

# A Comparison of Phonology-Orthography Consistency and L1-Absent Phonemes in Junior High School English Language Textbooks in Japan and South Korea

Yoko Ichiyama

Faculty of International Studies, Kyoritsu Women's University, Tokyo, Japan

Email: [yichiyama@kyoritsu-wu.ac.jp](mailto:yichiyama@kyoritsu-wu.ac.jp)

**How to cite this paper:** Ichiyama, Y. (2024). A Comparison of Phonology-Orthography Consistency and L1-Absent Phonemes in Junior High School English Language Textbooks in Japan and South Korea. *Open Journal of Modern Linguistics*, 14, 806-820. <https://doi.org/10.4236/ojml.2024.145043>

**Received:** September 4, 2024

**Accepted:** September 23, 2024

**Published:** September 26, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0). <http://creativecommons.org/licenses/by/4.0/>



Open Access

## Abstract

This study undertakes a comparative analysis of the consistency between phonology and orthography as well as the absence of vowel phonemes in the first language in English language textbooks used by third-year junior high school students in Japan and South Korea. The analysis was conducted using six textbooks: three of the most widely adopted English language textbooks in Japan and South Korea. The results revealed that the English language textbooks in South Korea contained a significantly higher number of words and sentences. Contrary to the initial hypothesis, no substantial differences were observed in the lexical difficulty or frequency of the 44 English phonemes. Furthermore, the English language textbooks in Japan were found to contain a significantly greater proportion of phonemes absent from the first language, as well as a higher incidence of irregular phoneme-grapheme correspondences. These findings indicate that Japanese junior high school students are exposed to English language textbooks with a considerably higher level of phonemic and graphemic complexity compared to South Korean junior high school students. These insights are valuable for English language learners, educators, policymakers, and textbook developers, particularly in contexts where the first language has a limited phonemic inventory or regular phoneme-grapheme correspondences.

## Keywords

Phonology-Orthography Consistency, L1-Absent Phonemes, English Language Textbook

## 1. Introduction

The intricate relationship between letters, sounds, and graphophonemic correspon-

dence in English presents a significant challenge, particularly for those learning English as a foreign language (EFL). In English, a single letter can represent multiple sounds, and conversely, a single sound can be represented by multiple letters, indicating inconsistencies in orthography and phonology (Lim, O'Brien, & Onni, 2024).

According to Narita (2009), although the relationship between sound-letter and letter-sound correspondences in English is highly complex, many of these correspondences exhibit discernible patterns. For instance, the English phoneme /e/ is represented by the grapheme <e> in 96% of instances. Similarly, the phoneme /ʌ/ is represented by the grapheme <u> in 91% of cases (e.g., but), while the grapheme <o> accounts for 7% of occurrences (e.g., love). In contrast, the English graphemes <ough> (e.g., enough) and <oo> (e.g., blood) are rarely associated with the phoneme /ʌ/, indicating an irregular phoneme-grapheme relationship.

Some alphabetic languages such as Finnish and Spanish exhibit an almost one-to-one correspondence between letters and sounds. Consequently, for learners of English who have a different first language (L1), acquiring the complex letter-sound relationships found in English, whether through letter-to-sound conversion (decoding) or sound-to-letter conversion (encoding), is likely to present a significant challenge even in the earlier stages of learning.

Another factor that complicates EFL learners' acquisition of English is the absence of English phonemes in their L1 (Ohata, 2004). To illustrate, the Japanese language has only 22 phonemes (5 vowels and 17 consonants), whereas English has 44 phonemes (20 vowels and 24 consonants), which is double the number (Kavanagh, 2007). This discrepancy signifies that English phonemes, particularly vowels, are approximately three times more unfamiliar to Japanese learners of English, while consonants are approximately 1.4 times more unfamiliar to them (see Table 1).

Similarly, the Korean language has 26 phonemes, including 7 vowels and 19 consonants (Uchida & Takagi, 2018). South Korean learners of English encounter approximately three times as many unfamiliar vowels, which can result in phonological errors such as the substitution of unfamiliar phonemes with more familiar ones (Kania & Ardi, 2022).

Both Japanese and South Korean learners of English must not only grasp the complex relationship between English letters and sounds, but also acquire a range of previously unfamiliar phonemes. However, Japanese learners of English face a greater challenge in this area, as they are required to master approximately 1.3 times more phonemes (24 phonemes) than their South Korean counterparts (19 phonemes).

The analysis of English language textbooks is one of the most frequently addressed topics in EFL research. A Google Scholar search for the keyword "English language textbook" yielded 17,800 and 17,200 results, respectively, when the search was and was not restricted to those published after 2020, indicating considerable scholarly attention to the theme.

Some studies have compared Japanese and South Korean English language

textbooks (Takeda, Choi, Mochizuki, & Watanabe, 2006; Ookawa, 2017). For example, Takeda, Choi, Mochizuki, and Watanabe (2006) conducted a comparative analysis of high school English language textbooks in Japan and South Korea. Their study encompassed a range of aspects, including the quantity and difficulty level of textbooks, structural elements, types of activities and tasks, and cultural content. The findings revealed that English language textbooks in Korea contained approximately three times the number of passages, particularly within the reading section, compared to those in Japan. Ookawa (2017) conducted a comparative analysis of English language textbooks for Japanese and South Korean high school students, and found that English language textbooks in Korea incorporated a greater number of activities and tasks encompassing all four skills (reading, writing, speaking, and listening) within each chapter than did their Japanese counterparts.

Interestingly, prior studies on textbooks have focused relatively little on difficulty levels with regards to the relationship between English sounds and letters, especially phonemes absent in L1 (Ichiyama, 2018; Mukai, Järvikivi, & Tucker, 2023). Therefore, this study aims to compare the difficulty levels of English used in the reading sections of Japanese and South Korean junior high school English language textbooks in terms of the relationship between English sounds and letters, with a particular focus on phonemes that do not exist in L1.

Based on previous research findings (Takeda, Choi, Mochizuki, & Watanabe, 2006; Ookawa, 2017), this study hypothesized that Korean English language textbooks would demonstrate a higher standard compared to their Japanese counterparts in all respects, including the frequencies of phonemes and their relationships to graphemes.

The findings of this study will be beneficial for learners and educators whose L1 is a language with phonemes different from those in English to recognize the importance of teaching and learning the complex sound-letter relationship in the English language.

**Table 1.** Phonemes of the English, Japanese, and Korean Languages.

	Vowels		Consonants		Total
	Phonemes	n	Phonemes	n	n
Japanese	/e//a//i://u://a://ei/ /ai/	8	/p// t// k// b// d// g// s/ /h// m// n// l// r/	12	20
Non-Japanese	/ɪ//æ//ʊ//ɔ://ɪ//ə/ /ə://ɔɪ//aʊ//oʊ//ɪəʀ/ /eəʀ//ʊəʀ/	13	/tʃ// ʔ// f// θ// ʃ// v/ /ð/ / ʒ// ɳ// w// j/	11	24
Korean	/e//a//ɔ//ə//i://u://a:// /ə://ei//ai//ɪə//eə/	12	/p// t// k// b// d// s/ /h// m// n// ɳ// l// r/	13	25
Non-Korean	/ɪ//æ//ʊ//ɪ//ɔɪ//aʊ/ /oʊ//ʊəʀ/	8	/g// ʃ// ʔ// f// θ// ʃ// v/ / ð// ʒ// w// j/	11	19

n: number.

---

## 2. Materials and Methods

### 2.1. Materials

This study examined English language textbooks used by third-year junior high school students in Japan and South Korea, a research focus that has been largely neglected in prior studies within the field of EFL. The rationale for selecting textbooks for third-year junior high school students is grounded in the expectation that, at this stage of education, students should develop a deeper understanding of the subject matter and engage with a prescribed volume of reading material. Notably, all Japanese junior high school students, except for those in some private institutions, are required to take and pass a senior high school entrance examination to secure admission. Given that English is a mandatory subject on this examination, it can be reasonably inferred that the texts are chosen to support the progressive development of English reading comprehension skills. Furthermore, in contrast to Japan, in South Korea, English is offered as an elective subject beginning in the second year of high school. Therefore, it is considered appropriate to utilize textbooks from the third year of junior high school, where English remains a compulsory subject (Chung & Choi, 2016). Six textbooks comprising the three most widely used texts in each country were selected. Each textbook consists of multiple units, each comprising various sections. These sections explicitly delineate the specific skills—reading, writing, speaking, and listening—that constitute the primary focus of each unit. Therefore, this study concentrated on the English texts within the specifically designated reading sections. Table 2 lists the titles and publishers of the selected textbooks.

### 2.2. Procedure

The texts were entered into an Excel spreadsheet for analyzing the various linguistic elements, including the total number of words, sentences, words per sentence, phonemes, phonemes present and absent in L1, and the regularity of graphemes corresponding to vowel phonemes absent in L1.

Cobb's (2000) Lextutor software was used to evaluate the lexical difficulty of the textbooks. The software systematically categorized the words based on their frequency distribution, organizing them into four distinct categories: the first thousand (K1) and second thousand (K2) frequency bands, the academic word list (AWL), and an "off list" category (Off) comprising words that did not fall within these established frequency bands. This categorization allowed for a comprehensive analysis of the lexical challenges posed by the selected vocabulary.

In addition to lexical analysis, the software toPhonetics (2013) was used to detect and analyze the phonemes within words.

### 2.3. Analysis

One-way analysis of variance (ANOVA) was used to examine potential differences in the number of words, sentences, words per sentence, difficulty level, and phonemes between the three English language textbooks from Japan and South

Korea, respectively. Additionally, a t-test was conducted to assess differences in the number of words, sentences, words per sentence, and phonemes between the Japanese and South Korean English language textbooks. A chi-square test was conducted to investigate differences in word difficulty, L1-absent phonemes, and phoneme-grapheme correspondence in non-L1 vowel phonemes in the Japanese and South Korean English language textbooks.

**Table 2.** Titles and publishers of the six textbooks.

	Title	Publisher	Country
1	New Horizon	Tokyo Shoseki	Japan
2	New crown	Sanseido	Japan
3	Sunshine	Kiryudo	Japan
4	Middle School English 3	Chunjae Education	South Korea
5	Middle School English 3	Visang Education	South Korea
6	Middle School English 3	Neungyule Education	South Korea

### 3. Results

The vocabulary of the reading sections in the six English language textbooks were analyzed according to Ichiyama's (2018) framework, focusing on the following five aspects:

- Length (word, sentence, words per sentence).
- Lexical difficulty (K1, K2, AWL, Off list).
- Frequencies of 44 phonemes (20 vowels, 24 consonants).
- L1 phoneme correspondence (present vs. absent).
- Graphemes corresponding to non-L1 vowel phonemes (regular vs. irregular).

#### 3.1. Length

**Table 3** shows the number of words, sentences, and words per sentence in the Japanese and South Korean English language textbooks. In this section, we first examine whether there are significant differences between the three English language textbooks from Japan and South Korea and then examine whether there are differences in linguistic features between the Japanese and South Korean English language textbooks.

##### 3.1.1. Comparison between Japanese English Language Textbooks

An ANOVA was performed to assess differences between the three English language textbooks used in Japanese junior high schools in terms of linguistic features, including the number of words, number of sentences, and words per sentence. The results indicated no statistically significant differences across the three textbooks,  $F(2, 6) = 5.1, p = 0.98$ . As the p-value exceeded the significance threshold, no further post hoc analysis was conducted, indicating that the three textbooks contain similar linguistic features.

### 3.1.2. Comparison between Korean English Language Textbooks

Similarly, an ANOVA was performed to examine differences in linguistic features across the three English language textbooks used in South Korean junior high schools. The analysis revealed no statistically significant differences between the textbooks,  $F(2, 6) = 5.1$ ,  $p = 0.99$ , suggesting that the three textbooks had similar linguistic characteristics.

### 3.1.3. Comparison between Japanese and Korean Textbooks

To assess whether the difference in the mean number of words in the reading comprehension sections of the English language textbooks from Japan ( $M = 302.2$ ,  $SD = 88.1$ ) and South Korea ( $M = 398.9$ ,  $SD = 45.8$ ) was statistically significant, a two-tailed t-test was performed at a 5% significance level. The results indicated a significant difference,  $t(45) = -8.2$ ,  $p < 0.01$ , confirming that the mean number of words per sentence in the South Korean English language textbooks was significantly higher than that in the Japanese English language textbooks.

A two-tailed t-test was used to assess the statistical significance of the difference in the mean number of sentences within the reading comprehension sections of the Japanese ( $M = 33.9$ ,  $SD = 11.1$ ) and South Korean ( $M = 41.3$ ,  $SD = 38$ ) English language textbooks at the 5% significance level,  $t(47) = -3.1$ ,  $p < 0.01$ , indicating a statistically significant mean difference. These findings suggest that the South Korean English language textbooks featured a significantly higher mean number of sentences than did the Japanese English language textbooks.

The independent samples t-test revealed that there was no statistically significant difference in the mean number of words per sentence between the Japanese ( $M = 9.1$ ,  $SD = 1.6$ ) and South Korean ( $M = 9.8$ ,  $SD = 1.8$ ) English language textbooks,  $t(46) = -1.6$ ,  $p = 0.11$ .

**Table 3.** Word length, sentence length, and words per sentence in the six English language textbooks.

	Words	Sentences	Words per sentences
JT average	302	34	9.1
JT1	313	34	9.3
JT2	332	39	8.8
JT3	263	29	9.1
KT average	399	41	9.8
KT1	393	42	9.9
KT2	412	41	10
KT2	392	41	9.8

JT: Japanese English language textbook, KT: South Korean English language textbook.

## 3.2. Lexical Difficulty

This section compares the vocabulary levels of the three English language textbooks for third-year junior high school students in Japan and South Korea using

the three English language textbooks (see **Table 4**). After initially examining potential significant differences between the three English language textbooks from Japan and South Korea respectively, we analyzed the language-level differences between the Japanese and South Korean English language textbooks.

### 3.2.1. Comparison between Japanese English Language Textbooks

A one-way ANOVA was conducted to compare the difficulty of the vocabularies in the three English language textbooks used by Japanese third-year junior high school students. The results showed no significant differences in vocabulary levels between the three textbooks, indicating uniformity in these measures,  $F(2, 9) = 4.26, p = 0.98$ .

### 3.2.2. Comparison between Korean English Language Textbooks

Similarly, an ANOVA was performed to examine the difficulty of the vocabularies in the three English language textbooks used by South Korean third-year junior high school students. No statistically significant differences were found between the textbooks in terms of vocabulary level,  $F(2, 9) = 0.45, p = 0.99$ . This suggests that the textbooks have similar textual characteristics.

### 3.2.3. Comparison between Japanese and Korean Textbooks

We conducted a chi-square test of independence and found significant differences between the conditions,  $\chi^2(3) = 101.4, N = 6632, p = 0.017$ . Residual analysis indicated that English language textbooks in Japan preferred words from the Off list ( $p = 0.002$ ) over English language textbooks in South Korea. Analyzing the vocabulary levels of the six textbooks revealed that the occurrence rates of K1, K2, and AWL words were consistent across both countries. However, the occurrence rate of words not included in these three categories (Off) was slightly higher in Japanese English language textbooks.

**Table 4.** Lexical complexity levels in English language textbooks in Japan and South Korea.

	K1		K2		AWL		Off	
	n	%	n	%	n	%	n	%
JT average	2784	83.4	189.3	5.7	61.3	1.8	303.7	9.1
JT1	2453	83.8	134	4.6	73	2.5	268	9.2
JT2	2818	83.9	230	6.8	72	2.1	240	7.1
JT3	3,081	82.7	204	5.5	39	1	403	10.8
KT average	2802.3	85.1	192	5.8	68	2.1	230.7	7.0
KT1	2839	85.5	190	5.7	100	3	191	5.8
KT2	2823	84.7	207	6.2	55	1.7	246	7.4
KT2	2745	85	179	5.5	49	1.5	255	7.9

K1: The most frequent 1000 words; K2: The second most frequent 1000 words; AWL: Academic words; Off: Words not listed in K1, K2, and AWL; JT: Japanese English language textbook; KT: Korean English language textbook.

### 3.3. Frequencies of 44 Phonemes

**Table 5** and **Table 6** present the frequency of phoneme occurrence in the reading sections of the Japanese and South Korean English language textbooks, categorized by vowels and consonants. In this section, we first examine whether there are significant differences between the three English language textbooks from Japan and South Korea, and then examine whether there are differences in phonemes between the Japanese and South Korean English language textbooks.

**Table 5.** Frequency of phoneme occurrence in English language textbooks used in Japan.

	JT1	JT2	JT3	JT average	
Vowel	ɪ	899	945	958	934
	e	255	240	310	268
	æ	177	192	216	195
	ʊ	70	94	134	99
	ɔ:	61	82	108	84
	ɑ	101	125	125	117
	ʌ	142	187	140	156
	ə	901	1036	1116	1018
	i:	158	161	201	173
	u:	116	96	134	115
	ɑ:	38	30	31	33
	ə:	430	386	380	399
	ei	210	181	168	186
	ai	306	277	206	263
	ɔɪ	7	8	7	7
	aʊ	88	110	76	91
	oʊ	198	144	131	158
ɪər	22	22	25	23	
eər	35	28	44	36	
ʊər	9	6	4	6	
Consonant	p	258	226	255	739
	t	696	771	884	2351
	k	313	358	392	1063
	b	170	170	243	583
	d	470	537	545	1552
	g	103	127	124	354
	tʃ	67	58	87	212
	ʈ	67	103	81	251
	f	196	228	214	638

Continued

	θ	36	47	41	124
	s	500	487	663	1650
	ʃ	67	127	80	274
	h	144	158	225	527
	v	182	188	187	557
	ð	286	338	393	1017
	z	360	385	372	1117
Consonant	ɜ̃	3	6	3	12
	m	316	381	346	1043
	n	712	829	842	2383
	ŋ	98	134	107	339
	l	467	510	571	1548
	w	247	250	275	772
	r	228	255	266	749
	j	126	125	165	416

JT: Japanese English language.

**Table 6.** Frequency of phoneme occurrence in English language textbooks used in South Korea.

	KT1	KT2	KT3	KT average	
i	887	925	824	879	
e	276	229	230	245	
æ	201	218	172	197	
ʊ	95	62	135	97	
ɔ	86	72	70	76	
ɑ	120	107	117	115	
ʌ	146	159	159	155	
ə	993	1015	912	973	
Vowel	i:	190	120	173	161
	u:	126	126	106	119
	ɑ:	82	118	113	104
	ə:	348	395	411	385
	ei	151	216	223	197
	ai	253	266	280	266
	ɔɪ	18	15	18	17
	aʊ	75	60	110	82
	oʊ	124	101	162	129

## Continued

Vowel	ɪə	30	26	12	23
	eə	39	35	26	33
	ʊər	5	6	9	7
Consonant	p	282	259	245	786
	t	852	842	757	2451
	k	408	342	319	1069
	b	196	215	205	616
	d	506	471	476	1453
	g	107	98	89	294
	tʃ	71	66	58	195
	ʈʂ	49	47	65	161
	f	232	243	223	698
	θ	65	50	48	163
	s	555	553	495	1603
	ʃ	81	77	73	231
	h	203	223	184	610
	v	226	188	151	565
	ð	354	375	325	1054
	z	380	381	330	1091
	ʒ	5	3	4	12
	m	365	383	302	1050
	n	757	716	704	2177
	ŋ	162	123	115	400
l	478	443	420	1341	
w	273	267	274	814	
r	276	224	246	746	
j	121	111	123	355	

KT: South Korean English language textbook.

### 3.3.1. Comparison between Japanese English Language Textbooks

A one-way ANOVA was performed to assess differences in the phonemes between the three English language textbooks used in Japanese junior high schools. The results indicated no statistically significant differences across the three textbooks,  $F(2, 78) = 3.1, p = 0.99$ . As the  $p$ -value exceeded the significance threshold, no further post hoc analysis was conducted, indicating that the three textbooks contained similar linguistic features.

### 3.3.2. Comparison between Korean English Language Textbooks

Additionally, an ANOVA examining phoneme differences between the three

English language textbooks used in South Korean junior high schools found no statistically significant differences between the textbooks,  $F(2, 78) = 3.1, p = 0.99$ , suggesting that the three textbooks have similar linguistic characteristics.

### 3.3.3. Comparison between Japanese and Korean Textbooks

An independent samples t-test revealed no statistically significant difference in phoneme occurrence between the Japanese ( $M = 219.3, SD = 226.4$ ) and South Korean English textbooks ( $M = 213.8, SD = 217.8$ ),  $t(100) = -0.1, p = 0.9$ .

### 3.4. L1 Phoneme Correspondence

A comparative analysis of the phonemes in the Japanese and South Korean English language textbooks, with particular attention to the phonemes present or absent in Japanese and Korean (see **Table 7**). Only 68.3% of the phonemes found in the Japanese English language textbooks corresponded to those in Japanese, whereas 74.7% of the phonemes in the South Korean English language textbooks were shared with Korean. Notably, approximately 11.1% of the phonemes in the South Korean English language textbooks were associated with vowels present in Korean, in contrast to a mere 4.7% correspondence of phonemes to Japanese vowels in Japanese English language textbooks.

#### Comparison between Japanese and Korean Textbooks

A chi-square test revealed significant differences between the conditions,  $\chi^2(1) = 362.1, N = 13,922, p < 0.00$ . Subsequent residual analysis demonstrated a statistically significant preference for non-L1 phonemes in Japanese English language textbooks compared to their South Korean counterparts ( $p < 0.00$ ).

The findings indicate that, while the South Korean English language textbooks exhibited a greater lexical richness compared to their Japanese counterparts, the number of instances of phonemes absent from the learners' L1 was comparatively lower. Conversely, the Japanese English language textbooks displayed a more limited vocabulary compared to their South Korean counterparts, yet featured a higher frequency of phonemes absent from the learners' L1s.

**Table 7.** Phonemes present and absent in Japanese and Korean.

	Present in L1				Absent in L1			
	Vowel		Consonant		Vowel		Consonant	
	n	%	n	%	n	%	n	%
JT	1157	4.7	15,659	63.6	3206	13	4612	18.7
KT	2697	11.1	15,393	63.6	1562	6.5	4542	18.8

JT: Japanese English language textbook; KT: Korean English language textbook.

### 3.5. Graphemes Corresponding to Non-L1 Vowel Phonemes

This section provides a comparative analysis of the graphemes corresponding to non-L1 vowel phonemes. Vowel phonemes that do not exist in L1 (six phonemes

in Japanese and four phonemes in Korean) were selected from the top ten most frequently occurring vowel phonemes. The frequencies and percentages of the graphemes corresponding to each phoneme were subsequently calculated. Following the methodology proposed by Narita (2009), graphemes that occurred at a rate of 5% or higher were classified as graphemes possessing regular phoneme-grapheme relationships, whereas those with a percentage below 5% were categorized as irregular graphemes (see Table 8 and Table 9).

Many irregular phoneme-grapheme correspondences occur in Japanese English language textbooks, particularly in relation to the phonemes /ə/ and /ɜ:/, which are not present in Japanese. For example, the phoneme /ɜ:/ is represented by the grapheme <er> in 54% of instances; <ur>, 24%; <ir>, 11%; and <our>, 2% (Narita, 2009).

In Japanese English language textbooks, words such as “hour” are classified as K1 words—those considered fundamental yet possessing rare phoneme-grapheme relationships—and appear more than ten times. In contrast, South Korean English language textbooks exhibit a relatively frequent occurrence of irregular graphemes, primarily with the phoneme /ɪ/. It is exceedingly rare for the phoneme /ɪ/ to appear in the graphemes <ie> in “movie” or <a> in “garbage,” as seen in South Korean English language textbooks. Nevertheless, with the exception of the phoneme /ɪ/, vocabularies with irregular sound-letter relationships in non-L1 vowel phonemes are seldom employed.

### Comparison between Japanese and Korean Textbooks

The chi-square test conducted in this study found significant differences between the conditions,  $\chi^2(3) = 168.6$ ,  $N = 10213$ ,  $p < 0.00$ . Residual analysis further revealed that Japanese English language textbooks exhibited a statistically significant preference for phonemes with irregular graphemes ( $p < 0.00$ ) compared to South Korean English language textbooks.

The findings indicate that South Korean English language textbooks use a considerable number of non-native phonemes that adhere to established regular phoneme-grapheme relationships, whereas Japanese English language textbooks use a significant proportion of relatively basic-level vocabularies that possess non-L1 phonemes that deviate from conventional regular phoneme-grapheme relationships.

**Table 8.** Frequency of graphemes corresponding to non-L1 vowel phonemes (regular vs. irregular) in Japanese English language textbooks.

		K1		K2		AWL		Off	
		n	%	n	%	n	%	n	%
ə	Irregular G	204	9	9	10	10	18	22	7
	Regular G	2087	91	82	90	46	82	275	93
ɪ	Irregular G	33	3	1	1	0	0	0	0
	Regular G	1112	97	149	99	95	100	256	100

## Continued

ə:	Irregular G	283	42	20	32	7	16	16	23
	Regular G	389	58	43	68	38	84	53	77
æ	Irregular G	2	1	0	0	0	0	0	0
	Regular G	225	99	69	100	6	100	182	100
ou	Irregular G	6	2	0	0	0	0	0	0
	Regular G	248	98	34	100	12	100	211	100
ʌ	Irregular G	30	6	0	0	0	0	0	0
	Regular G	385	94	55	100	12	100	27	100

G: Grapheme; K1: The most frequent 1000 words; K2: The second most frequent 1000 words; AWL: Academic words; Off: Words not listed in K1, K2, and AWL.

**Table 9.** Frequency of graphemes corresponding to non-L1 vowel phonemes (regular vs. irregular) in South Korean English language textbooks.

		K1		K2		AWL		Off	
		n	%	n	%	n	%	n	%
I	Irregular G	18	1	6	4	0	0	20	12
	Regular G	1741	99	143	96	88	100	148	88
æ	Irregular G	22	8	1	2	0	0	0	0
	Regular G	241	92	63	98	8	100	100	100
ou	Irregular G	12	3	2	4	0	0	0	0
	Regular G	368	97	49	96	6	100	25	100
ʌ	Irregular G	7	2	1	3	0	0	0	0
	Regular G	288	98	35	97	17	100	72	100

G: grapheme; K1: The most frequent 1 - 1000 words; K2: The 1001 - 2000 most frequent words; AWL: Academic word; Off: Words not listed in K1, K2, and AWL.

#### 4. Discussion

This study aimed to evaluate the phonology-orthography consistency and phonemes absent in L1 and their relationships to the graphemes of Japanese and South Korean English language textbooks to identify potential differences. Regarding the length of the reading sections in English language textbooks, we initially hypothesized that South Korean English language textbooks would surpass Japanese English textbooks in terms of words, sentences, and words per sentence. The hypothesis that South Korean English language textbooks would use longer sentences was supported by the findings related to the number of words and sentences. However, no significant difference was observed in the number of words per sentence, which suggests that lengthy sentences have become less common in South Korean English language textbooks, potentially in response to critiques emphasizing the need to foster communicative competence and shift away from

translation-focused teaching methods (Rose, 2023).

Interestingly, there were no significant differences in the frequencies of vocabulary items classified as K1, K2, and AWL. Similarly, there were no significant differences in the frequencies of phoneme occurrence for the 44 English phonemes between the Japanese and South Korean English language textbooks, which also challenges the hypothesis that Korean English language textbooks are superior. Consistent with previous findings, it may be posited that the use of lexical complexity is no longer aligned with the educational policy in South Korea, which prioritizes the enhancement of communicative competence (Chung & Choi, 2016).

Furthermore, the results revealed that Japanese junior high school English language textbooks present significant phonemic challenges to learners, particularly because of the high proportion of non-L1 phonemes and the irregular phoneme-grapheme correspondences they entail. Specifically, 31.7% of the phonemes in these textbooks do not exist in the Japanese phonemic inventory, compared to 25% in the South Korean English language textbooks. Additionally, the Japanese English language textbooks included 643 non-L1 vowel phonemes with irregular phoneme-grapheme correspondences, accounting for approximately 10% of the 6734 non-L1 vowel phonemes analyzed. In contrast, the South Korean English language textbooks exhibited a lower rate of such irregularities, with only 3% of the 3481 non-L1 vowel phonemes displaying irregular correspondences. In summary, these findings suggest that Japanese English language textbooks may not sufficiently prioritize the student's sound-letter relationships or graphophonemic knowledge critical to reading proficiency, potentially making English language acquisition more challenging for Japanese students.

Given these results, it is imperative that English language textbook developers place greater emphasis on the inclusion and treatment of non-L1 phonemes and their corresponding graphemes, especially in contexts where the L1 has a limited phonemic inventory and predominantly regular phoneme-grapheme correspondences, such as in Japan. Such an approach could help mitigate the difficulties learners face, enhancing both their reading proficiency and overall language acquisition. It could also benefit learners and educators in similar linguistic contexts where irregular phoneme-grapheme correspondences in English present significant obstacles to learning.

However, the present findings should be interpreted with caution because of the limited sample size, which may affect their generalizability. Future research should seek to analyze a wider range of textbooks to provide a more comprehensive understanding of these challenges. Additionally, surveys at the primary school level are essential to evaluate the effectiveness of English language materials during the early stages of language learning. Future studies should consider exploring the necessity of explicit instruction on the complex relationship between English phonemes and graphemes in classroom settings to better support learners facing these challenges.

## Acknowledgements

This work was supported by JSPS KAKENHI Grant-in-Aid for Scientific Research (C) No. 23K00727. The author is grateful for their support.

## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

## References

- Chung, J., & Choi, T. (2016). English Education Policies in South Korea: Planned and Enacted. In R. Kirkpatrick (Ed.), *English Language Education Policy in Asia* (pp. 281-299). Springer. [https://doi.org/10.1007/978-3-319-22464-0\\_13](https://doi.org/10.1007/978-3-319-22464-0_13)
- Cobb, T. (2000). *The Compleat Lexical Tutor*. <http://www.lextutor.ca>
- Ichiyama, Y. (2018). Orthographic and Phonological Features of English Language Textbooks in Junior High Schools in Japan. *International Journal of Science and Research*, 7, 372-374.
- Kania, A. N., & Ardi, H. (2022). Phonological Error of English Vowel by Korean Speaker in Korean Drama. *English Language and Literature*, 11, 238-250. <https://doi.org/10.24036/ell.v11i3.117646>
- Kavanagh, B. (2007). The Phonemes of Japanese and English: A Contrastive Analysis Study. *Journal of Aomori University of Health and Welfare*, 8, 283-292.
- Lim, A., O'Brien, B., & Onnis, L. (2024). Orthography-Phonology Consistency in English: Theory- and Data-Driven Measures and Their Impact on Auditory vs. Visual Word Recognition. *Behavior Research Methods*, 56, 1283-1313. <https://doi.org/10.3758/s13428-023-02094-5>
- Mukai, Y., Järvikivi, J., & Tucker, B. V. (2023). The Role of Phonology-to-Orthography Consistency in Predicting the Degree of Pupil Dilation Induced in Processing Reduced and Unreduced Speech. *Applied Psycholinguistics*, 44, 784-815. <https://doi.org/10.1017/S0142716423000279>
- Narita, K. (2009). *Handbook of English Spelling*. Sankeisyua.
- Ohata, K. (2004). Phonological Differences between Japanese and English: Several Potentially Problematic. *Language Learning*, 22, 29-41.
- Ookawa, K. (2017). Analyzing High School English Language Textbooks in Japan and South Korea. *Journal of Applied Linguistics and Language Research*, 4, 75-96. <https://doi.org/10.5296/ijele.v4i2.9308>
- Rose, R. S. (2023). *English Communication in Korean Education*. Ph.D. Thesis, Johns Hopkins University.
- Takeda, A., Choi, E. S., Mochizuki, N., & Watanabe, Y. (2006). Analysis and Comparison of the Junior and Senior High School Level English Language Textbooks for Japan and South Korea. *Second Language Studies*, 25, 53-82.
- toPhonetics.com. (2013). *toPhonetics*. <https://tophonetics.com/>
- Uchida, Y., & Sugimoto, J. (2018). A Survey of Pronunciation Instruction by Japanese Teachers of English: Phonetic Knowledge and Teaching Practice. *Journal of the Tokyo University of Marine Science and Technology*, 14, 65-75.