step 2	General vocabulary	.203	.002	.167	1.286	.204
	Non-word repetition (CTOPP)			.358	2.762	.008
Step 3	General vocabulary	.332	.000	-.034	-.253	.801
	Non-word repetition (CTOPP)			.257	2.072	.043
	PA			.442	3.256	.002
Step 3	General vocabulary	.534	.000	-.164	-1.395	.169
	Non-word repetition (CTOPP)			.161	1.457	.151
	PA			.160	1.157	.253
	Letter-sound identification			.165	1.291	.202
	Letter identification			.499	3.176	.002

Table 25. Hierarchical regression analysis examining posttest scores of variables related to word reading on posttest scores for the English L2 group (n = 27)

Word reading (Dolch) posttest		Model		Coefficients		
		Total R^2	Significance	Beta	t (n = 27)	Significance
Step 1	General vocabulary (PPVT-III)		.886			
Step 2	General vocabulary		.181			
	Non-word repetition (CTOPP)					
Step 3	General vocabulary		.324			
	Non-word repetition (CTOPP)					
	PA					
Step 3	General vocabulary	.549	.001	-.074	-.494	.626
	Non-word repetition (CTOPP)			.196	1.136	.269
	PA			.119	-.620	.542
	Letter-sound identification			.462	2.265	.069
	Letter identification			.356	1.916	.034

Discussion

The present study examined the effectiveness of a language and literacy (LL) training program that combined a vocabulary learning strategy with phonological awareness (PA) activities in significantly and meaningfully changing the general vocabulary scores of preschool children coming from diverse SES status and English L2 versus non-English L2 status. The performance of children participating in the LL training group was compared to the performance of children in the control group, which in most cases, participated in a math-training group. As children with diverse language status and SES participated in the two training conditions, training effects, language status effects and SES effects are discussed for vocabulary knowledge, phonological awareness and word reading skills.

Vocabulary knowledge

As hypothesized, children participating in the LL training program, showed significantly and meaningfully improved performance in untrained, English general vocabulary from pretest to posttest compared to children in the control group, regardless of their SES or language status. These successful training results run counter to the results of other training studies. Children in this LL training group recognized significantly more words than children in the control group on the measure of standardized oral vocabulary knowledge: the LL trained children identified more than twice as many of the untrained words as the control group of children. These results are unique in the vocabulary research literature, as no training programs to date were able to produce significant and large increases in untrained vocabulary knowledge (Bauman et al., 2002; Bauman et al., 2003; Beck & McKeown, 1983; 2007; Beck et al., 1982; Biemiller & Boote, 2006; Boyer-Crane et al., 2008; Hargrave & Senechal, 2006; Deffes Silverman, 2007; Freyd & Baron, 1982; Graves & Hammond, 1980; Kame'enui, Carnine & Freschi, 1982; McKeown et al., 1983; Nash

& Snowling, 2006; Otterman, 1955; Silverman, 2007; see Bauman, Kame'enui, & Ash, 2003 for a review).

Thus, the novel and significant findings in this study demonstrate that it is possible to train and effect change in general vocabulary knowledge or untrained vocabulary, resulting in gains on a standardized test of vocabulary. These findings suggest that only the vocabulary conceptualization employed at the base of this LL training program was successful in producing changes in untrained vocabulary knowledge. In other words, teaching words as concepts organized in networks generates significant growth in general vocabulary knowledge. This finding is in contrast with a plethora of research on teaching generalizing and transferring strategies that employed contextual analysis or morphemic analysis at the base of their training (Baumanet al., 2002; Bauman et al., 2003; Freyd & Baron, 1982; Graves & Hammond, 1980; Kame'enui, Carnine & Freschi, 1982; Nash & Snowling, 2006; Otterman, 1955; Silverman, 2007).

Specifically, in this LL training program, words are considered concepts about the world, concepts that are organized in complex networks as a function of various dimensions that they share (Cimpian & Markman, 2009; Gelman, 2004; Waxman & Gelman, 2009). Further, children compared words across their various dimensions, analyzed the functions of an object that is represented by the word, and synthesized word denominating objects in their various categories by function, habitat or critical feature. Employing these higher order cognitive skills to words led to increased untrained vocabulary, as children may have developed an increased ability to conceptualize complex realities. Having complex word networks means having a larger number of words in one's vocabulary. In other words, higher order cognitive operations such as comparison, analysis and synthesis that are applied to words, help form complex and overlapping networks of words. These complex networks may make it easier for new words to be retained quickly in contrast to situations when these word networks are not formed or when words are presented independent of these rich networks. As such, for a new word to be recalled, fewer encounters than typical may be needed when these networks are formed and when a child learns to compare, analyze and synthesize features and categories for the word.

It is not surprising that there were no differences from pretest to posttest between the LL training and the math-training group for specific vocabulary items, as both groups received incidental exposure to these words during their respective training programs. As such, the children in the LL training and in the control group, who received a math-training program, performed significantly better in posttest than in pretest on specific vocabulary items (Scarborough vocabulary). These results are supported by previous research conducted with a similar sample of mixed language status and SES children (Baciu et al., under review) and show that it is possible to effectively teach specific vocabulary items to a young group of children in the particular training format followed in both the LL and math-training programs. These results are also consistent with findings from other studies on incidental exposure to words and on direct teaching of words (Beck & McKeown, 1983; 2007; Beck et al., 1982; Biemiller & Boote, 2006; Boyer-Crane et al., 2008; Hargrave & Senechal, 2006; Deffes Silverman, 2007; McKeown et al., 1983).

Of note is the effect of training on growth from pretest to posttest on general vocabulary scores in the light of the growth from pretest to posttest on specific vocabulary items. Thus, the LL training group recognized significantly more untrained words than the control group, but both groups of children significantly improved their scores on specific vocabulary items (Scarborough vocabulary) from pretest to posttest. The children in both the LL training and math-training groups were incidentally exposed to these specific vocabulary items. However, only the children in the LL training group were taught vocabulary strategies aimed at improving their untrained vocabulary knowledge. The effectiveness of incidental exposure to specific words to generalize to gains on untrained words was possible to test, as a result of this design. As the results showed that only the children in the LL training program recognized significantly more untrained words from pretest to posttest, it is clear that incidental exposure to specific words does not generalize to gains in untrained vocabulary. In other words, learning of specific vocabulary items does not generalize in identifying untrained words measured by growth on general vocabulary knowledge. Therefore, only vocabulary instruction that conceptualizes vocabulary knowledge as conceptual knowledge rather than as number of words can actually produce these significant increases in untrained vocabulary knowledge. This conceptualization is specific to the current study.

Language effects in pretest and posttest, along with training effects on growth from pretest to posttest, occurred on the standardized measure of vocabulary for the general (untrained) vocabulary. Thus, the English L1 children significantly outperformed the English L2 children on this measure of vocabulary knowledge on pretest and on posttest. However, due to the training effects discussed above, the language status effects were diminished from pretest to posttest.

There were no differences on identifying untrained vocabulary words by language group or SES. Therefore, the LL training program was successful in teaching strategies that significantly increased the general vocabulary knowledge for English L1 and English L2 children. The strategies employed in the LL training were based on understanding words as concepts and organizing them using higher order cognitive processes, such as comparison between words on a variety of dimensions, synthesis of words by various dimensions, and comparison and synthesis used in the flexible categorization of words.

Additionally, at posttest, the English L2 children reached the levels of general vocabulary of English L1 children at pretest: the English L2 children knew on average 45.30 untrained words at posttest, while the English L1speakers knew on average 50.76 words at pretest. The growth from pretest to posttest on general vocabulary was similar for the two language groups in this sample, being an average of 16 untrained words. The English L2 group started from an average of 28.81 untrained words at pretest. The English L1 speakers reached an average of 66.64 words at posttest. However, LL-trained children had consistent growth from pretest to posttest across language status and SES groups, whereas the control group of children showed inconsistencies across the two language status groups and the two SES groups on growth from pretest to posttest on this standardized measure of general vocabulary knowledge.

As such, the English L2 trained children learnt on average 18.85 words from pretest to posttest and the English L1 trained children learnt on average 19.61 words. However, the English L2 control children learnt 13.5 words and the English L1 control children 5.34 words. This discrepancy between the performance of LL trained and control children by language status can be explained by the difference in size between the English L2 and English L1 samples of children: the English L2 group of children (n = 27) were outnumbered by the English L1 group of children (n = 59). Further, and most importantly, only two low SES, English L2 children participated in the control group, and their growth from pretest to posttest on general vocabulary was significantly different than the performance of the rest of the control group of children: low SES, English L2 control children (n = 2) learnt an average of 19.50 words from pretest to posttest, whereas the low SES, English L1 control children (n = 7) learnt an average of 7.57 words. Middle SES, English L1 control children (n = 8) learnt an average of 3 words, and middle SES, English L2 control children (n = 6) learnt an average 7.50 words from pretest to posttest. Therefore, the performance of the English L2 control children in this study was rather comparable to the performance of LL trained groups of children than to the other control groups of children and may not be representative of that group of children in a larger population. The very small sample size of that group (low SES, English L2 children) in this study does not allow any conclusive findings.

Longitudinal and concurrent predictors of general vocabulary knowledge for the two language status groups were different in this sample. As such, for the English L1 sample, the longitudinal variables predicting posttest vocabulary knowledge loaded onto two factors: a cognitive linguistic factor, which loaded on non-verbal reasoning, oral language and verbal memory, and an associative learning factor, which loaded on letter and letter-sound identification. However, for the English L2 sample, no longitudinal predictors were found for general vocabulary knowledge at posttest. In other words, pretest English variables in this study could not predict posttest general vocabulary knowledge in this English L2 sample. Research suggests that, longitudinally, native language variables predict vocabulary knowledge after children were immersed in an English-speaking environment (Chiappe et al., 2002; Gottardo & Mueller, 2009), however, to date, there is a dearth of available measures translated and standardized for the multitude of languages spoken by the immigrant children in Canada (see the diverse language composition of the current sample). For the English L1 sample, however, these results underscore once more the importance of conceptualizing vocabulary as a network of concepts organized by using higher order cognitive processes: children with a well formed cognitive understanding of the world at pretest, as expressed by higher non-verbal reasoning and verbal memory scores, had larger posttest untrained vocabularies than children with lower non-verbal reasoning and verbal memory scores on pretest. Additionally, for the same group of children, these results underline the importance of paired associate learning for acquiring general vocabulary knowledge: children with good performance on letter- and letter-sound identification in pretest had large vocabularies on posttest. It is important to note that this study provides a unique opportunity to understand longitudinal predictors of vocabulary knowledge in a very young sample of children, as no other research has examined these variables.

The concurrent predictors for posttest general vocabulary knowledge were, however, similar for the two language status groups in the study. As such, only posttest grammatical knowledge predicted posttest general vocabulary knowledge for the English L1 group and the English L2 group. In other words, children's ability to understand sentence construction and morphology predicted their ability to select a visual representation of a word from an array of four pictures presented at the same time. As with longitudinal predictors, the picture of concurrent predictors for general vocabulary knowledge in a young sample of children is unique in the research literature. This finding is consistent with the theoretical concept of a general language ability (Chomsky, 1968; Pinker, 1991).

It is important to look at the changes from pretest to posttest, across language groups, in general vocabulary knowledge to determine if the trained group had significantly increased their chances to succeed in the second stage of reading, in which vocabulary scores are main predictors of reading comprehension (August et al., 2005; Cunningham & Stanovich, 1997; Gottardo & Mueller, 2009; Oullette, 2006; see the Simple View of Reading, Gough & Tunmer, 1986). As general vocabulary knowledge is a predictor of reading comprehension in the later stages of reading attainment (Catts et al., 2005; Cunningham & Stanovich, 1997; Ouellette, 2006; Nation & Snowling, 2004; Scarborough, 1998; Senechal, et al., 2006; see the Simple View of Reading; Gough & Tunmer, 1986), and as the children in the current LL training group successfully increased their general vocabulary knowledge, these children stand a much higher chance of being good text comprehenders in English later on in their school years. Additionally, it is important to provide training in grammatical knowledge to both English L2 and English L1 children in their preschool years, as this knowledge predicts concurrent success in general vocabulary knowledge.

Phonological awareness and letter-sound identification

Based on a previous study (Baciu et al., under review), letter-sound identification improvement, phonological awareness (PA) growth, and word reading growth from pretest to posttest were expected for the children in the training group, above and beyond the performance of the children in the control group. In other words, it was hypothesized that the literacy-trained children would show greater gains in English measures of skills related to reading proficiency than children in the control group.

Although for the vast majority of measures the control group outperformed or performed similarly to the LL group on pretest, on posttest the situation was reversed, as expected. As such, the LL training group obtained higher scores than the control group on most of the measures on posttest. However, the pretest differences between the control and the LL group were not significant on any of the measures, whereas the posttest differences between these two groups of children on letter-sound identification reached significance, with the LL trained children knowing more letter-sounds than the control group. This posttest effect of training on letter-sound identification is explained by the effect of training on growth between pretest and posttest on this variable. Children in the LL training group learned significantly more letter-sounds than children in the control group during the same period of time. As the pretest gap between the LL trained and the control children on this measure was not significant, the posttest results on this measure were influenced by the differences in learning from pretest to posttest between the two groups of children.

At posttest, the LL training group outperformed the control group on the vast majority of phonological awareness measures: rhyme detection, syllable and initial phoneme deletion, and sound blending. However, these differences were not significant, which is in contrast with the results from an eight-week training program on phonological awareness (Baciu et al., under review). The LL children in the current study significantly outperformed the control children on letter-sound identification on posttest, although the two groups of children started with similar performance on this measure on pretest, results that are supported by previous research (Baciu et al., under review). Research has shown that at this very early stage of reading, only performance on sound blending, letter-sound identification and non-verbal reasoning predicted performance on word reading (Baciu et al., under review). Research also showed that the composite variable that measured phonological awareness at the onset rime level, although being correlated with word reading, did not predict variance on that measure for a similarly mixed language status and SES children (Baciu et al., under review). It is reasonable, therefore, to assume that the letter-sound identification growth from pretest to posttest for children in the current LL training program adequately prepared these children to succeed in learning to read in English in the first years of their schooling. Further, due to the Mathew effects in reading attainment (i.e., the rich get richer), it is expected that the current small difference between the literacy-trained and the control children on the PA measures might become even larger in the first years of kindergarten (Stanovich, 1986).

However, in order to determine the significance of this training program for the successful attainment of the first stage of reading, which is decoding, predictors of PA and of word reading in this sample will be discussed and compared to predictors of PA and of word reading in similar research that controlled for participants non-verbal reasoning. The longitudinal predictors of the posttest PA composite were different for the two language status groups. Thus, for the English-speaking group, pretest letter-sound identification was the sole predictor of posttest PA, while for the English L2 group, only pretest non-verbal reasoning predicted posttest

PA. These results are explained by the floor levels attained by the English L2 group on pretest letter-sound identification: these children knew on average .96 letter-sounds in pretest, with a standard deviation of 1.96. These results also underscore the importance of an accurate evaluation of non-verbal intelligence for English L2 children, as they show that, when language skills in L2 are low, non-verbal reasoning is the most important ability for learning difficult skills such as PA. The necessity of accurate evaluation of letter-sound identification for English L1 children is emphasized by the findings of this study, as well.

The concurrent predictors of the posttest PA composite were again different for the two language status groups. Therefore, letter-sound identification continued to predict PA on posttest for the native English-speaking group, but non-verbal reasoning and non-word repetition predicted posttest PA in the English L2 group. These results are similar to results found in other research mixed language status groups of children of similar age as the children in the current study (Baciu et al., under review), where letter sound identification, word repetition and non-verbal intelligence predicted PA, and in other research with older children (Gottardo, & Geva, 2005; Roberts, 2003). For example, letter-sound identification performance is consistently associated with variance in the phonological awareness tasks in the research literature (Roberts, 2003), and Gottardo and Geva (2005) found that non-verbal reasoning was related to variance on PA tasks. Non-word and word repetition are considered one of the predictor variables of phonological awareness in the research literature (Gottardo, Stanovich, & Siegel, 1996; McBride-Chang, 1996). The two different predictors of PA for the two language status groups underscore the importance of understanding the qualitative differences between PA in these samples: for the English L1 group, a paired associated learning skill predicted success in PA development (Carroll, Snowling, Hulme, & Stevenson, 2003; Ehri, 1995; Ehri & McCormick, 1998; Foy & Mann, 2006; Treiman, Tincoff, & Richmond-Welty, 1997) whereas for the English

L2 sample, cognitive-linguistic skills predicted it (Baciu et al., under review; Gottardo & Geva, 2005). Additionally, the large effect sizes for reading reported by all the training programs that taught phonological awareness in conjunction with the alphabetic principle (Bus & van IJzendoorn, 1999; Byrne & Fielding Barnsley, 1993; Cunningham, 1990; Hatcher, Hulme, & Ellis, 1994; Elbro & Petersen, 2004) demonstrate that letter-sound identification is an important predictor of reading. The same conclusion is drawn from findings showing that PA was predicted by letter-sound identification proficiency in the native English-speaking children. Therefore, the children participating in the training group have significantly improved their chance to succeed in learning to decode text in school, due to their large increases in letter-sound identification proficiency.

Word reading

Concurrent predictors of word reading were somewhat similar in the current study for the two language status groups. As such, letter identification predicted word reading in both the native English-speaking group and the English L2 group, but letter-sound identification approached significance in predicting variance in word reading for the English L2 group (see table 25). PA was no longer a predictor of word reading when letter identification was entered in the last step of the hierarchical regression analysis. For the English L2 sample though, PA was not a predictor of word reading in any of the hierarchical regression analysis steps. It is possible that the English measures of PA do not capture yet enough of the variability of word reading in English in this sample of very young English L2 children who are beginning to be immersed in an English-speaking environment. Again, word reading was predicted by letter identification or letter-and letter-sound identification in this study, findings that are supported with monolingual readers in other research (Carroll et al., 2003; Foy and Mann, 2006; Treiman et al., 1997). Additionally, researchers found that children learn letter-sound correspondences that can help them in reading a few words prior to phonological awareness skills (see the pre-alphabetic and partial-alphabetic phases of word learning; Ehri, 1995; Ehri & McCormick, 1998). Large effect sizes in word reading are reported for training studies that instructed children in PA in conjunction with letter-sound identification skills (Bus & van IJzendoorn, 1999; Lonigan, 2006), showing that letter-sound identification is an important predictor of reading. Therefore, this sample of children is expected to successfully reach the decoding stage of reading during the first years of formal schooling.

SES effects

Socio-economic status (SES) effects were expected in pretest, and these effects were expected to have diminished drastically in posttest, due to the training effect. However, there were no SES effects in this sample of children, and the lack of SES effects is addressed in the light of the large difference in size between the English and English L2 samples by SES and training condition, as well as in the light of possible effects of mixed SES samples in the training condition. Additionally, it might be possible that SES effects appear above and beyond language status effects only after intensive exposure to an English-speaking environment. A 6-month period, which was the duration of the current training program, might not be sufficient to examine these effects. Further, the educational relevance of the current study is discussed, as researchers have repeatedly attempted to decrease the performance gap on vocabulary knowledge between disadvantaged and advantaged children (see Bauman, Kame'enui, & Ash, 2003, for a review).

Educational Implications

Children in the LL training program significantly improved their performance on general vocabulary knowledge. Teaching specific vocabulary items (Scarborough vocabulary) did not generate changes in overall vocabulary: children in the math-training group and the LL training group who were incidentally exposed to these specific words, improved their scores on the experimental measure that tested learning of these words, but children in the math training group did not perform significantly better on general vocabulary knowledge. In other words, the positive effect of training specific vocabulary items did not extend to untrained vocabulary. Similar results of differential effects for trained versus untrained vocabulary have been reported for French vocabulary growth in French Immersion kindergarten children (Wade-Woolley, 2005). This result is also consistent with research reporting no significant impact on reading comprehension for primary years programs such as Reading Recovery (Gregory et al., 1993) and for the Success for All (Madden et al., 1993).

Therefore, the underlying thesis of the current study is that only by considering vocabulary as a network of concepts (Chambers et al., 2008; Cimpian & Markman, 2008; Gelman et al., 1998; Prasada, 2000; Waxman & Gelman, 2009) rather than conceptualizing it as number of words known or produced, and only by addressing conceptual development at a very early stage of development it is possible to change the vocabulary growth of children, as vocabulary development is translated in cognitive development (Booth & Waxman, 2002; Booth et al., 2005; Diesendruck et al., 2003; Kemler Nelson, 1995, 1999; Kemler Nelson, Frankenfield, et al., 2000; Kemler Nelson, Russell, et al., 2000). Since the gap between vocabulary knowledge for normative versus advantaged populations tends to increase over time (Biemiller & Slonim, 2001; Pan et al., 2004) and since vocabulary plays a crucial role in later stages of reading development (August et al., 2005; Cunningham & Stanovich, 1997; Catts et al., 1999; Gottardo & Mueller, 2009; Oullette, 2006), it is important to foster vocabulary acquisition in the early years of children's lives. Thus, educators need to consider providing this type of LL training earlier than the age of four when the children enter kindergarten, specifically, at three years of age, if changes in growth of vocabulary development are to be expected.

Even when the oral language proficiency skills (receptive and expressive vocabulary) are very low, as was the case of English L2 children who were exposed to very little English before they started this training program, children dramatically improve their general vocabulary skills with the LL training program researched in this study. English L2 and English L1speakers from middle or low SES backgrounds equally benefit from this training program. It is thus clear that children do not need a certain threshold of vocabulary knowledge before entering a vocabulary-training program focused on conceptual development in order to succeed in the program. It is assumed that, as a result of vocabulary growth, children's reading comprehension will be enhanced in the second stage of reading (Catts et al., 2005; Cunningham & Stanovich, 1997; Ouellette, 2006; Nation & Snowling, 2004; Scarborough, 1998; Senechal, et al., 2006; Snow, 1997), which in turn, will decrease the rate of school-drop out later on in life. Longitudinal effects of this study will compare the reading comprehension performance for the LL trained and math-trained children in a follow-up study.

In addition, children from different language status and socio-economic status show similar levels of learning in the current training program for letter-sound identification, a variable that is critically related to word reading in this and other studies (Hatcher et al., 2004; Lonigan et al., 2000). Therefore, code-related skills need to be targeted in training programs that are aimed at increasing the reading success of children coming from disadvantaged backgrounds.

Limitations

Some measures (i.e. the phoneme detection task and the rhyme detection task) had very low and low internal reliability, respectively. It is possible that the memory load needed to solve these tasks successfully is too large for 3- to 4-year-old children: children had to select the non-word which starts with a different sound or which doesn't rhyme from an array of three non-words. It is also possible that children did not perform consistently on these measures due to the fact that they actually did not yet develop the level of phonological awareness skill that allows for finer parsing of linguistic units. Other methods to test children's ability to detect initial sound or rhyming differences might be more appropriate for this age group and would provide a satisfactory answer to the question of children's development of finer phonological awareness skills.

The children in both the literacy and the math training programs were self-selected by their parents for these programs. Therefore, the results of the literacy training study might be, at least partially, due to self-selection bias. However, at pretest, there were no detected differences between the children in these groups on the measures known to influence vocabulary and phonological awareness development.

No main effects of SES were found for any of the variables in this study. These results are supported by findings of a study conducted with similar language status and SES groups (Baciu et al., under review), but are not supported by other research that suggests that children coming from low SES families show lower levels of oral language proficiency than their middle SES counterparts (Hart & Risley, 1992; Snow, Burns, & Griffin, 1998). As mentioned earlier, this result might be confounded by the larger number of native English-speaking children compared with the number of English L2 children, especially in the low SES sample. Additionally, it is possible that the strong language effects due to very limited exposure to English before the program started, were confounded with SES effects in this sample, but will appear later in children's development, when English L2 children would have had extensive enough exposure to English.

In the current study, SES was indexed by the educational levels of the children's parents, due to the mixed language status composition of the sample. It is possible that for the English L1 sample, however, the educational status of the parents as a distal factor influencing children's development does not provide enough information regarding the proximal factors that can influence children's development, i.e. the educational and other parental experiences that parents bring to their children. Therefore, adding measures of proximal and distal variables that influence development can bring more light to the picture of SES versus language status influence on second and first language learner's development of pre-literacy skills.

The parents of the children participating in the program reported that they valued literacy. They also showed great commitment to the program, with many of them even attending the sessions. They reported that they practiced naming the sounds of the letters and counting the words in the sentences and the syllables in the words with their children. By taking a real interest in their child's success in the program, these parents offered a variety of stimulating experiences and offered a great deal of emotional support to their children. Thus, they altered the proximal variables influencing their children's outcomes. Although the distal influences of low SES are known to have a negative impact on children's outcomes, these distal influences are exerted through the proximal variables. As those parents changed those proximal influences, they had a positive impact on their child's achievement. Thus, it can be inferred that SES differences for the trained English L2 children were reduced in this sample. This, combined with a very small sample of low SES English L2 children in the control group ($n = 2$), may have led to no SES effects, at least for the English L2 sample.

Although the performance on phonological awareness skills was increased for the trained children in comparison to the control children at posttest, this difference did not reach significance. The current study used the PA component from a prior study (Baciu et al., under review) that had previously showed significant growth on PA for the trained children compared to control children. The difference in results between the two studies that used the same PA component might be attributed to the different focus of the two programs. Thus, it is possible that due to the vocabulary focus in the current study, PA skills were not targeted to the same extent (e.g., the same number of repetitions), although for the same duration as in the previous study. Stricter fidelity of implementation measures should be employed in order to examine if the change of focus determined a change in the duration of the PA training. Another possible explanation for this difference in the PA results is that the vocabulary training focus in such a short period of time occupies most of the cognitive resources of children; therefore they are not able to learn other skills, that is, PA, during this time, to the same extent. This hypothesis merits future investigation.

Conclusion

Precursors of reading attainment, namely general vocabulary knowledge and letter-sound identification, can be successfully trained in various language status and SES groups of very young children (three to four years old). Specific vocabulary items, such as Scarborough vocabulary, can be effectively trained as well in such a sample. Only by considering vocabulary as a network of concepts (Chambers et al., 2008; Cimpian & Markman, 2008; Gelman et al., 1998; Prasada, 2000; Waxman & Gelman, 2009) that need to be highly organized and by addressing vocabulary training early on in children's lives can interventions produce the needed changes in vocabulary learning in both English L2 and English L1 samples. This study, therefore, demonstrates that conceptual development has a significant facilitative effect on vocabulary development, contributing to the research that demonstrates the effect of language learning on cognitive development. More research is needed with larger samples of low SES children with varied language status to provide more information about the patterns of vocabulary and reading acquisition for these children. Additionally, longitudinal research is needed to determine if the positive results on untrained vocabulary learning of this study are sustained over time and predict good performance in reading comprehension tasks.

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APPENDIX 1
Parent-Home Questionnaire

Thank you for your time, please answer the following questions.

Child's Name:

Name of the centre which (s)he attends:

Did your child attend school in a foreign country? *(Please draw a circle around the correct answer)*
Yes No
Which was the last grade (s)he completed at this school?

What type of work does the child's father do in this country?

What type of work does the child's mother do in this country?

What was the last school grade completed by the child's father?

What was the last school grade completed by the child's mother?

What country is the child's father from?

What country is the child's mother from?

If he lived in a foreign country, what type of work did the child's father do in that country?

If she lived in a foreign country, what type of work did the child's mother do in that country?

How old was the child when (s)he began to show interest in written words and/or numbers?

How did (s)he show that interest?

How often is a newspaper acquired in your family? *(Please draw a circle around the correct answer)*
Daily Three times per week Once a week Rarely
If you acquire the newspaper, which newspapers do you acquire most often?

How often are magazines acquired in your family? *(Please draw a circle around the correct answer)*

Daily Three times per week Once a week Rarely

If you acquire magazines, which magazines do you acquire most often?

____

____

What languages are spoken in your home?

____

____

Which people speak these languages?

____

____

What language is spoken most frequently in your house?

____

Please draw a circle around the correct answer

Do you have more than 25 books at home?

Yes No

Do you read out loud to your child every day?

Yes No

Do you read the same book to your child many times if the child asks you?

Yes No

When you read to your child, the child sits on your lap or very close to you and is in a position to follow the reading of the book?

Yes No

Did any other adult read to the child before the child began attending The Ontario Early Years Centre?

Yes No

Besides yourself, is there another adult living at home?

Yes No

Please draw a circle around the answer that most indicates how true the following declarations about you and your child are.

During her/his free time at home, MY CHILD reads very often

True Somewhat true Somewhat False False

Knowing how to read is very important

True Somewhat true Somewhat False False

During YOUR free time, you read very often.

True Somewhat true Somewhat False False

YOU enjoy reading very much

True Somewhat true Somewhat False False

Thank you very much. Once it is completed, please send this questionnaire back to the centre with your child.

APPENDIX 2
Scarborough vocabulary

Relational Terms (Scarborough, 2003)

Provide the following instructions to the child. Mark as either 1 (correct) or 0 (incorrect). For the first 5 items, you can provide feedback, e.g., "Nice try, this is put the chair on top of the book". Discontinue providing feedback after the fifth item. For each set, discontinue testing after **six consecutive** errors. Circle the answer given by the child or write down his/her actions.

A. SPACE RELATIONS

1. Put the chair on **top** of the book
2. Open the **bottom** drawer.
3. Put your hands **up**.
4. Go **under** the table.
5. Jump **over** the book. **(have a book on the floor)**
6. Put your hands **down**. **(have the child reach above first)**
7. Put the pen **below** the book.
8. Turn the chair **upside-down**.
9. Put the dinosaur **in front of** the chair.
10. Reach **above**.
11. Put the dinosaur **on your left.**
12. Stand **beside** the chair.
13. Put the dinosaur **behind** the chair.
14. Put the chair **on your right.**
15. Put the dinosaur **next to** the chair.
16. Reach **across** the table.
17. Sit the dinosaur **far from** the chair.
18. Jump **toward** me.
19. Sit the dinosaur **away from** the chair.
20. Put the dinosaur **near** the mirror.
21. Go **around** the chair.
22. Put the chair **by** the mirror.
23. Move the chair **in the back** of the room.

24. Put the drawer **on the side.**

B. TIME/ORDER RELATIONS

1. Don't stand up **until** I say "**name of child**"
2. Touch the toy in the **middle.**
3. **Whenever** I say 1, you say 2. 1 (look expectantly)…, 1 (same)….1 (same)….
4. Touch the toy at the **beginning** of the row **(have the toys aligned in a row)**
5. Give me the chair, the mirror, the dinosaur and the drawer **(make sure you have more than the 4 toys on table). First**, give me the mirror. **Second,** give me the chair. **Last**, give me the dinosaur.
6. Give me the dinosaur. **Next**, give me the chair **(have the toys aligned in a row)**
7. Give me the toy **next to the last** one.
8. **After** I say dinosaur, you say chair. Dinosaur, (wait for response, look expectantly)….
9. **When** I say baby, you say cup. Baby, (look expectantly)…
10. Give me the toys **from the dinosaur to the chair (have the toys in a row, one toy before the dinosaur, one in the middle, one after the chair).**

C. QUANTITY

1. Give me **all** of the toys.
2. Circle **each** of the cats.
3. Give me **some** of the toys.
4. Circle **most** of the cats.
5. Give me **a few of** the toys.
6. Circle **any** of the cats.
7. Give me one toy. Give me **more** toys.
8. Touch **none of** the chairs.
9. Give me **no** chairs.
10. Draw **a little** line.

D. LOGIC

1. Give me the **same (have 3 objects on table, 2 identical)**
2. Give me the ones that are **alike (same as above)**
3. Touch the one that is **similar (have three objects on table, one that is identical to one on**

the table in your hand)

4. Circle that one that is **<u>different.</u>**

5. **<u>If</u>** I give you a dinosaur, **<u>then</u>** you give me a chair **(proceed by giving the dinosaur)**

6. Give me the chair **<u>or</u>** the dinosaur.

7. Give me **<u>exactly</u>** 2 toys.

APPENDIX 3

Getting Ready for School – Lesson containing typical phonological awareness instructions

Materials:

Hello Song (Use CD and Appendix A for words)
Good-bye Song (Use CD and Appendix B for words)
Surprise Bags
Name tags for each student
Collection of pictures and letter cards
Marking Sheets (Appendix C)

Purpose of the Lesson Group learning: Identifying sounds (review of sounds from previous lesson). Introduction of initial sounds S, M, A
Individual learning:

1. **Welcome Activity** (5 minutes)
Invite all children to come and sit in the circle. Encourage them to find their name tag on the floor and to sit behind their nametags. For those who have difficulty finding their nametags, show them which one it is. Once everyone is seated, begin the class with the "Hello Song". Invite the children to join in the singing of the song.

3. Activity: Sound Listening Game (10 minutes – Review of lesson 1)
Instructions:

1. Introduce the listening game with the following: *"Our world is filled with many sounds. We can listen to these sounds with our eyes closed* (demonstrate by clapping and closing your eyes) *or we can listen with our eyes open* (demonstrate by clapping and having eyes open). Repeat this again clapping with eyes closed and then open.

2. Provide time for students to practice this skill e.g., *"I'm going to make some sounds now and I want you to tell me what noise I'm making. I want you to close your close eyes while I make these sounds. OK everyone, close your eyes and listen for the sound."* Listed below are examples of possible sounds to use for this activity. Items to use to make these sounds are also provided in the kit. Repeat this activity 7-10 times or until the attention of the children starts to decrease or they become increasingly restless.

knocking on the wall or table
blowing a whistle
clicking with the tongue
coloring hard on paper
crumpling paper
dropping a block
rubbing hands together
stirring with a teaspoon
sounds of your choice

clapping
hammering
coughing
scratching
hitting blocks together
snapping fingers
tearing paper
snapping fingers

After several examples where one sound has been demonstrated, introduce making two sounds at a time, e.g., say "I'm now going to make two sounds and I want you to tell me what the two sounds are." (e.g., knocking on the wall and clapping). Demonstrate this by saying "First we heard knocking on the wall, and then we heard clapping." Provide several examples using two sounds.

Introduce three and four sound sequences, following the example above. Observe the skills of the students, which students are comfortable with this skill, which students seem to be having challenges. Those who experience challenges will require individual assistance later in the lesson.

If students are able to maintain attention, continue to challenge them by

- creating a four sound sequence
- repeating the sequence
- repeating the sequence and leaving one sound out (e.g., I'm going to make the same sounds again, but this time I'm going to leave one sound out. I want you to guess which sound I leave out. If you know which sound I'm leaving out, then put your hand up like this.")

4. Grouping Students

Divide students into small groups, one instructor for each group. Children are to be grouped in a different way than in the first session, e.g., different students and different teachers than last time for the small groups. In the way the children are working with different students each day and with a different instructor.

5. Introduction of Sounds Related to Letters S, M, A (10 minutes)

Instructions:

1. Introduce this activity by making a connection to the sound activity just completed: "*Everyone did a great job of telling me which sounds I was making. Good for you. Now I'm going to share some different sounds with you. When we say our names there is a sound at the beginning of our names. My name is "Susan" and the first sound I hear is "S"*. Repeat this several times using the names of the children in the group

2. Matching Game with Letters / Sounds: "Now I'm going to bring out some pictures (or objects) and I want you to tell me what's on the picture (or what the object is).
a) Show pictures related to S, M, and A, e.g., "Tell me what's on this picture (sun). What sound do we hear at the beginning of sun? (s). I have three letters here, which one makes the "sss" sound like sun?" Have students identify the letter or hold up the letter card for the children.
b) Repeat his activity numerous times, each time showing the picture, focusing on the initial sound of the picture, and then identifying the letter that makes that sound. (The focus is on the sound.)

As this activity continues, explicit state the sound for each letter, e.g., short "A" sound, as in apple, ant, (not "a" as in airplane)

In this activity, the grapheme of each letter is shown, telling the student the sound of this grapheme (not the letter name).
The instructor says:
"This is A. What sound is this?"
Children respond by saying "A" together with the instructor,
The instructor then repeats this one more time. "This is A. What sound is this?" C
Children respond with "A" together with the instructor.

After this introduction to the letter sound and grapheme of that sound, the same letter sound is paired with an object or picture of a word that starts with that sound – "A as in apple" "A as in ant" and other words that start with "A" from pictures / objects around the room.

The same progression of instructions is used for M:
Instructor: "This is M. What sound is this?:
Children say "M" together with the instructor.
Instructor repeats this one more time.
Pair with an object or picture of a word that starts with that sound, e.g., "M as in Mama" "M as in Moon", "M as in monkey"
The same progression of instructions is used for S:
Instructor: "This is S. What sound is this?"
Children say "S" together with the instructor.
Instructor repeats this one more time.
Pair with an object or picture of a word that starts with that sound, e.g., "S as in star", "S as in Santa", "S as in snake" and other words that start with M from pictures / objects around the room.

Repeat this activity numerous times, each time showing the picture, focusing on the initial sound of the picture, and then identifying the grapheme that makes that sound. (The focus is on the sound.)

Reinforcing the Sounds through Bingo Boards –

Bingo 1: match the lower case grapheme with the upper case grapheme, while saying the sound of that grapheme
Bingo 2: match the word that starts with that sound on the bingo board, with the lower case grapheme of that sound
Bingo 3: match the upper case grapheme of that sound with the initial sound of words (pictures that are part of the bingo board).

The idea is to use the same skill in different activities, so that the children will get exposure to sound naming and grapheme-sound correspondence several times, in a different way – it looks like they do a different think, they rehearse though the same concepts.

Variations here will include making the graphemes out of play-dough, tracing them in sand, stamping them on paper, tracing them on paper; each time saying the sound of that grapheme – so that they get the motor part in this rehearsal of the skill.

6. **Talking About our Bodies** (Activity Break & Vocabulary Building)

Instructions:

Invite the students to stand up. "I'm going to point to a part on my body, and if you can tell me what it's called, I want you put your hand up." Point to your arm, leg, head, eyes, nose, mouth, ears, hair. "Great job. I know a song that will help us remember all these parts. The song has some actions with it too. Listen while I sing it. Watch the actions that I'm going to do." Sing "Head and Shoulders, Knees and Toes" and do the accompanying actions. Review the words and the actions with the students. Then sing it together several times until the children are comfortable with it.

Once they are comfortable with the song, change the last body part in the song (nose) to another body part, e.g., stomach, cheeks, etc.) "Let's sing the song again, this time listen for the last body part that we sing about in the song." (nose) Let's sing it again, this time let's change nose to cheeks." Continue to do this for 5-6 other body parts (or as long as children's attention span will allow.

7. **Musical Instruments** (10 minutes)

Instructions:

Bring out the box of musical rhythm instruments, provided in the kit. "Remember the musical instruments we used yesterday, and that some instruments make sounds that are the same, and some instruments make different sounds

Instructions:

Musical (rhythm) instruments are included in the kit.

1. Bring out the box of musical rhythm instruments, which is provided in the kit. "*We have some special noise makers here – they're called musical instruments and they each make special sounds. In a few minutes I will give each of you a musical instrument to play with. I'm going to put an instrument in front of you to play with. When I put my hand up in the air like this* (put your hand and arm up in the air and put your instrument on the floor) – *that means that everyone needs to stop playing with their instrument.* (As each instrument is brought out, demonstrate its sound and label it). *Here's one of the instruments. It's called a triangle. Listen to its sound.* (Place the instrument in front of a child). Repeat with the other instruments as you take them out of the bag). Provide a couple of minutes for the children to explore the instrument given to them. Raise your hand – have the children put their instruments down. You may need to move the instruments further away from the children to avoid them playing with them while you are speaking.

2. When the instruments are on the floor and the children have refocused, provide demonstrations to teach the concepts of same and different. "*Everyone needs to be sitting right down on their bottoms, looking at me, lips closed.*" (Refocus their attention to you.) "*Some instruments make the same sound and some instruments make different sounds. For example,* (child's name) *has a* (label the instrument), *and* (child's name) has *a* (label the instrument). *These instruments make similar sounds* (e.g., "Tammy has a bell and Johnny has a tambourine".) Demonstrate the sounds of these instruments by having the children make the sounds and then have them return their instruments to the floor. "*But* (repeat this process to emphasize that some instruments are different) "*Susie has some wooden blocks and Jamie has a triangle*". Repeat these kinds of activities using the instruments 4-6 times depending on the attention level of the student. Emphasize when the instruments sound "the same, or similar" and when they sound "different".

3. To determine if the students have understood the difference between "same" and "different", ask the students to do the following. Ask two children to demonstrate their instruments. Then ask the students "*Are the sounds these instruments make the "same" or are they "different*"? Repeat several times.

4. "*It's time now to return the instruments to their box. Please put your instruments in this box." Collect the instruments, and then instruct the children to return to their small group circle.*

8. **Nursery Rhymes** (10 minutes)

Instructions:

1. Use the songs"Jack and Jill" and "Twinkle, Twinkle, Little Star" from the CD or sing these nursery rhyme songs yourself.
2. Follow the same format as in lesson one, reviewing the concepts addressed under the Listening Activity with Nursery Rhymes.

9. **Surprise Bag** (10 Minutes)

Instructions:

The purpose of this activity today is to provide an opportunity for the children to practice the skill of identifying beginning sounds for each object they pull from the bag. The emphasis continues to be on sounds (not naming the letters).

a) Demonstrate the activity by closing your eyes, putting your hand in the bag and taking a toy out. Say "Look what I found! I found a (label the toy), and talk about it (it is an animal/food/plant, etc.; it says meow, etc. we grow it in the garden, it is red, it is like a ball, etc.)

b) Ask the children to take turns in picking up a toy: "Now we are going to pick up a toy from the bag. Who would like to start?" Encourage the children to put their hand up to indicate that they want to participate. "Johnny, let's see what you get from the bag!" (Johnny should have his eyes closed when he searches in the bag). Talk about the toy that Johnny got, by asking him questions about it: "What is it? Is it yellow? Is it like a ball or like a block? Etc.

10. Snack Time (10-15 minutes)

Instructions:

1. Students remain in their small groups for snack time.
2. Bring out the foods for snack time.
3. The children will have a choice between two types of fruit/vegetable and cereal. They will be asked what they wanted: banana or carrots. After they ea their fruit/vegetable, they will be asked if they wanted cereal.
4. As children are eating, help them to identify the different noises that can be heard while eating and getting snacks ready. This part of the lesson is incidental teaching. After the children are served their choice, talk with them about the noises that they can hear while eating – "We are chewing our food now, do you hear what noise we are making?" "We are taking the cereal out of the box; do you hear what noise we are making?"

11. **Play Time** (30 minutes)

Instructions:

a) When children have finished their snacks, invite them to participate in free play time. "Now we have some time for you to play at the activities. You may choose to go to the following activities (list the options for them.)

b) While children are playing at the activities, interact with them one on one. The purpose here is to encourage the children to use language. Prompt the use of language by interacting with them and asking questions, e.g., "What are you playing with here? What are you doing at this activity? What colour is this? What shape is this? What can you do with this? What do we do with this? Where do we use, put this? Is this same/different?", etc.

c) Take one child at a time and teach them/ review with them – the concepts of same and different with objects. Pick several pairs of blocks: 2 red ones, 2 blue ones, 2 yellow ones, etc. Arrange 3 blocks in front of the child, 2 that are the same. Demonstrate "same" first, by saying "These 2 blocks are the same." Then choose another display of three blocks, with 2 blocks of the same colour. Ask the child: "Which two are the same?" If the child offers a correct response, repeat the activity three times. Mark with a plus (+) on the marking sheet if the child answered correctly for "same" during the 3-4 trials. If a child did not respond correctly for each of those trials, mark a "(-)" for "same" on the marking sheet and follow the procedure described in the next step.

d) If a child does not answer correctly, demonstrate again, and then ask again, providing some clues – pointing to the two that are the same, etc. Make sure that you switch the blocks each time before you ask the child which two blocks are the same. Repeat the activity 7-8 times, until the child seems to understand "same". Mark with a "+" for "same" on the marking sheet.

12. Wrap-Up

1. Use the same signal as in previous lessons, e.g., rhythm clapping (or flashing the lights) to gain the attention of the children. Ask the children to clean up their activities, and to return to the whole group area. Children put the name tags that are wearing in the middle, starting with the instructor who demonstrates the activity, matching their name tags with the ones that are on the floor.
2. Celebrate the learning and / or behaviour of the children today, e.g., *"You've done a great job today. We learned about beginning sounds. The first sound in mitten is ____. The first sound we hear in sun is ____. Good job. Be sure to share this with mommy or daddy when you go home today. Let's finish our morning together by singing our good-bye song"*. (Use the CD provided in the kit, or lead the singing yourself.)

APPENDIX 4

Getting Ready for School – Lesson containing typical vocabulary instruction

Materials:

Hello Song (Use CD and Appendix A for words)
Good-bye Song (Use CD and Appendix B for words)
S, M, A & T, B, O Bingo Boards and matching letter cards
Word Blocks
Name tags for each student
Collection of pictures and letter cards
Farm & Jungle Animals, Food and Vehicle Manipulatives
Old McDonald Had a Farm Song
Marking Sheets (Appendix C)

Purpose of the Lesson Group learning: Identifying sounds (review of sounds from previous lesson).
Review of initial sounds S, M, A, T, B, O
Putting words into sentences (using blocks)
Blending of sounds (putting two sounds together)

1. **Welcome Activity** (5 minutes)
Invite all children participating in the "Getting Ready for School Project" to come and sit in a small circle. Begin the class with the "Hello Song". Invite the children to join in the singing of the song.

2. **Farm and Jungle Animals**
The purpose of this activity is to start categorizing objects by various characteristics that they have. The first categories are of domestic (sometimes we might say farm, although domestic and farm are not totally overlapping) and wild animals. Then, in further lesson, we will teach the children that animals belong to different habitats that might have different climates, and then we'll talk about what animals we can find in each habitat, being them domestic or wild. We are trying to teach words in different contexts, so that children develop semantic networks with same words – networks of animals by where they live, then by their climate's habitat etc.

There are two versions of the songs that will be used: Old MacDonald had a farm, and Old MacTarzan had a jungle. The instructor first sorts the animals by domestic and wild animals, while providing the definitions of these two categories: "*This pile contains farm animals, or domestic animals, The animals that live around the house and are fed and taken care of by people are called domestic animals. The animals that live in the jungle and take care of themselves are called wild or jungle animals.*"

"*We are now going to sing the Old MacDonald or Old MacTarzan song. You have to pay attention and pick up an animal from the correct pile – a domestic animal if we sing Old Mac Donald, and a wil animal if we sing Old MacTarzan. I'll show you first. Ready?*"

The teacher then demonstrates what the children have to do – when she sings Old MacDonald, she picks an animal from the domestic animals pile. When she sings Old MacTarzan, she picks an animal from the wild animals pile.

Now we are going to do the same. The children sing together, and then they have a turn in picking a wild or a domestic animal, according to what is sung. After each child had a turn, they will sing again for their second turn, such that they'll end up with a domestic and a wild animal at the end of the activity.

"Now we will tidy up the animals. Make a domestic animal pile here, and a wild animal pile there when you tidy up. The children are to put their animals into the correct piles."

3. Grouping Students – Divide students into groups, one instructor for each group.

3. Activity: Reviewing Sounds Related to Letters S, M, A, T, B, O (10 minutes)

Instructions:

a) Divide children into groups. Form an advanced group for the children who have demonstrated many of the sounds. Assess each child's mastery of all the sounds. Record their progress on the marking sheet

The marking sheets are to be recorded each session, for each child, when the instructors are working one-on-one with the children. The results of these marking sheets are used for the instructional decisions. If there can be two or three groups of children formed, those who know all 6 sounds, in one group(s), and those who know 4 sounds or fewer, in another group(s), then they will be taught differently. The ones who need only a review of the 6 sounds will focus more on first sound correspondence with graphemes that they have in front of them (of the 6 sounds). The ones who know 4 or fewer sounds, will be first taught directly, as in lesson 3, the sounds that they did not master yet, then they will be moved to first sound identification and pairing (if known) to the corresponding grapheme.

b). **Matching Game**: Use the cards or objects from the previous lesson to review the sounds, e.g., show the mitten, review what it's called, then identify the first sound, e.g., "mmm". Explicitly state the sounds for each letter for T, B, and O, e.g., A as in apple, ant (not airplane); What's this sound? Follow the format provided in previous lessons to scaffold the learning of the children.

c). **Reinforcing the Sounds through Bingo Boards –**

Bingo 1: match the lower case grapheme with the upper case grapheme, while saying the sound of that grapheme

Bingo 2: match the word that starts with that sound on the bingo board, with the lower case grapheme of that sound

Bingo 3: match the upper case grapheme of that sound with the initial sound of words (pictures that are part of the bingo board).

The idea is to use the same skill in different activities, so that the children will get exposure to sound naming and grapheme-sound correspondence several times, in a different way – it looks like they do a different think, they rehearse though the same concepts.

Variations here will include making the graphemes out of play-dough, tracing them in sand, stamping them on paper, tracing them on paper; each time saying the sound of that grapheme – so that they get the motor part in this rehearsal of the skill.

c) Bingo Board Game: Using the letters T, B, O, S, M, and A, children are asked to match the capital letter sounds with the lower case letters on the bingo board. Focus is on sounds.

4. Grouping of Food, Vehicles and Animals (farm and jungle)

Instructions:

a) Review the categories, e.g., vehicles take us places (they don't need to have wheels), a boat is a vehicle. Food is something we eat.

b) Give each child at least an item from each category. Then ask the children, one at a time, to bring an item to the correct pile: *Johnny, show me a vehicle. Great, a car is a vehicle. Why is a car a vehicle? Because it takes us places. Good, now Johnny, could you please put your vehicle into the vehicle pile.*

c) The next child has a turn, with an item from a different category. *Jane, show me a food item. Good, an apple is a food item/ Why? Because we eat it. Good, now Jane, could you please put your food into the food pile.*

d) Continue until all the children have sorted out all their items into the corresponding category.

Divide all of the manipulatives (vehicles, food, farm animals, jungle animals) into piles according to their category. Give each child several items as the items are sorted. Ask each child one at a time to sort his items, e.g., *John, please put your vehicles away. Philip, please put your animals away. John, please put your food away*, etc. until everyone has finished sorting all of their manipulative materials.

5. Oral Blending Activities (10 minutes)

Instructions:

1. Practice blending of sounds, e.g.,

- if we put "s" and "a" together, ssss (pause) aaaa, it is "ssssaaaaa"
- if we put "t" and "a" together, t (pause) aaaa, it is taaaa
-if we put "a" and "t" together, aaaa (pause) t, it is taaaa
If we put "a" and "p" together, aaaa (pause) and p, it is aaaap

The emphasis here is on oral language. The instructor lifts the letters in the air and puts them together in front of the children while blending them.

6. Word Blocks – Building Sentences (10 minutes)

Instructions:

a) Model forming 3-4 word sentences using the blocks. Each block represents one word.

b) Provide an opportunity for each child to take a turn in making a sentence, e.g., *"Raise your hand if you would like to share something with everyone."* As they share their sentence, continue to demonstrate the placement of the blocks to form a sentence.

B For this activity, the children are to take any block from the pile to represent a word – e.g., for the sentence "I came to school" there are four words in the sentence, so the child must choose 4 blocks and place them in front of them, from left to right, with spaces between to represent the words. In this way they are able to construct the sentences as they will eventually do when they begin writing in school.

E.g. "The sky is blue." As each word is said the child puts a block on the floor? Yes, again, the instructor demonstrates first, when the activity is introduced, then the children do it too, as the instructor says the word. I need your help in clarifying this activity.

c) Repeat the activity several times, with different sentences, making sure that you vary the number of words in sentences ("I listen" – 2 words; "I played outside yesterday" – 4 words; "I like apples" – 3 words).

7. Musical Instruments

Instructions:

a) Review the musical instrument activity with the focus on same and different.

b) *"We have our musical instruments here today. Remember that some instruments make similar sounds, and some instruments make different sounds. For example, (child's name) has a (label the instrument), and (child's name) has a (label the instrument). These instruments make similar sounds (bell-triangle-tambourine)* Demonstrate while talking, then accentuate that these are similar sounds, and demonstrate again. Repeat this process substituting instruments that are different. *"(child's name) has a (label the instrument) and (child's name) has a (label the instrument). A (name of instrument) and (name of instrument) make different sounds* (demonstrate while talking, then accentuate that these are different sounds, and demonstrate again.

c) Review instruments and ask children to tell if two instruments make similar or different sounds.

8. Nursery Rhymes (10 minutes)

Instructions:

a) Use the songs "Jack and Jill" and "Twinkle, Twinkle, Little Star" from the CD or sing these nursery rhyme songs yourself.

b) Follow a similar format to the previous lessons, reviewing the concepts addressed, e.g., sing the song in a whispering voice, shout the songs, pinch your noses and sing it in a funny manner, invite children to keep the beat by marching as they sing the songs, or clapping, tapping the beat, etc.

c) Focus on words that rhyme:

" Now we are going to pay attention to words that rhyme, for example, Jill and hill rhyme, down and crown rhyme, too. Let's sing again the song again, but this time we'll shout/whisper only the rhyming words" –

Jack and JILL	Twinkle, twinkle little STAR
Went up the HILL	How I wonder what you ARE
To fetch a pail of water	Up above the world so HIGH
Jack fell DOWN	Like a diamond in the SKY
And broke his CROWN	Twinkle, twinkle little STAR
And Jill came tumbling after.	How I wonder what you ARE.

9. Talking About our Bodies (Activity Break & Vocabulary Building)

Instructions:

a) Invite the students to stand up. Review the body parts from yesterday. Point to specific parts, e.g., legs, arms, head, eyes, nose, mouth, ears, hair, etc. Have children point to these parts on themselves and to say the words with you, similar to yesterday's lesson.

b) Continue with the singing of "Head and Shoulders, Knees and Toes". Review the song from yesterday, and sing together several times.

c) *"Let's sing the song again, this time listen for the last body part that we sing about in the song."* (nose) Let's sing it again, this time let's change nose to cheeks." Continue to do this for 5-6 other body parts (or as long as children's attention span will allow.

10. Activity: Sound Listening Game (10 minutes)

Instructions:

a). Review the listening game with the following: *Remember that our world is filled with many sounds. We can listen to these sounds with our eyes closed* (demonstrate by clapping and closing our eyes) *or we can listen with our eyes open* (demonstrate by clapping and having eyes open). Repeat this again clapping with eyes closed and then open.

b) Provide time for students to practice this skill, e.g., *"I'm going to make some sounds now and I want you to tell me what noise I'm making. I want you to close your close eyes while I make these sounds. I'm going to make two sounds. I want you to tell me which two sounds I'm making. OK everyone, close your eyes and listen for the sound."*

Listed below are examples of possible sounds to use for this activity. Items to use to make these sounds are also provided in the kit. The focus of this activity today is to produce two sounds, and have the children respond with *"First we heard a _____, then we heard a _____."* Encourage children to raise their hands when they have an answer.

Create a sequence of three or four sounds, having the children identify the sequence.

"You've done a great job of listening to the sounds and telling me which sound comes first, and what comes next. Good for you. Listen to the sounds I'm going to make now" (create a sequence of three sounds. Have students identify the sequence of sounds.) *Now I'm going to try to trick you. I'm going to leave one of the sounds out. Which sound am I*

leaving out?" (Students identify the sound that has been left out.)

Repeat this activity 7-10 times or until the attention of the children starts to decrease, or they become increasingly restless.

knocking on the wall or table	clapping
blowing a whistle	hammering
clicking with the tongue	coughing
coloring hard on paper	scratching
crumpling paper	hitting blocks together
dropping a block	snapping fingers
rubbing hands together	tearing paper
stirring with a teaspoon	snapping fingers
sounds of your choice	

Observe the skills of the students, which students are comfortable with this skill, which students seem to be having challenges. Those who experience challenges will require individual assistance later in the lesson.

11. Surprise Bag (10 Minutes)

Instructions:

The purpose of this activity today is to provide an opportunity for the children to practice the skill of identifying beginning sounds for each object they pull from the bag. The emphasis continues to be on sounds (not naming the letters).

a) Demonstrate the activity by closing your eyes, putting your hand in the bag and taking a toy out. Say "Look what I found! I found a (label the toy), and talk about it (it is an animal/food/plant, etc.; it says meow, etc. we grow it in the garden, it is red, it is like a ball, etc.)

b) Ask the children to take turns in picking up a toy: "Now we are going to pick up a toy from the bag. Who would like to start?" Encourage the children to put their hand up to indicate that they want to participate. "Johnny, let's see what you get from the bag!" (Johnny should have his eyes closed when he searches in the bag). Talk about the toy that Johnny got, by asking him questions about it: "What is it? Is it yellow? Is it like a ball or like a block? Etc.

12. Snack Time (10-15 minutes)

Instructions:

a). Students remain in their small groups for snack time. Introduce students to the snack time by bringing out the foods

b) The children will have a choice between two types of fruit/vegetable and cereal. They will be asked what they wanted: banana or carrots. After they eat their fruit/vegetable, they will be asked if they wanted cereal

c) While children are eating, the instructor helps the students identify different sounds that we hear while eating and getting snacks ready (pouring, chewing, etc.), as well as different beginning sounds of words of snacks (grapes start with G, apples start with A etc).

13. **Play Time** (30 minutes)

Instructions:

a). When children have finished their snacks, invite them to participate in free play time. "Now we have some time for you to play at the activities. You may choose to go to the following activities (list the options for them.

b). While children are playing at the activities, instructor interacts with them one on one. Continue to promote the use of language similar to the first lesson, e.g., "What are you playing with here? What are you doing at this activity? What colour is this? What shape is this? What can you do with ? What do we do with? Where do we use, put this? Is the __ same / different?

a) Take one child at a time and repeat with them the sound identification lesson – "What sound is this?" For each of the three sounds; have the three graphemes on the table, ask "Which is A?" Mix the grapheme order in front of the child again, ask "Which is S?" and continue for three trials for each of the sounds (3 for A, three for M etc) We are now focusing only on sounds, no longer on the concept of same and different with objects, unless there are still some children who have not yet mastered this concept.

b) Repeat these activities for the all sounds learned to this point– S, M, A, T, B and O.

14. Wrap-Up

1. Use the same signal as in previous lessons, e.g., rhythm clapping(or flashing the lights) to gain the attention of the children. Ask the children to clean up their activities, and to return to the whole group area. Children put the name tags that are wearing in the middle, starting with the instructor who demonstrates the activity, matching their name tags with the ones that are on the floor.
2. Celebrate the learning and / or behaviour of the children today, e.g., *"You've done a great job today. We learned about beginning sounds. The first sound in banana is ____. The first sound we hear in mitten is ____. When we put "a" and "t" together, we get _______" Good job. Be sure to share this with mommy or daddy when you go home today. Let's finish our morning together by singing our good-bye song"*. (Use the CD provided in the kit, or lead the singing yourself.)