

A Close Examination of Vocabulary in Japanese EFL Textbooks

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For EFL learners, most of whom receive little English input outside the classroom, textbooks possibly serve as the main source of English input; thus, the improvement of textbooks can contribute to the advancement of learners' English skills. This study investigates vocabulary appearing in Japanese EFL senior high school textbooks by comparing them with the New General Service List (NGSL). Vocabulary in textbooks is assessed by calculating the coverage of textbooks by the NGSL and that of the NGSL by textbooks. Additionally, the distribution of NGSL words in textbooks across five 560-word frequency bands is investigated. Results show that textbooks are largely composed of NGSL words but cover a narrow variety of them. The distribution analysis identifies that most of the textbooks do not fully cover even the first 560-word level; none of the textbooks cover even half of each of the other four frequency bands. Finally, pedagogical implications are discussed.

授業で使われている教科書は主要な英語のインプット源であるため、その改善により学習者の英語力向上に貢献することができる。本研究は高校生英語検定教科書に使用されている語彙をNew General Service List (NGSL)と比較して調査した。その際、NGSLが教科書に占める割合を求めた。加えて、教科書にしようされているNGSLの語彙が、560語毎に分割した5つのレベルにどのように分布するのをも調査した。結果として、教科書で使われている語彙の大部分はNGSLの単語で構成されているが、それらはNGSLのごく一部であることが示された。しかも、最初の560語レベルでさえ十分に網羅されておらず、残りのレベルの語彙に関して、それぞれ半分以上網羅出来ている教科書はないことが判明した。本稿の締めくくりとして教育的意義が議論された。

In reaction to an increasingly globalized society, the revision of the Course of Study Guidelines in Japan demonstrates a strong awareness of the necessity of improving learners' English skills regardless of their intended occupations, since English is used in more situations than ever (the Ministry of Education, Culture, Sports, Science and Technology [MEXT], 2017a, b, 2018). To cultivate students' English skills, one area in which researchers can contribute is the development of textbooks in ways that can teach English more effectively because for EFL learners, sources of English input are limited, indicating that textbooks used in classrooms possibly serve as its main source.

This study investigated vocabulary, whose essentialness in language learning has long been acknowledged by researchers (Nation, 2013). According to Nation (2006), a reasonable learning target for nonnative speakers is to achieve vocabulary thresholds where comprehension occurs for the English texts in which they are interested. From the standpoint of vocabulary teaching, the primary role of textbooks is thus to widen learners' vocabulary size to meet the necessary requirements for comprehension, motivating the current study to examine what percentage of high-frequency words were treated in MEXT-approved textbooks used in senior high schools (hereafter, SH). Additionally, it was calculated what percentage of words in SH textbooks were high-frequency words.

Literature Review

High-Frequency Words

High-frequency words are those that frequently occur in a wide range of contexts. For this study, I purposefully considered the 2,801 most frequent words in general English of the New General Service List (NGSL) to be high-frequency words (Browne et al., 2013). According to the website of the NGSL (Browne, n.d.), the lexical coverage of general English texts provided by successive frequency-ranked words decreases sharply after

the first 2,801 words of the NGSL; therefore, they seem to be a reasonable cut-off word group of high-frequency words. The details of the NGSL will be explained later.

Vocabulary Size Needed to Read English Texts

For learners to meet the requirements for comprehension, how many high-frequency words would learners need to know? At the end of the 20th century, it was suggested that 95% of the running words should be known for reading a text (Laufer, 1989; Liu & Nation, 1985) and guessing from context (Liu & Nation, 1985). Subsequently, Hu and Nation (2000) identified that 98% of the running words should be known for doing so. Although 95% coverage level is now accepted as a minimal threshold for comprehension of a written text, vocabulary specialists deem 98% coverage to be ideal (Hu & Nation, 2000; Laufer & Ravenhorst-Kalovsk, 2010). According to Laufer and Ravenhorst-Kalovsk (2010), 95% coverage requires readers to know 4,000–5,000 of the most frequent word families plus proper nouns; for 98% coverage, knowledge of the 8,000 most frequent word families plus proper nouns is needed.

Purpose of the Study

For learners with a limited chance of receiving English input outside school, it is ideal that textbooks are designed to provide learners with a sufficient number of high-frequency words for reading a text. However, this brings up a very basic question: whether or not it is possible for textbooks to do so in the first place. Waring (2009) mathematically estimated the relationship between the frequency rank of a word and the number of words needed to encounter it through reading by analyzing the British National Corpus, reporting that learners would need to read at least 47,343 words in order to have encountered all of the 3,000 most frequent word families once, almost the same size as the NGSL. Hence, learners need to read a considerable number of words to even see all of the basic high-frequency words only once.

As mentioned above, one of the main attempts of this study was to explore what percentage of high-frequency words (in this study, NGSL words) were taught in textbooks. However, Waring's (2009) estimation could lead us to conclude without any empirical research that the number of NGSL words textbooks provide is far from what is needed for reading a text because textbooks are often too short to cover all of them. Nevertheless, this research may prove useful in that it can inform textbook developers of the potential insufficiency in the number of high-frequency words in their textbooks.

Without this information, textbook designers may unintentionally leave current textbooks as they are.

Despite this pedagogical importance, this area of research has not yet been directly investigated. Rather, previous studies have investigated vocabulary in MEXT-approved textbooks primarily by measuring their vocabulary levels (e.g., Wongsarnpigoon, 2018). This analytical approach is valuable to justify the appropriateness of textbooks as teaching materials but might not be sufficient.

The study broke NGSL words down into five 560-word frequency bands following the ways researchers have adopted the NGSL for the creation of a reliable and valid diagnostic and placement test of NGSL knowledge (Stoeckel & Bennett, 2015) or that of free flashcard learning apps (Browne & Waring, n.d.) and compared them to textbooks. Unlike other word lists that are often broken down into 1,000 word bands, Stoeckel and Bennett (2015) adopted this smaller size of band because the number of words would be a reasonable learning target of intensive learning for one semester. This rationale can be applicable to this study because the 560 word bands that are found to be insufficiently covered could also be a reasonable learning target. Teachers can then compensate for the lack of learners' input, for example, by making students work on the vocabulary with Browne and Waring's learning tool. The following research questions were addressed:

- RQ1. What percentage of words appearing in reading passages of widely-used MEXT-approved English communication textbooks for SH students are NGSL words?
- RQ2. What percentage of NGSL words appear in reading passages of widely-used MEXT-approved English communication textbooks for SH students?
- RQ3. Which frequency bands of NGSL words do reading passages of widely-used MEXT-approved English communication textbooks for SH students focus on and have a shortage of?

Methodology

Textbooks Under Scrutiny

This study examined textbooks intended for SH students. According to the current Course of Study Guidelines (as of 2021), SH English classes are roughly divided into two types of courses by their course aims (MEXT, 2009): *Komyunikeisyon Eigo* (directly translated as *English Communication*) and *Eigo Hyogen* (directly translated as *English Expression*). Textbooks used in the former course are commonly composed of reading

passages, lists of new words, and comprehension questions on the passages. On the other hand, textbooks used in the latter course are largely composed of decontextualized sentences accompanied by their Japanese translations, explanations of grammatical rules written in Japanese, and grammar exercises. Because learners would be more likely to be required to comprehend the texts of the *Komyunikeisyon Eigo* textbooks, I decided to analyze vocabulary occurring in them. Text data used in the study were gathered solely from reading passages in the textbooks and did not include English words appearing in lists of new words, comprehension questions on the passages, and so on.

SHs in Japan are not required by MEXT to use the same series of three types of textbooks throughout three years of English learning. Therefore, it was almost impossible to determine which set of three types of textbooks was used the most among approximately 100 types of MEXT-approved *Komyunikeisyon Eigo* textbooks. Utilizing available information on textbooks used by the majority of Japanese SH students, this study consulted the marketing data of textbooks in Tokyo (Tokyo Metropolitan Board Education, 2020) since Tokyo has the most students in the country in 2020 (Knowledge Station, n.d.). I selected the 2021 top three best-selling MEXT-approved textbooks in Tokyo from each grade (see Table 1).

Table 1
Textbooks Analyzed in This Study

| Grade | Textbook |
|-------|---------------------------------|
| 1st | VISTA I (Kaneko, 2018a) |
| | All Aboard! I (Kiyota, 2017) |
| | COMET I (Ikeno, 2017) |
| 2nd | VISTA II (Kaneko, 2018b) |
| | ELEMENT II (Ushiro, 2018) |
| | COMET II (Ikeno, 2018) |
| 3rd | LANDMARK Fit III (Tanabe, 2018) |
| | ELEMENT III (Ushiro, 2019) |
| | All Aboard! III (Kiyota, 2019) |

Word List

As a benchmark word list, this study adopted the NGSL ver. 1.01. (Browne et al., 2013), which is sourced from more than 273 million words within the Cambridge English Corpus. The NGSL is composed of the 2,801 most frequent words in general English plus 52 supplemental words, including days of the week, months of the year, and numbers. A remarkable superiority of the NGSL over other word lists of general English lies in that it covers a larger number of words in a text with smaller number of words. For example, the NGSL has been found to cover approximately 92% of words of general texts with 2,801 words (Browne, 2021) whereas the General Service List (GSL; West, 1953), one of the most well-known word lists, covers only 84% of words of general texts with approximately 3,600 words (Browne, 2013). For Brezina and Gablasova's (2013) new GSL, it can cover approximately 80% with 2,494 words. Hence, the NGSL can potentially provide a more accurate profile of vocabulary in a text.

Components of the NGSL

English words are classified and counted in several ways, such as types, tokens, word families (a headword and its inflections and derivations), and lemmas (a headword and its inflections in the same part of speech). Browne et al. (2013) counted words differently than existing word lists for the creation of the NGSL. They used a modified lexeme approach that corresponds to the counting unit of *flemmas* (McLean, 2017). Their modified lexemes and McLean's *flemma* word counting unit are distinguished from the lemma counting in that they include the inflected forms of a word in different parts of speech in addition to those in the same part of speech. Another point to mention is that the NGSL deleted "proper nouns, abbreviations, slang and other noise" (Browne, 2013, p. 15). All the words in the textbooks were replaced with headwords to follow these features of the NGSL, as detailed in the next section.

Procedure

There are several corpus-analysis tools capable of calculating the lexical coverage of a text by the NGSL such as AntWordProfiler 1.5.1 (Anthony, 2021), the Online Graded Text Editor (Waring & Browne, n.d.), and VocabProfile (Cobb, 2021a). Unfortunately, these tools cannot compute the coverage level of NGSL words by a text, in part because they are meant to analyze not the NGSL itself but imported texts. For this reason, I adopted a unique approach by using Text Lex Compare ver. 4.2. (Cobb, 2021b). This tool compares two different texts and informs us of how many words, word types, word

families, and word phrases are used in both or are unique to only one of the imported texts. By replacing words in the textbooks with their headwords based on the modified lexeme approach, the number of word types in a text counted by that tool becomes equal to that of flemmas in the text, enabling one to adequately compare vocabulary between the NGSL and the textbooks. For this treatment, the replacement function of Microsoft Word 2016 was used. This was also used to separate contracted forms that were composed of two different flemmas (e.g., “I’m” into “I be”). Semantically opaque ones (e.g., “I’d” for “I would” or “I had”) and homographs (e.g., “found” for the past tense form of “find” or the meaning of “establish”) were replaced with their headwords by considering the surrounding context. For lexical coverage analysis, I made one of the texts the NGSL and compared it with the texts from the textbooks.

In calculating the lexical coverage of the textbooks, 52 supplemental words were included in the NGSL to avoid underestimating the lexical coverage of each textbook due to their frequent recurrences in a single textbook. In contrast, supplemental words were not included in the NGSL when calculating the coverage of NGSL words to avoid underestimating the coverage of the list due to the lack of those words in the textbooks. The following formulae (a) and (b) were used to calculate the lexical coverage of the textbooks and the coverage of NGSL words, respectively:

$$(a) \frac{\text{Number of words in the textbook} - \text{Number of words unique to the textbook}}{\text{Number of words in the textbook}}$$

$$(b) \frac{2,801 - \text{Number of words unique to the NGSL}}{2,801}$$

Results

Lexical Coverage of the Textbooks by the NGSL

Table 2 reports the lexical coverage of each textbook. Despite differences in the vocabulary size of the textbooks, every textbook was found to be largely composed of NGSL words with greater than 92% coverage.

Table 2
Results of Lexical Coverage Analysis

| Textbook | Number of tokens | Number of off-list words | Coverage (%) |
|------------------|------------------|--------------------------|--------------|
| VISTA I | 1,633 | 118 | 92.8 |
| All Aboard! I | 1,464 | 61 | 95.8 |
| COMET I | 1,257 | 50 | 96 |
| VISTA II | 1,755 | 74 | 95.8 |
| ELEMENT II | 6,149 | 395 | 93.6 |
| COMET II | 2,475 | 144 | 94.2 |
| LANDMARK Fit III | 4,923 | 335 | 93.2 |
| ELEMENT III | 7,457 | 487 | 93.5 |
| All Aboard! III | 3,164 | 217 | 93.1 |

Coverage of the NGSL by the Textbooks

Table 3 illustrates the coverage of the NGSL in each textbook. The most notable fact is that the textbooks covered only a small proportion of NGSL words with a minimum of 12% frequency to a maximum of 38% frequency.

Table 3
Coverage of NGSL Words by the Textbooks

| Textbook | Number of NGSL words covered in the textbook | Number of NGSL words not covered in the textbook | Coverage (%) |
|------------------|--|--|--------------|
| VISTA I | 431 | 2,370 | 15 |
| All Aboard! I | 404 | 2,397 | 14 |
| COMET I | 344 | 2,457 | 12 |
| VISTA II | 425 | 2,376 | 15 |
| ELEMENT II | 913 | 1,888 | 33 |
| COMET II | 547 | 2,254 | 20 |
| LANDMARK Fit III | 859 | 1,942 | 31 |
| ELEMENT III | 1,069 | 1,732 | 38 |
| All Aboard! III | 650 | 2,151 | 23 |

Distribution Analysis

Dividing the NGSL into five 560-word frequency bands from NGSL 1–NGSL 5 in descending order of frequency, the two types of vocabulary analyses above investigated the distribution of NGSL words in each textbook across the bands (see Table 4).

There were several common characteristics across the range of textbooks examined in this study. All the textbooks presented fewer NGSL words at lower frequency bands; this trend was not gradual but sharp after the first frequency band. Similar to this trend, all the textbooks produced lower coverage for the lower frequency bands. Most of the textbooks could not even fully cover the first 560-word level or even half of NGSL words at the second through fifth frequency bands.

Overall, the textbooks for higher graders produced higher coverage for every frequency band; however, this tendency was not consistent. For example, *All Aboard! III* better covered the NGSL than every other textbook for 1st graders. However, *ELEMENT II* covered a wider variety of NGSL words than *All Aboard! III*.

Table 4
Distribution of Words Across Five Frequency Bands

| Textbook | NGSL 1 | | NGSL 2 | | NGSL 3 | | NGSL 4 | | NGSL 5 | |
|------------------|--------|-----|--------|-----|--------|-----|--------|-----|--------|-----|
| | (a) | (b) | (a) | (b) | (a) | (b) | (a) | (b) | (a) | (b) |
| VISTA I | 77 | 48 | 8 | 14 | 4 | 8 | 2 | 4 | 2 | 4 |
| All Aboard! I | 79 | 44 | 8 | 13 | 4 | 8 | 2 | 4 | 1 | 2 |
| COMET I | 84 | 43 | 6 | 10 | 3 | 4 | 2 | 2 | 1 | 2 |
| VISTA II | 81 | 46 | 8 | 14 | 3 | 7 | 2 | 5 | 2 | 4 |
| ELEMENT II | 77 | 79 | 8 | 38 | 4 | 24 | 2 | 13 | 1 | 9 |
| COMET II | 78 | 56 | 7 | 20 | 3 | 8 | 2 | 6 | 3 | 7 |
| LANDMARK Fit III | 75 | 73 | 9 | 34 | 5 | 22 | 2 | 14 | 2 | 11 |
| ELEMENT III | 78 | 86 | 7 | 45 | 4 | 31 | 2 | 15 | 2 | 13 |
| All Aboard! III | 77 | 63 | 8 | 26 | 4 | 15 | 2 | 7 | 2 | 6 |

Note. (a) = the percentage of words occurring at the frequency band; (b) = the coverage of the frequency band by the textbook. Results are expressed as a percentage.

Discussion

In order to answer my first research question, I performed the coverage analysis of the textbooks, and it was shown that despite large differences in their vocabulary size and vocabulary taught in them, they were largely composed of NGSL words with greater than 92% coverage. This implies that vocabulary that learners learn in textbooks would be what they are more likely to encounter in the real world. In other words, those who have mastered core high-frequency words and have some knowledge of proper nouns may be able to read the textbooks without having to use a dictionary frequently. This affordance is contrary to Browne's (1998) findings. He analyzed the lexical coverage of MEXT-approved SH textbooks using the GSL and found that the textbooks contained so many new and low-frequency words that even learners with knowledge of all 2,000 words of the list could hardly read a text and guess word meaning from context. Although these contrasting findings may partially be due to the improved coverage provided by the NGSL, it is also possible that MEXT-approved SH textbooks have improved over the past two decades and finally begun to reflect high-frequency words as they are used in the real world, at least in terms of vocabulary levels.

This study also revealed some shortcomings of the textbooks. The textbooks analyzed in this study contained at most 7,457 tokens. On the other hand, over 47,000 words are needed to meet the 3,000 most frequent words once (Waring, 2009), almost the same size of the NGSL, leading one to infer that the study found a severity of NGSL words in the textbooks; this inference was proved to be the case. The coverage analysis of the NGSL identified that the textbooks covered a small part of the list with smaller than 38% coverage, which answers the second research question. This finding suggests that learners were less likely to find most of NSGL words in their textbooks.

By addressing the last research question, both an advantage and a disadvantage of the textbooks were revealed. According to the distribution analysis, the textbooks produced higher coverage for words at higher frequency bands and presented them more frequently. That is, learners can learn more frequent words first. However, the distribution analysis also identified that even the first frequency band was not fully covered in most of the textbooks. For the other bands, none of the textbooks covered even half of each band. Hence, it is highly likely that SH students will never encounter the majority of NGSL words, especially those at the second through fifth frequency bands. Overall, the textbooks for higher grades tended to produce higher coverage for every frequency band, but this trend was not consistent, indicating that MEXT-approved SH textbooks do not necessarily improve in terms of the coverage of high-frequency words through years 1–3.

How then can we bridge the gap between students' vocabulary size and that required for comprehension? The new Course of Study Guidelines (MEXT, 2018) intends to increase the number of words to learn from approximately 3,000 words (MEXT, 2009) to between 4,000–5,000 words. This addition could allow MEXT-approved textbooks to treat a larger number of high-frequency words but might bring disadvantages to learners.

The results of a survey conducted by the Benesse Educational Research and Development Institute (2014) showed that junior and SH students spent most of their class preparation time looking up new words. Furthermore, the vast majority of English teachers in Japan felt that students were averse to memorizing vocabulary (Benesse Educational Research and Development Institute, 2015). Accordingly, increasing the number of different words in a textbook might impose a heavy burden on learners and hinder them from studying high-frequency words.

This is not to say Japanese learners should have to give up learning all the basic words before they graduate SH. To grow learners' vocabulary size to meet the necessary requirements for comprehension, one of the logical and pedagogically sound solutions

would seem to be to ask them to do extensive reading in addition to their regular course work (Waring, 2009, 2011). Specifically, let's say learners' first target is to get 95% coverage, the minimum requirement for reading a text (Laufer, & Ravenhorst-Kalovski, 2010), how many words and how often would learners need to read to become able to read an authentic text through extensive reading? According to Waring (2009), 1,321,429 words are required to meet the 5,000 most frequent word families 10 times, the minimum requirement for learners to get a rich knowledge of one word (Webb, 2007). Given that SH students spend 156 weeks ($\{365 \text{ days} \times 3 \text{ years}\} / 7$) and can read 84.18 words per minute (Iwahori, 2008), they would have to read approximately 101 minutes every week or 14 minutes every day. For extensive reading to work well, however, it is indispensable for learners to have few unknown words with smaller than 2% of the text (Hu & Nation, 2000). Considering that even SH graduates have insufficient knowledge of core words (McLean et al., 2014), there might be SH students who cannot take benefits of extensive reading. Moreover, learners would not necessarily come across unknown words every time they do extensive reading.

To overcome these disadvantages of extensive reading, it can be helpful to have learners study NGSL words not appearing in their textbooks from word cards (Nation, 2013) with such learning tools compatible with the NGSL as Word Learner (Browne & Waring, n.d.) and flashcards available on Quizlet (Hanks et al., n.d.). In Quizlet, learners can study NGSL words by 50, 100, or 560 words in each band according to their needs. If teachers administer Stoeckel and Bennett's (2015) test of the NGSL to their students, they can know which word bands they have insufficient knowledge of and would be able to study NGSL words without spending time on those that learners have already known. This intentional vocabulary learning is helpful for learners in that unlike extensive reading for which they would have to spend a huge amount of time to learn unknown words as their vocabulary size develops, it allows them to work on those words directly (Waring, 2009). However, only definition-based vocabulary learning is insufficient because learners may learn little about one word (Nagy, 1997). According to Nation (2013), three aspects are involved in the vocabulary knowledge of one word, namely, form, meaning, and use, each consisting of three components involved in both receptive and productive aspects. Learning words only in decontextualized sentences might prevent learners from learning those aspects.

Both incidental and intentional vocabulary learning have shortcomings. They can be probably best compensated with the combined approach of the two ways of learning, which accords with researchers' suggestion for improving vocabulary learning from incidental learning (Nation, 2015; Pigada & Schmitt, 2006). That is, learners can develop

their vocabulary size in a time efficient way by learning from word cards, and enrich their existing vocabulary knowledge through extensive reading.

Limitations

The textbook corpus used in this study gathered language data exclusively from reading passages. To ensure representative sampling, the corpus should have included English words used in comprehension questions on passages, word lists of new words, and so on.

Relatedly, the current study excluded textbooks used in the *Eigo hyogen* course from the scope of analysis. To obtain a clearer picture of learners' vocabulary input, it is useful for future research to discuss vocabulary in the *Communication eigo* textbooks together with those in the *Eigo hyogen* textbooks.

Conclusion

The combined results of the two types of coverage analyses suggested that the textbooks were largely composed of high-frequency words contained in the NGSL, but they only represented a small part of the list. In the distribution analysis, the majority of vocabulary learners meet in textbooks were found to be those at the first 560-word level, and even this band was not fully treated in most of the textbooks. In regard to the other frequency bands, learners can rarely encounter them. In reaction to these findings, the combined approach of extensive reading and intentional learning was suggested.

Unlike research into vocabulary in textbooks that commonly investigated only their vocabulary levels, this study examined the coverage of a benchmark word list and identified the potential insufficiency in the number of high-frequency words in textbooks, allowing the study to make pedagogical suggestions on vocabulary learning. Future research investigating not only the coverage of textbooks but that of a benchmark word list would be worth conducting. By doing so, textbooks would come to be more useful learning sources.

Bio Data

Shusaku Nakayama is currently a special research student at Meiji Gakuin University in Tokyo, Japan. He has been working at a senior high school as an English teacher for five years. His research interests include textbook analysis, interlanguage analysis, and teaching English as a foreign language. <shusaku-nakayama@outlook.jp>

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