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Is Text Written for Children Useful for L2 Extensive Reading?

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The researchers completed a corpus-driven analysis of 688 texts written for children, language learners, and older readers to determine the vocabulary size necessary for comprehension and the potential to incidentally learn vocabulary through reading each text type. The comparison between texts written for different audiences may indicate their relative value for use in extensive reading programs. The results indicate that a vocabulary size of 10,000 words plus knowledge of the proper nouns and marginal words was required to know 98% of the words in both text written for children and text written for older readers. In contrast, a vocabulary size of 3,000 word families plus knowledge of the proper nouns and marginal words was necessary to know 98% of the words in text written for language learners. Repetition of words in Nation's (2006) 3rd to 14th 1,000-word lists was higher in the text written for language learners, followed by children's literature and then text written for adults. The findings indicate that the lexical load of text written for children is similar to that of text written for older readers, and that neither of these text types is as well suited as graded readers for second language extensive reading.
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Research has shown that extensive reading may lead to vocabulary learning (Day, Omura, & Hiramatsu, 1991; Dupuy & Krashen, 1993; Horst, 2005; Horst, Cobb, & Meara, 1998; Hulstijn, 1992; Pitts, White, & Krashen, 1989; Waring & Takaki, 2003), increased reading rate (Bell, 2001; Iwahori, 2008), interest and motivation towards reading (Cho & Krashen, 1994; Constantino, 1995; Macalister, 2008; Shin, 1998), and reading comprehension (Bell, 2001; Elley & Mangubhai, 1983). Texts written for children are often viewed as appropriate for extensive second language (L2) reading (Day & Bamford, 1998; Gardner, 2004, 2008; Kirschenmann, 2004; Mikulecky, 2009; Smallwood, 1998; Takase, 2009). Day and Bamford (1998) provide a strong case for their use in their seminal book on extensive reading:

> If a language lacks language learner literature, teachers can turn to a sure source of easy reading material that exists in almost every language: books designed to teach children their first language. The books . . . can add variety to any extensive reading library. This valuable resource should not be overlooked. (p. 98)

The primary justifications for incorporating text written for children into an L2 extensive reading programme is that it has fairly simple language, is appropriate in text length, and is interesting and motivating for some adult learners.

There are four more reasons why text written for children may be appropriate for extensive reading. First, they may be relatively easy to understand because they use a greater proportion of high-frequency words in comparison to other text types (Mikulecky, 2009). Although Mikulecky (2009) does not draw on any data to support this claim, he reports that texts written for children and young adults provide 98% coverage (the percentage of known words in a text) for intermediate-level L2 learners. Reaching the 98% coverage point is significant because it indicates adequate comprehension of first language (L1) and L2 text (Carver, 1994; Hu & Nation, 2000; Schmitt, Jiang, & Grabe, 2011). Second, children's stories typically contain a large number of illustrations that are likely to aid comprehension (Smallwood, 1998) and help to facilitate incidental vocabulary learning (Elley, 1989; Horst et al., 1998). Third, Smallwood (1998) suggests that children's literature, in comparison to other text types, has a greater degree of vocabulary and pattern repetition that helps learning and increases comprehension. It should also be noted that vocabulary repetition has the added benefit of contributing to incidental vocabulary learning (Chen & Truscott, 2010; Horst et al., 1998; Rott, 1999; Waring & Takaki, 2003; Webb, 2007). Fourth, children learn their first language through reading children's literature to some extent, so it stands to reason that these texts may also be useful for L2 extensive reading.

Research has also provided some justification for the use of text written for children in L2 learning. The *book flood* studies provide the strongest support for the use of children's literature. These studies involved young L2 learners reading illustrated children's stories extensively for a period of 1 to 3 years and resulted in significant improvement in reading comprehension, speaking, and writing (Elley, 1991). There is little research on the use of children's text with adult learners. Hitosugi and Day (2004) found that university students learning Japanese improved their reading comprehension through reading text written for Japanese children in a 10-week extensive reading program. The young adult learner of Japanese in Tabata-Sandom and

Macalister's (2009) case study was initially reluctant to read children's books but later reported enjoying them and that they reinforced her grammatical knowledge. Children's stories have also been found to motivate young L2 learners (Ghosn, 2002), and reading these texts aloud can also be motivating for college-level L2 learners (Khodabakhshi & Lagos, 1993).

Although the research cited so far provides some justification for using text written for children in extensive reading, it does not indicate that this text type is as well suited as texts written for extensive reading. To our knowledge there is no research that has compared the appropriateness of different text types for extensive reading.

There are several reasons why children's text may be less effective than graded reading materials that have been written specifically for extensive reading. First, the vocabulary in graded readers is written around sets of word families (a word family includes a base form and its inflections and derivations), which should provide a smaller lexical load than most forms of authentic text. Mikulecky (2009) argues that text written for children also uses a relatively simple vocabulary, but the vocabulary size necessary to understand children's literature has yet to be examined. It is intuitively logical that children's stories have a small lexical load because they are written to be understood by children. However, it should also be noted that the L1 vocabulary size of children may be much larger than it is for most L2 learners. Nation (2001) estimates that L1 vocabulary size increases at a rate of 1,000 word families per year for children, and Biemiller (2005) reports that 7-year-olds have an L1 vocabulary size of approximately 6,000 root words. A root word is the base form of a word which, if understood, may allow comprehension of inflected and derived forms. For example, if the root word *focus* is known then *focused*, *focuses*, and *refocus* may also be understood if learners have knowledge of word parts. In comparison to L1 vocabulary learning, many L2 learners have difficulty learning the most frequent 2,000 word families.

The much larger vocabulary size of young L1 learners in comparison to L2 learners is the second reason that children's literature may not be well suited for extensive reading. The larger vocabulary size of L1 readers makes children's text much easier to understand because research has shown that the percentage of known words in a text is the biggest factor in whether text is understood (Laufer & Sim, 1985).

A third reason why text written for children may not be appropriate for extensive reading is that it contains age-specific vocabulary that is more likely to be known by young L1 learners than by L2 learners (Webb & Rodgers, 2009a). Learning high-frequency words is prioritized in L2 vocabulary learning because these items are encountered and used on a day-to-day basis and therefore have the greatest value to

students (Nation, 2001, 2008). However, this is not the case in L1 learning because the high-frequency words are already likely to be known by children by the time they start to read. Instead there may be greater emphasis placed on learning lower frequency topic-related words that help to expand a child's vocabulary beyond 5,000 word families. These words may not be known to older L2 learners, nor are they of similar value to the more frequently occurring items.

How Can We Determine the Vocabulary Size Necessary for Comprehension of Text Written for Children?

Corpus-driven research investigating the lexical demands of text is well established. Studies have examined the number of words necessary for comprehension of spoken discourse (Adolphs & Schmitt, 2003; Meara, 1991, 1993; Nation, 2006); movies (Nation, 2006; Webb & Rodgers, 2009b); television programs (Rodgers & Webb, 2011; Webb & Rodgers, 2009a); and different types of written discourse such as novels (Hirsh & Nation, 1992), comic books (Meara, 1993), graded readers (Nation, 2006; Wodinsky & Nation, 1988), and the *New Zealand School Journal* (hereafter, *School Journal*; Macalister, 1999). The methodology used in this type of research involves calculating the number of words that are required to reach certain coverage (the percentage of known words), figures that indicate whether or not learners may comprehend the text. It is difficult to understand discourse if you do not know the words that are used, so the higher the coverage, the more likely the text will be understood.

Many other factors are involved in comprehension of a text, such as background knowledge (Leeser, 2007; Pulido, 2004; Stahl, Hare, Sinatra, & Gregory, 1991; Stahl & Jacobson, 1986; Stahl, Jacobson, Davis, & Davis, 1989), individual differences in reading ability (Mezynski, 1983), the relevance of unknown vocabulary in the text (Hulstijn, 1993; Stahl, 1990), the ability to derive word meanings from context (Hulstijn, 1993; Stahl, 1990), and the amount of redundant information in the text (Kameenui, Carnine, & Freschi, 1982). However, coverage may have the greatest effect on comprehension (Laufer & Sim, 1985). A similar argument can also be made for readability, with some measures of readability based to a large degree on vocabulary (Elley, 1969; Fry, 1969, 1977; Klare, 1963).

The coverage necessary for comprehension may vary between discourse types and the degree of understanding required. Laufer (1989) found that 90% coverage provided poor understanding and that 95% coverage provided reasonable understanding of an L2

academic text. In contrast, Hu and Nation (2000) found that few L2 learners had adequate understanding at 90% coverage, more learners had adequate comprehension at 95% coverage, and at 100% coverage most learners were able to understand a relatively easy text without use of a dictionary or glossary. Using regression analysis, Hu and Nation determined that 98% coverage provided adequate comprehension of the text and suggest that greater coverage of texts is needed for newspapers and academic texts. Hu and Nation's findings are supported by Schmitt et al. (2011). In a comprehensive analysis of the relationship between coverage and text comprehension, they found a relatively linear relationship between the two; as coverage increased, so did comprehension. Although Schmitt et al. suggest 98% coverage is necessary for extensive reading, they also found no precise level of coverage that provided a lexical threshold signalling comprehension.

Taken together, the research on coverage indicates that 98% coverage should be the prerequisite for unassisted reading. Thus, determining the vocabulary size that provides 98% coverage of text written for children should indicate the suitability of these texts for extensive reading. Gardner (2004) and Macalister (1999) conducted the only studies to provide data on the frequency of the vocabulary in text written for children. Macalister found that knowledge of the 2,000 most frequent word families provided approximately 85% coverage of texts written for children of four different ages from the *School Journal*. Similarly, Gardner found that the most frequent 3,185 word families accounted for approximately 89% of a corpus of 56 texts (28 narratives and 28 expository texts) written for 10- and 11-year-olds. Neither of these corpus-based studies investigated the vocabulary size necessary to reach 98% coverage. However, the findings indicate that a relatively large vocabulary size is needed to reach 98% coverage of children's literature, which suggests that texts written for children might not be appropriate for L2 extensive reading. Our first research question aims to shed more light on this issue.

What Is the Vocabulary Learning Potential of Reading Children's Text?

Corpus-driven research has also investigated the potential for incidental vocabulary learning through encountering language in different text types. Studies have examined the vocabulary learning potential of graded readers (Cobb, 2007; Nation & Wang, 1999; Wodinsky & Nation, 1988), movies (Webb, 2010), newspaper articles (Hwang & Nation, 1989; Schmitt & Carter, 2000), television programs (Webb & Rodgers, 2009a), teacher talk (Horst, 2009; Meara, Lightbown, & Halter,

1997), and different types of written text (Cobb, 2007; Macalister, 1999). This line of research involves counting the number of times that words likely to be unknown are encountered in a text. Unknown words are typically operationalized in these studies as items that are beyond the frequency level that the learners have mastered.

Incidental vocabulary learning research has shown that the frequency of encounters with unknown words during reading affects learning. Learning rarely occurs after a single encounter; however, as the number of encounters increases, the potential to learn items increases (Chen & Truscott, 2010; Horst et al., 1998; Jenkins, Stein, & Wysocki, 1984; Rott, 1999; Saragi, Nation, & Meister, 1978; Waring & Takaki, 2003; Webb, 2007). Findings have varied among studies. Rott (1999) found that six encounters was sufficient, whereas Waring and Takaki (2003) found that more than 20 encounters was necessary to learn words incidentally. Factors that may account for these differences are the amount of information in the texts used to infer the meanings of target words (Webb, 2008) as well as the proficiency of the learners (Zahar, Cobb, & Spada, 2001).

Corpus-driven research on the vocabulary learning potential of text written for children in English is limited. Gardner (2004, 2008) compared the frequency of words in expository and narrative texts written for 10- and 11-year-olds. He found that there was greater word repetition in the expository texts, indicating that this text type may lead to superior incidental vocabulary learning. Macalister (1999), however, found that imaginative rather than informative texts provided greater opportunity for incidental vocabulary learning. Informative texts tend to be content specific; for instance, in an article about poultry, the word type *hen* may be encountered multiple times but be unlikely to be met again in articles on other topics. Imaginative prose texts, on the other hand, tend to draw on the language of storytelling; in writing for children, for example, the word type *monster* is encountered in multiple texts. The difference between the findings in the two studies can be explained by the characteristics of the corpora. Macalister's corpus was made up of multiauthored narrative fiction and informative texts with varying themes, whereas Gardner's corpus was made up of single-authored and tightly themed texts. One comparison that is yet to be examined is between text written for children and text written for older readers. Because a lot of children's reading material is written to promote vocabulary learning, there might be greater repetition of less frequent words. If this were true, then it would indicate that text written for children might have greater value as a source of incidental vocabulary learning than text written for older readers and provide justification for its use in extensive reading programs. Our second research question aims to shed light on this issue.

The Present Study

The aim of this study was to determine the lexical demands of text written for children. A comparison between three text types (text written for children, for older readers, and for L2 learners) may reveal the suitability of children's literature for extensive reading and indicate how it might best be used in the language learning classroom. The lexical demands of text are indicated by the vocabulary size necessary for comprehension of the text and the number of encounters with unknown words. Specifically, this study may shed light on the vocabulary size necessary for adequate comprehension of text written for children and the potential for incidental vocabulary learning through reading children's text.

RESEARCH QUESTIONS

The current study seeks to address the following four research questions:

1. What is the vocabulary size necessary to reach 98% coverage of text written for children?
2. Does knowledge of 2,000 high-frequency word families offer more coverage of text written for children than it does of graded readers and text written for older readers?
3. Is the vocabulary size necessary to reach 98% coverage the same for texts written for younger and older readers?
4. To what extent are low-frequency words encountered in text written for children, graded readers, and text written for older readers?

METHOD

Materials

This study used 688 texts written for children, language learners, and older readers. The sets of texts that were written for each of these types of readers made up three corpora, each consisting of 285,143 tokens, for a total of 855,429 tokens. The composition of each corpus is shown in Table 1. It was important to use an equivalent number of tokens in each corpus in order to provide a valid measurement of the number of encounters with low-frequency words in the different text types. The

number of tokens in the children's corpus is a function of the relatively short length of texts written for children. However, the sample size (517 texts) is consistent with well-established corpora such as the Brown Corpus and the Lancaster Oslo Bergen Corpus, and should provide a valid representation of texts read by young L1 readers.

This study analyzed 517 texts written for young L1 readers. The texts consisted of all readings from 4 years (60 issues) of the *School Journal* from 1997 to 2000. The *School Journal* is a collection of stories, articles, poems, and plays written for children ranging from 7 to 13 years of age and has been distributed by the New Zealand Ministry of Education since 1907. The *School Journal* has included works by many well-known New Zealand authors and illustrators, and has a primary aim of developing a love of reading in children. It has four parts, with each part written for a specific age range. Part 1 has five issues per year and is written for 7–8-year-olds. Part 2 has four issues a year and is written for 8–9-year-olds. Part 3 is written for 9–11-year-olds, and Part 4 is written for 11–13-year-olds. Parts 3 and 4 have three issues per year. Each issue contains six to nine texts. Although the vocabulary is not controlled, the different parts of the *School Journal* provide a form of graded reading. Grading is most obviously achieved through controlling the length of texts and textual features such as the amount of white space. The guidelines also ask authors to consider the New Zealand national reading standards and aim to contribute texts that are at the appropriate level for the intended age range. As an example of what this may mean in practise, the standards suggest that 8-year-olds should be able to read texts with a straightforward text structure and are expected to have developed automaticity with high-frequency vocabulary; 2 years later, students are meeting mixed text types and being exposed to quantities of unfamiliar words, including academic vocabulary.

The vocabulary in 33 graded readers from the Oxford Bookworm series was also analysed to compare the lexical demands of texts written for L2 learners with L1 texts written for children. The vocabulary in the readers is controlled, with the greater range of vocabulary found in readers at higher stages. The 33 readers consisted of nine Stage 1 readers, ten Stage 2 readers, seven Stage 3 readers, and seven

TABLE 1
Composition of the Corpora

Corpus	Target readers	Number of texts	Number of tokens
School Journal	L1 children	517	285,143
Graded readers	L2 learners	33	285,143
Wellington Written Corpus	L1 adult	138	285,143

Stage 4 readers. Each set of readers at a stage was matched for tokens with the four parts of the *School Journal* to allow comparison between L1 texts written for children of different ages and L2 texts written for learners at different levels. This meant that not all of the tokens in any one graded reader at each stage were included. In these texts, running words were included from the start of the graded reader until the total number of tokens for that stage was the same as the corresponding part of the *School Journal*. Thus, to some extent the end of those graded readers was not included. It was important to use a similar number of tokens in the comparisons because the number of tokens affects the number of encounters with words in each set.

This study analyzed 138 texts from the Wellington Written Corpus (WWC; Bauer, 1993) to allow comparison between the L1 texts written for children (7–11 years of age) in the *School Journal* with texts written for older readers (12 years of age and older) in the WWC. The texts were all approximately 2,000 tokens and were taken from the Press: Reportage section, which was made up of New Zealand newspaper articles, and Fiction, which was made up of samples of New Zealand books in print. The sampled texts from the WWC provided a useful comparison with texts from the *School Journal* because they included both imaginative and informative prose for readers in the same community but for a different intended audience—older readers.

Analysis

RANGE (Nation & Heatley, 2002) was used to analyse the vocabulary in the texts. RANGE is software which classifies the words in a text by their frequency. Nation's (2006) lists of word families ranging from the 1,000- to 14,000-word levels were used with RANGE to show the 1,000-word level in which the words in the texts occurred. The lists were derived from the range of occurrence and frequency of words in the British National Corpus (BNC). Table 2 shows examples of headwords found in the first, second, fifth, eighth, and tenth lists.

The word families in the lists include more than 80 derivational affixes as well as inflections (Nation, 2006). Words that are less frequent than those in the 14,000-word level were categorized as *Marginal Words*, *Maori*, *Proper Nouns*, and *Not in the Lists*. A list of Maori words was created and used together with the BNC lists because of the presence of Maori in both the *School Journal* and the WWC. Including a list of Maori words allowed for a more accurate classification of the lowest frequency words. The *Proper Nouns* list includes more than 13,000 entries, but this will rarely capture all the proper nouns in multiple texts. A number of proper nouns will be incorrectly categorized by

TABLE 2
Headwords From Nation's (2006) British National Corpus Word Lists

1st 1,000 word level	2nd 1,000 word level	5th 1,000 word level	8th 1,000 word level	10th 1,000 word level
safe	sack	saddle	sadist	Sabbath
sale	sad	saga	safari	sabre
same	sail	salad	saliva	sacrilege
Saturday	sake	sanction	salon	sacrosanct
save	salary	sarcastic	saloon	salami

RANGE as *Not in the Lists* (less frequent than the 14,000-word level). These items were recategorised as proper nouns and included in the *Proper Nouns* totals. Because many hyphenated words such as *part-time*, *short-tailed*, and *remote-controlled* were found in *Not in the Lists*, the hyphens were removed and those words were reclassified according to the frequency of their single-word items.

Word families were considered to be an appropriate unit of counting because the research questions in this study examine the appropriateness of children's stories for language learners who have already developed a vocabulary size that would enable them to take part in an extensive reading program. Research indicates that knowledge of one member of a word family facilitates recognition of other members of the word family (Bertram, Laine, & Virkkala, 2000; Nagy, Anderson, Schommer, Scott, & Stallman, 1989; Wysocki & Jenkins, 1987). For example, if the word *safe* is known, a reader may be able to recognize that *safely*, *safer*, *safest*, *safety*, and *unsafe* convey related meanings if they are encountered in a text.

The cumulative coverage of the different types of text (*School Journal*, graded readers, WWC) was calculated to determine the vocabulary size necessary for comprehension. The cumulative coverage shows how many words a reader needs to know to reach the 98% coverage point that is associated with adequate comprehension. The cumulative coverage of the different parts of the *School Journal* was also compared with the four stages of graded readers to examine whether texts written for children use a wider range of words at higher age levels in the same manner that graded readers use a wider range of words at higher stages. The coverage of the proper nouns and marginal words (e.g., *ah*, *oh*, *huh*) that occurred in the texts was included in the calculation of coverage. This is because they may have a lower learning burden and be more easily learned (Nation, 2006). Learners taking part in extensive reading should have developed the ability to recognise proper nouns in text because they are typically clearly marked by the capitalisation of the first letter.

To determine the potential for incidental vocabulary learning in text written for children, the number of encounters with words outside the 2,000 most frequent word families was examined. This included all items in the 3rd to 14th 1,000-word lists plus the words less frequent than the 14th 1,000-word list found in *Not in the Lists*. The reason that words in the first and second 1,000-word lists were not included in this analysis was that most learners in extensive reading programs are likely to be familiar with these high-frequency items, whereas the words in the other lists are much more likely to be unknown.

RESULTS

The cumulative coverage, including proper nouns and marginal words for the three corpora, which was the focus of Research Questions 1 and 2, is shown in Table 3. The 83.25% in the top cell of *School Journal* is the sum of 79.57% (the coverage of the most frequent 1,000 words), 3.47% (proper nouns), and 0.21% (marginal words). The final row of the table reveals that each of the three corpora consisted of 285,143 tokens. Including proper nouns and marginal words, the vocabulary size required to reach 98% coverage was 10,000 word families for the *School Journal* and the WWC. In contrast, only 3,000 word families plus proper nouns and marginal words was necessary to reach 98% coverage

TABLE 3
Cumulative Coverage, Including Proper Nouns and Marginal Words of the *School Journal*, Graded Readers, and Wellington Written Corpus (WWC)

Word list	*School Journal*	Graded readers	WWC
1,000	83.25	91.06	82.43
2,000	89.88	96.73	89.76
3,000	93.21	98.52*	92.91
4,000	94.94	98.99	94.82
5,000	96.08	99.26	96.00
6,000	96.83	99.46	96.73
7,000	97.30	99.56	97.25
8,000	97.63	99.64	97.65
9,000	97.89	99.70	97.98
10,000	98.07*	99.76	98.24*
11,000	98.21	99.78	98.50
12,000	98.32	99.79	98.65
13,000	98.4	99.82	98.79
14,000	98.45	99.83	98.87
Proper nouns	3.47	4.02	3.11
Marginal words	0.21	0.12	0.08
Not in the lists	1.31	0.17	0.99
Total tokens	285,143	285,143	285,143

*The lexical coverage recommended for adequate text comprehension.

of the graded readers. Similarity between the vocabulary in the texts written for older readers and children is apparent in the first two rows of the table. A vocabulary size of 1,000 word families plus proper nouns and marginal words provides 82.43% and 83.25% coverage for the WWC and the *School Journal*, respectively, and both text types are approaching 90% coverage at the 2,000-word level. In contrast, a vocabulary size of 1,000 word families plus proper nouns and marginal words provides 91.06% coverage of the graded readers at the 1,000-word level and 96.73% coverage at the 2,000-word level. The percentage of proper nouns was highest for the graded readers and was above 3% in all three text types. Because there is a large amount of research showing graded readers to be effective extensive reading material, and the percentage of proper nouns is higher in these texts, language learners may quickly develop the skills to recognise and understand proper nouns to some degree. This is likely to allow readers to process the text more easily when they encounter unknown proper nouns rather than other unknown words. However, it may not necessarily mean that they acquire these words in the same way as content words, because proper nouns are often context specific and may thus have very different encounter rates than content words. Table 3 also shows that there was a greater percentage of words found in *Not in the Lists* for the *School Journal*. This was due to a higher proportion of low-frequency words beyond the 14,000-word level, such as *tyrannosaurus*, *meow*, *scruffle*, *meerkat*, *megastar*, and *tomahawk,* that may reflect a range of topics that is uncommon in text written for older readers.

Tables 4 and 5 show the cumulative coverage, including proper nouns and marginal words, for the four parts of the *School Journal* corpus and the four stages of the graded reader corpus. The final row in each table reveals an identical number of tokens in the four parts and their corresponding stages. The third research question focused on the issue of the vocabulary size necessary to reach 98% coverage of text written for younger and older readers. The vocabulary size necessary to reach 98% coverage in the *School Journal* decreased from 11,000 word families in Parts 1 and 2 to 10,000 in Part 3 and 9,000 in Part 4. In contrast, the vocabulary size needed to reach 98% coverage of the graded readers was 3,000 word families for each of the four stages.

As for the issue of the extent to which low-frequency words are encountered in the different text types, which was the focus of the fourth research question, Table 6 shows the number and percentage of encounters with low-frequency word families in each corpus. Analysis of the texts reveals that most word families in these lists were only encountered once. Forty-two percent of items (2,171 word families) in the *School Journal*, 27% of items in the graded readers (274 word families), and 47% of items in WWC (3,694 word families) were

TABLE 4

Cumulative Coverage, Including Proper Nouns and Marginal Words of the Four Parts of the *School Journal* Corpus

Word list	Part 1	Part 2	Part 3	Part 4
1,000	82.85	83.47	82.93	83.49
2,000	89.23	89.78	89.60	90.41
3,000	92.38	93.14	93.05	93.72
4,000	94.26	94.76	94.82	95.44
5,000	95.57	95.95	96.00	96.45
6,000	96.75	96.60	96.64	97.14
7,000	97.14	97.16	97.12	97.58
8,000	97.51	97.50	97.56	97.82
9,000	97.72	97.73	97.89	98.09*
10,000	97.97	97.87	98.12*	98.23
11,000	98.07*	98.00*	98.29	98.36
12,000	98.18	98.08	98.37	98.51
13,000	98.26	98.18	98.44	98.60
14,000	98.35	98.22	98.47	98.65
Proper nouns	4.06	4.09	3.47	2.80
Marginal words	0.24	0.25	0.20	0.16
Not in the lists	1.39	1.51	1.29	1.17
Total tokens	48,062	63,535	70,477	103,069

*The lexical coverage recommended for adequate text comprehension.

TABLE 5

Cumulative Coverage, Including Proper Nouns and Marginal Words of the Four Stages in the Graded Reader Corpus

Word list	Stage 1	Stage 2	Stage 3	Stage 4
1,000	91.70	91.33	90.65	90.87
2,000	96.62	97.28	96.68	96.47
3,000	98.35*	98.65*	98.77*	98.33*
4,000	98.82	98.95	99.19	98.94
5,000	99.14	99.29	99.40	99.17
6,000	99.44	99.49	99.53	99.37
7,000	99.48	99.57	99.61	99.53
8,000	99.49	99.62	99.75	99.62
9,000	99.60	99.68	99.77	99.70
10,000	99.75	99.76	99.80	99.74
11,000	99.76	99.81	99.83	99.75
12,000	99.77	99.82	99.84	99.76
13,000	99.82	99.84	99.85	99.79
14,000	99.83	99.85	99.85	99.80
Proper nouns	4.55	4.31	3.59	3.87
Marginal words	0.23	0.10	0.14	0.08
Not in the lists	0.17	0.16	0.13	0.22
Total tokens	48,062	63,535	70,477	103,069

*The lexical coverage recommended for adequate text comprehension.

encountered once. The analysis also shows that the graded readers provide the greatest repetition of word families found in these lists. Twenty-four percent of items (242 word families) were encountered 10

TABLE 6
Number and Percentage of Encounters for Word Families Outside of the Most Frequent 2,000 Word Families

	School Journal		Graded readers		Wellington Word Corpus	
	Amount	%	Amount	%	Amount	%
1 encounter	2,171	42%	274	27%	3,694	47%
2 encounters	752	14%	135	13%	1,307	17%
3–4 encounters	782	15%	153	15%	1,172	15%
5–7 encounters	529	10%	157	15%	747	10%
8–9 encounters	197	4%	63	6%	286	4%
10+ encounters	756	15%	242	24%	643	8%
Total word families	5,187		1,024		7,849	

or more times in the graded readers, 15% (756 word families) were encountered 10 or more times in the *School Journal*, and 8% (643 word families) were encountered at that frequency in the WWC.

DISCUSSION

In answer to the first research question, the results indicate that readers need to know the most frequent 10,000 word families plus proper nouns and marginal words to reach 98% coverage of the *School Journal*. This suggests that the vocabulary found in texts written for children is likely to be challenging for most language learners, that comprehension of children's texts is likely to be poor without learning support, and that these texts may not be appropriate for L2 extensive reading.

In answer to the second research question, the analysis shows that the *School Journal* had coverage levels very similar to those of the samples of text written for older readers from the WWC. Including proper nouns and marginal words, coverage of the first 1,000 word families was 83.25% and 82.43% for the *School Journal* and the WWC, respectively. Coverage of both corpora approached 90% at the 2,000-word level and reached 96% at the 5,000-word level. In contrast, coverage of the graded readers reached 91% at the 1,000-word level, 96% at the 2,000-word level, and 98% at the 3,000-word level. The much smaller vocabulary size necessary to reach 98% coverage of graded readers indicates that they are much better suited for L2 extensive reading than the other text types.

In answer to the third research question, the results indicate that the vocabulary size necessary to reach 98% coverage may decrease as the age of the children the text is written for increases. The analysis shows that 11,000 word families plus proper nouns and marginal words were necessary to reach 98% coverage of Parts 1 and 2 of the *School Journal*, 10,000

word families plus proper nouns and marginal words were necessary to reach 98% coverage of Part 3, and 9,000 word families plus proper nouns and marginal words were necessary to reach 98% coverage of Part 4. Contrary to what might be expected, the lexical demands of the text written for younger children (Part 1) were highest, whereas the text written for the oldest children was lowest (Part 4). This finding was consistent at all 14 1,000-word levels. The reason for this may be that texts written for children contain many words such as *fairy*, *pirate*, *monster*, and *dragon* that are less common in text written for older readers. These words may represent a children's genre-specific vocabulary that is highest in texts written for younger children and gradually decreases as the age the texts are written for increases.

In contrast, 3,000 word families plus proper nouns and marginal words were necessary to reach 98% coverage at all four levels of the graded readers. The fact that there was no difference in the vocabulary size necessary to reach 98% coverage in the four stages of graded readers is surprising because it might be expected that the vocabulary size necessary to reach 98% would increase from Stage 1 to Stage 4. The analysis did show that coverage at the 1,000-word level was highest for the easiest graded readers (Stage 1 = 91.70%) and lowest at the most difficult level (Stage 4 = 90.88%). However, coverage was inconsistent between the four stages at the 2,000- and 3,000-word levels. Because graded readers are written around specific sets of headwords, this may indicate that the increase in headwords that follows Stage 1 primarily consists of high-frequency words. It may also indicate that if learners are able to meet the lexical demands of texts at Stage 1, they may be able to make rapid progress to Stage 4.

The comparison between the four levels of the two corpora provides further evidence that text written for children may be a poor substitute for graded readers in extensive reading. In fact, the findings show that if learners were to work through the first four stages of graded readers in an extensive reading program, they would still not come close to reaching the vocabulary size necessary to reach 98% coverage of texts written for children. The analysis indicates that the first four levels of graded readers would help readers primarily learn the first 3,000 word families. However, the vocabulary size necessary to read the *School Journal* was 10,000 word families. Similarly, Cobb's (2007) analysis of a larger graded reader corpus made up of 54 texts from all six stages indicates that if learners were to read all of these texts, there would not be sufficient encounters with the items in the third most frequent 1,000-word list to incidentally learn them all. Both findings suggest that if text written for children were included in an extensive reading library, graded readers alone would not be sufficient to get learners to the vocabulary size necessary for unassisted reading of children's texts.

In answer to the fourth research question, the results indicate that there is greatest repetition of lower frequency word families in graded readers, followed by the *School Journal*, and then the WWC. In the analysis of word families outside the high-frequency words, there was a higher percentage of word families encountered 10 or more times and a smaller percentage of word families encountered once in the graded readers than in the other two text types. However, the results also suggest that text written for children might be a more effective text type for incidental vocabulary learning than text written for older readers. The percentage of word families encountered 10 or more times was 24% in the graded readers, 15% in the *School Journal*, and 8% in the WWC. In fact, the percentage of words with three to four, five to seven, and eight to nine encounters was the same or higher for the graded readers than the other text types. In contrast, the percentage of words encountered only once was 47% in the WWC, 42% in the *School Journal*, and 27% in the graded readers.

It should also be noted that, although the percentage of word families encountered 10 or more times is much higher in the graded readers, the number of word families that were encountered 10 or more times was much smaller than in the other two text types. Only 242 word families were encountered 10 or more times in the graded readers, whereas 756 and 643 word families were encountered at this frequency in the *School Journal* and the WWC, respectively. The reason for this is that there is a large difference between the percentage of high-frequency words in the graded readers and the other two text types. Because graded readers are written with a controlled vocabulary with relatively few items outside of the high-frequency words, if a lower frequency word is found in a text it is likely to be repeatedly encountered. This is true in a single graded reader and between graded readers at the same level (Wodinsky & Nation, 1988), as well as between graded readers at different stages (Nation & Wang, 1999). Thus, graded readers may be extremely efficient in contributing to incidental vocabulary learning of the lower-frequency words. The higher number of repetitions in the other two corpora indicates that if learners have the vocabulary size necessary for comprehension of texts written for children and older readers, and the texts are read extensively, then greater incidental vocabulary learning is likely to occur.

Why is a surprisingly high proportion of lower frequency vocabulary frequently encountered in text written for children? It is likely due to a difference in high-frequency vocabulary between text written for older readers and text written for children. First it is important to note that the BNC word lists used in the analysis were derived primarily from formal written text (Nation, 2006). This means that the lists may provide a valid representation of the vocabulary that will be encoun-

tered in written text by adults rather than children. Although there is likely to be a reasonable degree of overlap in the high-frequency vocabulary for children and adults, there are also likely to be some differences. These differences were apparent when looking at word families outside of the high-frequency words that were encountered 10 or more times in the *School Journal*. A large number of these items were examples of animals, fish, birds, and insects, such as *monkey*, *elephant*, *hedgehog*, *shark*, *shrimp*, *mussel*, *eagle*, *penguin*, *gannet*, *ant*, *flea*, and *caterpillar*. The large number of these items and the fact that some of these are particularly infrequent in the BNC (*gannet*, *tortoise*, *mussel*, and *wallaby* are not found in the most frequent 10,000 word families) suggests that topics related to wildlife are common to texts written for children. This is supported by frequently occurring items in the *School Journal* related to the natural environments where wildlife is found, such as *lagoon*, *reef*, *vine*, *twig*, and *nest*, as well as words which might be used in a description of wildlife, such as *claw*, *fluffy*, *fur*, *buzz*, and *tame*. Another set of frequently occurring semantically related words that was clearly apparent was character types that are common to children's stories such as *fairy*, *robot*, *alien*, *pirate*, *monster*, *ghost*, *princess*, *prince*, and *dragon*.

The relatively high number of encounters with lower frequency words in the *School Journal* provides support for claims that a large proportion of L1 vocabulary learning occurs through reading. Despite the relatively short length of children's text, frequent repetition of topic-related vocabulary may allow young L1 learners to make rapid progress in vocabulary development. It could be argued that using children's text might also be valuable for L2 extensive reading. This could be true for young L2 learners who are likely to learn with age-specific topics and be motivated to learn age-appropriate vocabulary. However, there are two reasons to reject this argument for adult learners. First, the lower percentage of high-frequency words indicates that comprehension of text written for children will be more challenging than with graded readers. Second, the vocabulary that is most likely to be learned incidentally has relatively low value in comparison to higher frequency words.

Corpus-driven studies on vocabulary clearly demonstrate the relative value of words. The 2,000 high-frequency words have the greatest value to learners, followed by academic vocabulary and vocabulary that fills a need for learners (Nation, 2008). This is because approximately 80%–90% of spoken discourse and 70%–80% of written discourse is made up of high-frequency words. Thus, knowledge of these items is central to understanding and using English. Academic vocabulary also has high relative value because it represents approximately 10% of the words found in academic written text (Coxhead, 2000). Graded readers are made up of a much higher percentage of high-frequency vocabulary than other text types, helping learners to increase their

knowledge of these items. The results reveal that the high-frequency words accounted for 96.73% of the running words in the graded readers, whereas these items accounted for 89.88% in the *School Journal*. The difference between these two percentages is far from insignificant. Schmitt et al. (2011) found that each 1% increase in coverage between 90% and 100% represented an increase of 2.3% on a combined measure of comprehension made up of a multiple-choice test and graphic-organizer task. In this case that would be an increase of approximately 16%. The effort to read a text with support from a dictionary is also considerable at such a low coverage figure. One out of every 10 words is unknown at 90% coverage. On a page of 200 running words, this means that 20 words may be unknown. If learners need to read 30 pages, then it may require looking up hundreds of words, making the reading task both impractical and discouraging.

A stronger argument can be made for using text written for children in intensive reading rather than extensive reading. The greater amount of repetition in children's text than in text written for older readers may help teachers identify key unknown words and focus on these items in prereading activities to increase comprehension. Carefully selecting text with related themes may also allow teachers to build units around specific topics and allow language learners to consolidate their vocabulary knowledge in subsequent readings. If electronic versions of children's texts are available, RANGE together with the BNC word lists can be used to examine coverage levels and identify topic-related words in a single text and up to 28 texts at one time. Webb and Nation (2008) outline how this procedure can be used for evaluating the vocabulary in texts.

Limitations

The present study examined one factor (vocabulary) related to texts written in English for children. Although research indicates that vocabulary knowledge may be the most important factor in determining whether a text is understood (Laufer & Sim, 1985), it is not the only factor. Two other factors that may have a positive effect on comprehension of text written for children are background knowledge and illustrations. Many language learners are likely to be familiar with the content found in text written for children because of the L1 texts that they read when they were children. Although the content may vary between cultures, there is likely to be some overlap in topics that may help to facilitate comprehension. Texts written for children also tend to have a large number of illustrations, although this is likely to vary between texts, text types (fiction and nonfiction), and the age of

the children the texts are written for. Often the illustrations may help readers decipher key vocabulary in the texts, increasing the potential for vocabulary learning (Elley, 1989; Horst et al., 1998). Examining the relationship between the illustrations and the vocabulary in text written for children would be a useful follow-up to this study. A corpus-based approach might be modified to include illustrations in the analysis to determine the degree to which they may have an impact on vocabulary learning. A study comparing vocabulary learning through extensive reading with texts that include illustrations and the same texts with the illustrations removed may also shed light on the effects of this factor. Empirical research comparing the extent to which text written for children, graded readers, and text written for older readers are understood by learners of varying vocabulary sizes, as well as the degree to which unknown words are learned incidentally through reading these texts, would also be useful follow-up studies.

CONCLUSION

The present study drew on empirical research investigating the effects of coverage on comprehension (Hu & Nation, 2000; Laufer, 1989; Schmitt et al., 2011) and built on corpus-based studies examining the number of words necessary for comprehension of different text types (Adolphs & Schmitt, 2003; Meara, 1991, 1993; Nation, 2006; Webb & Rodgers, 2009a, 2009b). The results indicate that the lexical demands of children's literature may be similar to those of text written for older readers and that children's literature may be more appropriate for intensive rather than extensive reading. On the other hand, the findings provide strong evidence that graded readers should be used in extensive reading. Graded readers have a relatively small lexical load that increases the chances that they will be understood by language learners. This study also demonstrates the value of examining the texts used for extensive reading, because the suitability of text types may vary, and determining the most appropriate extensive reading material may increase the chances that learners will read and continue to read widely.

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