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A Study on Phonological Word Recoding of Young Japanese EFL Learners

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CHAPTER 1

INTRODUCTION

This is a quantitative and qualitative study on the development of basic literacy skills among young learners who learn English as a foreign language (EFL) in Japanese public elementary schools. The primary objective of this research is to investigate the phonological word recoding ability of sixth-grade students and shed light on the error types they encounter during this process. Moreover, through a comprehensive exploration of the progression of their phonological word recoding skills and their response to the curriculum, this research aims to contribute to ongoing discourse on promoting early literacy skills within elementary English education curriculum in Japan. Ultimately, this dissertation seeks to provide valuable insights to facilitate collaborative curriculum development between elementary and junior high schools in Japan.

Background of the Study

The early introduction of English education to elementary school children has been much discussed since the 1990s and the Ministry of Education, Sports, Science, Culture, and Technology (MEXT) publicized its decision to introduce English education to public elementary schools in 2013 to keep pace with globalization. The new Course of Study was promulgated in 2017 and practiced from 2020, including English as a new course in public elementary schools. Since then, English has been introduced to one unit-hour per week in the 3rd and 4th grades as *Foreign Languages Activities*, and two unit-hour per week in the 5th and 6th grades as a regular subject. Along with these changes, there is a growing need to develop literacy skills in English during elementary English education.

The MEXT (2014) reported that many seventh graders in junior high school did not understand the relationships between spelling and the pronunciation of words, which led to their learning difficulties in reading and writing. It has been recognized as one of the big challenges in connecting English education from elementary to junior high school. This problem affects their subsequent learning. Benesse (2020) reports approximately 70% of freshman students in high school have difficulties not only in grammar, vocabulary, and writing, but pronunciation and word spelling. It also reports that students who are not good at English have more difficulties in reading aloud sentences and comprehension.

Moreover, in the study conducted by Brown and Hayne (1985), it was observed that Japanese university students faced difficulties in grasping the correlation between spelling and pronunciation. The researchers compared Japanese EFL with Arabic EFL learners and Spanish EFL learners in tasks related to visual word identification and pronouncing spelled words. The findings revealed that Japanese EFL learners exhibited high accuracy and speed in visual word identification but struggled the most with correct pronunciation. The observed feature in these performances, unique to Japanese EFL learners, likely originates from their native language (L1), where *kanji*, a prominent written symbol in the Japanese language, functions as an ideogram. A noteworthy observation that emerged across all stages of learning was that Japanese EFL learners lack a comprehensive understanding of the alphabetic principle when it comes to reading (pronouncing) words.

Reading and writing in English is very complex cognitive work for EFL learners, especially for young EFL learners. Even among children who speak English as L1, there is considerable variance in word recognition skills (Koda, 1999). Likewise, among proficient

bilingual readers whose L1 and L2 are linguistically similar languages, such as English and French or English and Germany, English word recognition as their second language (L2) is much slower and contains more errors compared to the word recognition in their L1 (Frith *et al*., 1998; Han, 2015). Thus, it is obvious that learning reading and writing in English is very challenging for Japanese EFL learners.

The Motivation for the Study

Two personal experiences aroused my interest in the present study. One is my experience as a young EFL learner at an elementary school. When I was an elementary school student, I only had a few English-related activities each year because English was not a subject in the curriculum. We played a simple game by using only a few English words or invited some foreigners living near the school to learn about a different culture. Since I was a girl who had a strong interest in learning English, I felt very disappointed in those activities because they did not teach me any language skills. This experience potentially created my belief as a teacher that I want to do a learning-centered English class for children.

The second experience is my recent one as a teacher teaching English to young EFL learners. I observed an experimental English class for upper graders at a public elementary school twelve years ago, taught by a university professor, who was an expert in this field. I was very impressed by the way that children became autonomous learners by gaining basic literacy skills. Her curriculum had two major parts—developing oracy using stories and developing basic literacy. After becoming a teacher for young learners, I have been practicing following her idea, I found out how important it is to foster English literacy skills in a systematic way from elementary school for the following reasons.

First, literacy instruction gives children a sense of accomplishment and develops their autonomy toward learning. My master thesis (Kobayashi, 2015), qualitative research based on long-term classroom observation, reported how literacy instruction had developed their autonomy as well as their literacy skills. Through literacy learning, the students (1) found the meaning of learning English, (2) experienced gaining confidence, (3) reflected on their learning, and (4) gained competence.

Second, by gradually introducing spoken language followed by literacy, children get greater awareness of oral language. For children, learning to read and write helps to reinforce what they are learning orally (Pinter, 2006). Literacy skills, including knowing the matching of letters and sounds, raises learners' metalinguistic awareness and supports short-term memory for oral language processing (Reis & Castro-Caldas, 1997).

Third, literacy is the key to effectively connecting English education in elementary school to junior high school. At the secondary level, according to Cameron (2003), a British researcher of English education to young learners, written language can support oral language development, which is the reverse of the direction at the primary level. Cameron says well-established literacy skills allow them to learn the valuable source of new vocabulary through written and spoken discourse activities around the text. It takes a long time for children to master those skills. Thus, it is a very important issue to introduce early literacy instruction effectively from the primary level and to connect it to the secondary level.

Phonological word recoding is one of the skills that should be taught in elementary schools in Japan, as an essential skill for connecting English learning in junior high school. Therefore, the primary object of this study is to investigate the system of phonological word

recoding among young EFL learners. This dissertation will contribute to the improvement of literacy instruction in elementary schools and its connection to English education in junior high school.

Purposes of the Study

The purpose of this study is to measure and examine the students' actual skill of phonological word recoding and understand its process. Reading and writing are very complex cognitive processes for children since it is a second-order system to represent spoken language. It is difficult even for native speakers, and even more difficult for EFL learners who have not acquired a spoken language. The goal of early literacy education is to make students able to read and write simple texts in a foreign language, which becomes a solid foundation for future literacy development (Cameron, 2001; Chall, 1983; Hayes & Flanigan, 2014). One of the first skills for early literacy development is *phonological word recoding*. It is the skill to change printed information into speech (Hamada & Koda, 2010; Harris & Hodge, 1995; Perfetti & Hogaboam, 1975). This skill is essential for word recognition (Scarborough, 2001), and is helpful to learn new words independently (Share, 1995). Seeing and pronouncing the same printed words multiple times makes the sounding-out process automatized, which greatly contributes to rapid word recognition and reading comprehension (Ehri, 2005a; Ehri, 2005b).

Phonological word recoding requires knowledge of the alphabetic principle—the knowledge about letter-sound relationships. The way to teach the alphabetic principle is called *phonics*. In English-speaking countries, phonics is usually introduced from kindergarten through grades 1, 2, or 3. Thus, teaching how to read and write simple words by

understanding the alphabetic principle is one of the aims of literacy education at the elementary school level. However, the goals of the Course of Study in Japan miss this important skill—phonological word recoding. There are two main goals related to reading in the Course of Study: (1) to be able to identify printed letters of the alphabet and pronounce their names; (2) to be able to understand the meaning of simple words and basic expressions with sufficient familiarity through audio (MEXT, 2017a, p. 78). Even though the alphabetic principle is considered to be a 'cue' for being able to pronounce words and understand their meaning, the importance of phonics and phonological word recoding has not been emphasized (p.78). Behind this missing, there is a concern that introducing phonics explicitly to teach the way of phonological word recoding makes children confused (p. 103-104). The view of the MEXT is very different from the view I have gained through my teaching experience at elementary schools. Based on this situation in Japan, this dissertation also concerns literacy curriculum to develop students' phonological word recoding skills in the Japanese context.

Methodological Perspective

This dissertation aims to examine the phonological word recoding of young Japanese EFL learners and consider the literacy curriculum for developing these skills. A concurrent mixed methods design is adopted and modified in this research. According to Cresswell (2009), in the concurrent mixed design, (1) both quantitative and qualitative data are converged and merged for comprehensive analysis, (2) both quantitative and qualitative forms of data are collected and integrated, (3) one smaller form of data may be embedded within another larger data collection.

Chapter 3 of this study presents a comprehensive analysis of the phonological word recoding ability among young Japanese EFL learners. The research delves into both quantitative and qualitative aspects of the students' skills. A total of 121 sixth-grade students from two public elementary schools participated in the tests, providing valuable insights into their phonological word recoding skills and the challenges they encounter during the process. Error analysis was conducted based on the test results and further supplemented by interviews with 33 students, selected from the participants.

In Chapter 4, the focus shifts towards understanding the progression of the students' phonological word recoding skills and their response to the curriculum. The chapter employs qualitative data gathered through semi-structured interviews with the same 33 students selected in the previous chapter's study. This aim is to gain a deeper understanding of how the students' phonological word recoding abilities evolve and how they actively engage with and respond to the curriculum to enhance their literacy skills.

CHAPTER 2

LITERATURE REVIEW

This chapter presents an overview of phonological word recoding, its mechanism, and its connection to word recognition. Subsequently, the instruction of phonological word recognition will be exemplified within the context of English as a Native Language (ENL). Finally, the challenges associated with developing phonological word recoding among English as Second Language (ESL)/EFL learners will be addressed, followed by an exploration of research focusing on young Japanese EFL learners and the educational environment in Japan.

Definition of Phonological Word Recoding

Phonological word recoding is defines as "print-to-sound translation" (Share, 1995). To clarify this definition, it can be compared to the term *decoding*, which seems to be more recognized term in the context of reading instruction. Decoding can be defined as a process of reading words by converting printed letters into sounds. Perfetti and Hogaboam (1975) define decoding as the process of 'convert(ing) print into the language code' (p.461), and Hamada and Koda (2010) also define it as 'the phonological conversion of visually presented words' (p.514). For example, it is the skill to see a printed word *black* and pronounce /blæk/. Decoding words involves not only converting each letter into its sound but also blending the sounds to form recognizable words (Ehri *et al.*, 2001).

Although decoding might be a commonly recognized term, another term called *phonological recoding* is also used as a technical term in this research area. Many

researchers[1] use this term synonymously with decoding (Bowey & Muller, 2005; Elbro *et al.*, 2012; Knoepke et al., 2014; McKay & Thompson; 2009; Thompson *et al*. 2008; Treiman *et al.*, 1983; Tunmer & Hoover, 1993, etc.), but according to the literacy dictionary edited by Harris and Hodge (1995), both two terms are different in a strict way. Recoding means "to change information from one code into another, as writing into speech", and this process does not include semantic understanding (p.215); Decoding means "to analyze spoken or graphic symbols of a familiar language to ascertain their intended meaning" (p.55). A comparison of these definitions shows decoding includes semantic understanding, but not recoding. [2] These differences in nuance might not matter for native English speakers, who have sufficient word knowledge acquired through rich spoken language in their daily lives. For EFL learners, however, who are limited in exposure to oral language, sounding out printed words and understanding their meaning are completely different processes (Jiang, 2000). Thus, this dissertation, which focuses on the reading of novice EFL learners in Japan, hereafter adopts the term phonological recoding.

The Alphabetic Principle and Sound Manipulation

For phonological word recoding, learners need to know the alphabetic principle—letters and groups of letters represent sounds (e.g., *b* represents the sound /b/, *sh* represents

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[1] See other researches: Parkin, 1982; Mcquade, 1983; Jorm *et al*., 1984; Koda, 1990; Segalowitz & Hébert, 1990; Moustafa, 1995; Vandervelden & Siegel, 1995; Demont & Gombert, 1996; Frith *et al*., 1998; Uhry & Shepherd, 1997; López & González, 2000; Wesseling & Reitsma, 2000; Walton *et al*., 2001; Orsolini *et al*., 2006; De Jong *et al*., 2009.

[2] In reading practice, the term of decoding is usually used to refer to simple word identification rather than to identification of higher units of meaning (Harris & Hodge, 1995).

the sound /ʃ/), and acquire how to manipulate the sounds to pronounce a whole word. A way of teaching reading and spelling focusing on letter-sound relationships is called *phonics*, and it is especially used in the beginning of reading instruction (Harris & Hodge, 1995).

Although English, German, Norwegian, Danish, Italian, Spanish, Portuguese, French, African Swahili, Vietnamese, and many other languages have an alphabetic writing system, each language has a different degree of consistency between letters and their sounds. English is more difficult to read and write than Italian, Spanish, or German (Wydell & Butterworth, 1999). The letter-to-phoneme correspondence in these languages (known as *transparent languages*) is much more consistent than in English. Thus, phonological recoding of those languages will be easier, and no one disagrees that phonics is effective (Frost, 1994).

In English (known as an *opaque language),* on the other hand, the letter-to-sound correspondence is less transparent, which makes phonological recoding more difficult. In Italian, as an example of a transparent language, there are 33 sounds and 25 ways to represent sounds; in English, there are approximately 44 sounds and approximately 1100 ways to spell sounds (Soura, 2014)[3]. This gap between the transparent and opaque languages clearly shows the difficulty of learning reading and writing in English. Needless to say, phonics is helpful for the phonological recoding of regularly spelled words—such as *map, test, clock, cake, shape, etc*.— while it may seem that learners must memorize irregularly spelled words and phonics is not adaptable to them. However, phonics is still helpful even for irregularly spelled

[3] The number of sounds and ways to spell sounds varies slightly depending on counting method and regional difference.

words by combining it with other instruction (McArther *et al*., 2015a; McArther *et al*., 2015b). McArther *et al*. (2015b) found it effective to introduce phonics before making learners memorize irregular words by heart. Therefore, developing the phonological recoding of regularly spelled words should be at top of the priority of reading, especially for EFL novice learners.

Instructions for phonological word recoding typically start with reading monosyllabic words, which are words consisting of only one syllable. Since a syllable commonly comprises a central vowel (*nucleus*) surrounded by consonants (Shirahata *et al.*, 2019), learners must first acquire fundamental letter-sound relationships of both consonants and vowels and then learn how to blend them to pronounce complete words.

Consonants

A consonant is "a speech sound made by partial or complete closure of part of the vocal tract, which obstructs airflow and causes audible friction in varying amounts" (Harris & Hodge, 1995, p.42). [4] Table 1 shows the American English (GA) consonant sounds. The majority of letters represent the sound contained in the name of the alphabet (e.g., /p/ in /pi/, /b/ in /bi/, /m/ in /ɛm/, /t/ in /ti/, /d/ in /di/, /n/ in /ɛn/, /f/ in /ɛf/, /v/ in /vi/, /s/ in /ɛs/ and /si/, /z/ in /zi/, /l/ in /ɛl/, /dʒ/ in /dʒi/), there are some exceptions, such as /k/ for *c*, /g/ for *g*, /h/ for *h*, /r/ for *r*, /w/ for *w*, /j/ for *y*, /ŋ/ for *ng*, /θ/ and /ð/ for *th*, /tʃ/ for *ch*, /ʃ/ for *sh*). The one-

[4] According to Yavas (2011), English consonants are classified into several groups based on their place of articulations: bilabial, labiodental, interdental, alveolar, palate-alviolar, retroflex, palatal, velar, glottal sounds.

letter-one-sound correspondences are the basic letter-sound relations taught through phonics first (Templeton, 1998; Heye &Flanigan, 2014; Allen-Tamai, 2019).

Table 1

American English Consonants (International Phonetic Association, 2003; Ladegoged & Disner, 2021)

Phoneme	Word Example	Phoneme	Word Example
/p/	*pet, pie*	/θ/	*thigh*
/b/	*bet, buy*	/ð/	*then, thy*
/m/	*met, my*	/s/	*set, sigh*
/t/	*ten, tie*	/z/	*Zen, zoo*
/d/	*debt, die*	/ɹ/	*retch, rye*
/n/	*net, nigh*	/l/	*let, lie*
/k/	*ken, kite*	/h/	*hen, high*
/g/	*get, guy*	/tʃ/	*Chet, chime*
/ŋ/	*hang*	/dʒ/	*jet, jive*
/f/	*fed, fie*	/ʃ/	*shed, shy*
/v/	*vet, vie*	/j/	*yet, you*
/w/	*wet, why*		

However, each consonant can be represented in multiple ways by graphemes, which is why English spelling-sound relations are complex. Taking the sound of /f/ as an example, it can be represented not only by *f* (as in *fat*), but also by *ff* (as in *cliff*), *ph* (as in *phone*), *gh* (as in *laugh*), *lf* (as in *half*), and *ft* (as in *often*[5]). A combination of two consonant letters representing a single speech sound—such as *ff, ph, gh, lf, ft*—is called a *consonant digraph*. Although how many orthographic patterns are taught depends on the teaching method or instructor, *sh, ch, ph, wh, th, ck, ng* are commonly taught (Daud & Salamah, 2016; Allen-Tamai, 2019).

[5] The *t* in *often* may sometimes by pronounced as with /ɒftən/.

Consonant clusters are "a sequence of two or more distinguishable consonant sounds before or after a vowel sound (in a syllable)," such as /bl/ in *blue* or /spr/ in *spring* (Harris & Hodge, 1995, p.42). They are also an important feature in English because they are usually a challenging task even for ENL children (McLeod et al., 2001). McLeod et al. emphasize that even young ENL children tend to delete one element of a consonant cluster.

Vowels

A vowel is "a voiced speech sound made without stoppage or friction of the airflow as it passes through the vocal tract" (Harris & Hodge, 1995, p.276). In American English (GA), there are fourteen to fifteen vowels: /i/, /ɪ/, /eɪ/, /ɛ/, /æ/, /ɑ/, /o/, /ʊ/, /u/, /ʌ/, /ɚ/, /aɪ/, /aʊ/, /ɔɪ/, /ə/, (see Table 2). Vowels are much more complex than consonants. The same letter *a* can be pronounced as /æ/ (e.g., *cat*), /eɪ/ (e.g., *cake*), or /ə/ (e.g., *above*). Furthermore, the same sound /eɪ/ can be represented by as many as ten spelling patterns: *a_e* (as in *mate*), *ai* (as in *maid*), *ay* (as in *bay*), *ea* (as in *break*), *ey* (as in *they*), *eigh* (as in *weigh*), *aigh* (as in *straight*), *er* (as in *foyer*), *et* (as in *filet*), *au* (as in *gauge*). Since phonics is just a convenient method to help learners understand some basic letter-sound relations for word recognition, it does not always teach all these spelling patterns. In general, /æ/, /ɛ/, /ɪ/, /ɑ/, /ʌ/ are introduced as short vowel patterns (as in *hat, bed, sit, top, cut*) and /eɪ/, /i/, /aɪ/, /oʊ/, /u/ are introduced as long vowel patterns (as in *cake, tree, like, hope, cute*). Because of the complexity, short vowels are taught before long vowels (Templeton, 1998; Martinez, 2011; Heye &Flanigan, 2014; Allen-Tamai, 2019). There are mainly two patterns of spellings including long vowels: *silent-e* and *vowel digraphs*. Regarding words such as *cake, like, hope, cute*, the first vowel is pronounced in a name way and the final *e* is not pronounced. Just as consonants representing one sound with

two letters are called consonant digraphs, the spelling with two consecutive vowels, such as *ai, ea, ee, ie, oa, oe, ue*, *au, oo* are also called *vowel digraphs*.

Table 2

American English Vowels

(International Phonetic Association, 2003; Ladegoged & Disner, 2021)

Phoneme	Word Example	Phoneme	Word Example
/i/	*bead, beat, heed*	/u/	*booed, boot, who'd*
/ɪ/	*bid, bit, hid*	/ʌ/	*bud, but, Hud*
/eɪ/	*bayed, bait, hayed*	/ɚ/	*bird, Bert, heard*
/ɛ/	*bed, bet, head*	/aɪ/	*buy, bite, hide*
/æ/	*bad, bat, had*	/aʊ/	*bought, bout, howd(y)*
/ɑ/	*bod, bot(tom), hod*	/ɔɪ/	*boy, hoyd(en)*
/o/	*bode, bought, hawed*	/ə/	*a(bove)*
/ʊ/	*good, but (cher), hood*		

Blending

After learning single sounds of consonants and vowels, learners need to know how to blend those sounds for phonological word recoding. *Blending* is "to combine the sounds represented by letters to pronounce a word" (Harris & Hodge, 1995, p.20). Elbo *et al*. (2012) pointed out "'blending' individual phonemes into a coarticulated whole is not a straightforward matter, not even for orthographically regular words" (p.342). According to their examples that learners puzzle to pronounce 'w..aa..sss [w]… [ə]… [z]' when they try to recode *was*, there is a gap between the recoding of each sound and the recoding of a whole word. Thus, learners need to be taught how to blend each sound successfully following some points to keep in mind.

The way of blending each phoneme is called *complete blending* (e.g., /h/ + /æ/ + /t/), while the way of blending larger units —onset and rime— is called *partial blending* (e.g., /h/

+ /æt/) (Ikeda, 2015). Onset is an optional consonant or consonant cluster; rime is the following sound usually consisting of a nucleus (usually a vowel or vowel cluster) and an optional coda (the final consonant or consonant cluster) (Geudens *et al*., 2005; Treiman, 1989). Take the word *bring* for example, *br* is the onset and *ing* is the rime. Complete blending is more difficult than a partial blending of onset and rime (Seymour & Evans, 1994; Vandervelden & Siegel, 1995). According to the linguistic status hypothesis, phonological awareness of English-speaking children develops from large to small units: which means they acquire the ability to break down speech into words, then words into syllables, syllables into onset and rime, and finally into phoneme (Goswami & East, 2000; Treiman *et al*., 1994). This is why many teachers introduce phonics by using onset-rime units.

Treiman and Weatherston (1992) found that longer words or words including consonant clusters are more difficult for phonological word recoding. Thus, phonics is usually introduced beginning with monosyllabic words, which comprise one vowel sound and one or multiple consonant sounds. After vowel-consonant (VC) or consonant-vowel-consonant (CVC) words being introduced, CCVC or CVCC words including consonant clusters should be introduced.

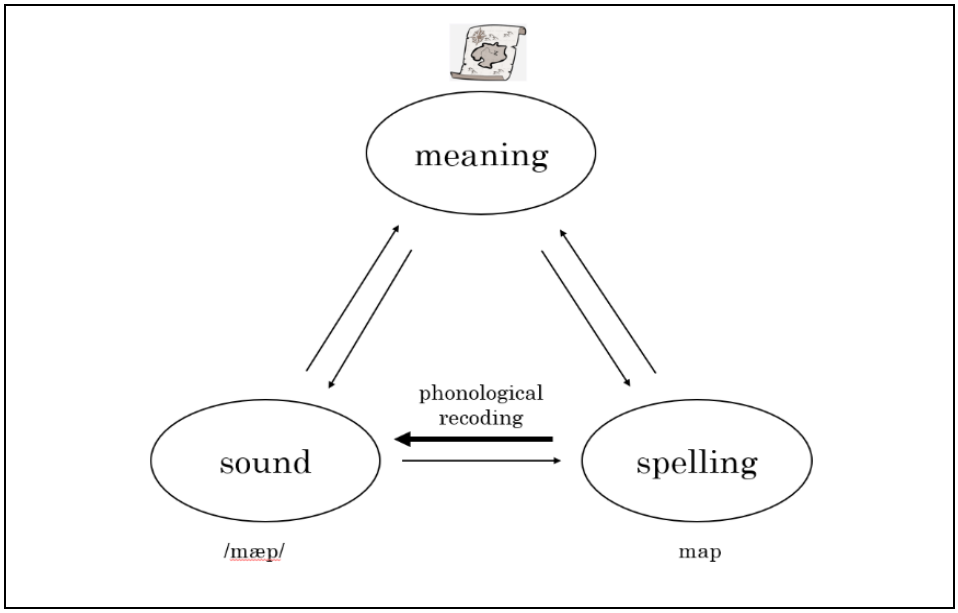
Phonological Word Recoding and Word Recognition

This section attempts to deepen the understanding of phonological word recoding in relation to word recognition. The definition of word recognition is “the ability to accurately identify printed words” (Hayes & Flanigan, 2014). The process of identifying printed words accurately involves determining the pronunciation and some degree of the meaning of a word in written or printed form (Harris & Hodge, 1995). Word recognition consists of three

essential components (see Figure 1): phonological component (sound), orthographic component (spelling), and semantic component (meaning). Phonological recoding is the conversion of the orthographic component to the phonological component based on the understanding of letter-sound relations. Then the pronounced words are supposed to be accessed by the readers' semantic lexicon. If the word is already known, they understand the meaning; if not, they need to learn the meaning of the new word. This route—letters to sounds to meaning—is called the *phonological route (*or *indirect route)*, which is helpful when we learn new words (Soura, 2014).

Figure 1

Three components of the word map



Note. This figure was made based on Hayes and Flanigan (2014)

As readers encounter the same words many times, their *lexical route* (or *direct route*) takes place for the phonological route. On the lexical route, soon after the spelling is identified, the word and its meaning are simultaneously selected, and then its pronunciation is

retrieved. This route is used for most words if readers encounter the words frequently, and store them in their mental dictionaries (Soura, 2014). Both the phonological route and lexical route are required for fluent reading, which is called a *dual-route model* (Barron, 1986; Coltheart *et al*., 2001; Soura, 2014).

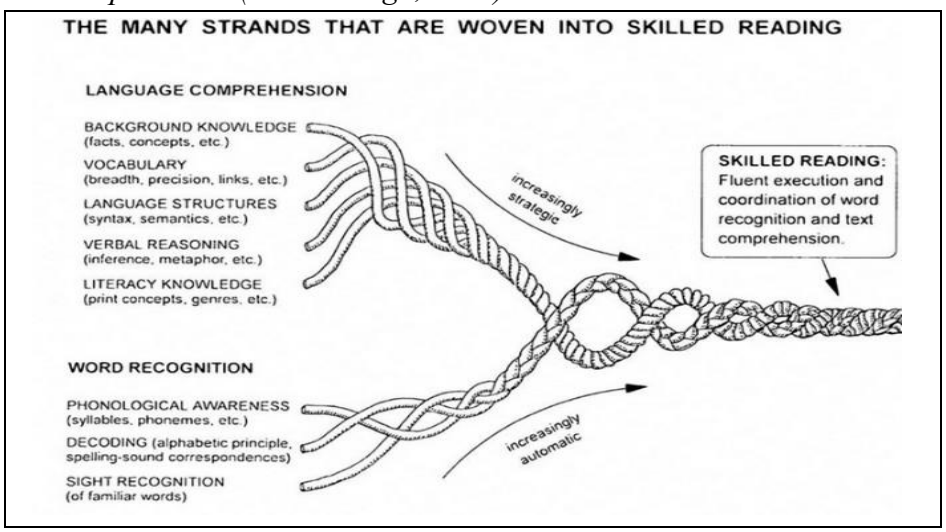
Word recognition is one of the lower-level processes and the most frequent cognitive activity involved in reading (Han, 2015). Although it is not sufficient for reading comprehension, it is a necessary skill to enable access to written language and influences reading comprehension (Hayes & Flanigan, 2014; Perfetti, 2007). Scarborough's reading Rope Model shows word recognition is one of the necessary skills for skilled reading, as well as language comprehension (Scarborough, 2001; see Figure 2). This model shows how people become skilled readers when word recognition increasingly becomes automatic and language comprehension increasingly becomes strategic. For word recognition, the subskills required alongside phonological recoding skills are phonological awareness and sight recognition. These three skills mutually complement each other to promote the automaticity of reading.

Phonological awareness refers to "one's degree of sensitivity to the sound structure of oral language" (Anthony & Francis, 2005, p.255). Soura (2014) explains phonological awareness as "the recognition that oral language can be divided into smaller components, such as sentences into words, words into syllables, and, ultimately, syllables into individual phonemes." (p.37). The sound structure within a word includes syllables, onsets and rimes, and phonemes (Harris & Hodge, 1995), and phonological awareness in children usually develops from larger to smaller units (Goswami & East, 2000; Treiman *et al*., 1994). Since

phonological awareness entails thinking about language, it is thought of as a metalinguistic ability in early reading (Tunmer *et al*., 1988; Yopp & Yopp, 2000). The awareness of these phonological units can be trained and measured by many types of sound manipulation activities: matching the same sound, isolating the beginning sound, substituting one sound for another, blending sounds, segmenting a word into sounds, deleting a specific sound from the word (Yopp & Yopp, 2000).

Figure 2

The Rope Model (Scarborough, 2001)



Snow *et al*. (1998) state that the levels of phonological awareness at school age predict subsequent reading skill development. Stanovich (1986) says the development of phonological awareness and early reading is interactive. A substantial number of empirical research studies proved the importance of phonological awareness for early reading including word recoding（Gellert & Elbro, 2017; Vandervelden & Siegel,1995). It is because

"phonological awareness helps the beginning readers decipher oriented words by linking them to the spoken words that the child already knows" (Soura, 2014, p.42). Thus, for phonological recoding, children need to acquire not only syllabic or onset-rime awareness but also phonemic awareness, because each phoneme is represented by each letter or group of letters.

A sight word is "a word that is immediately recognized as a whole and does not require word analysis for identification" (Harris & Hodge, 1995, p.233). Although the process of how a reader can recognize words automatically has already been explained earlier in the part regarding the lexical route, when a reader repeats phonological recoding and access to its meaning, it gradually becomes automatized and stored as a sight word (Soura, 2014). Since there are not a few words that cannot be read by phonics rules in English, conscious and repetitive practice is required to learn those words. When learners learn irregularly spelled words, they do not have to remember by heart but can apply a phonological recoding procedure (Share, 1999). Learning irregularly spelled words by sight also follows the same process of learning regularly spelled words, in which forming connections between letters and sounds to bond spellings of the words to their pronunciations and meanings in memory (Ehri, 2005a).

Phonological Word Recoding of ENL Learners

The proficiency and development of phonological word recoding are very different between ENL and ESL/ EFL learners. First, this section reviews studies on the development of literacy skills including phonological word recoding within the ENL context. The stage of reading development by Chall (1983) suggests which stage of overall reading development,

from novice to proficient reader, is the stage of acquiring phonological word recoding. The reading development theory proposed by Ehri (1999) elucidates the progression of the development of phonological word recoding skills and how these skills transform into sight words. After reviewing the theories by Chall and Ehri, the five strands of reading by the National Reading Panel, which has greatly influenced the current reading curriculum in America, will be introduced. Lastly, there will be addressed a specific significant benefit that phonological word recoding skills usually bring to ENL learners.

Chall's Stages of Reading Development

According to Chall's stage of reading development, there are the following six stages of reading skills developed in a hierarchy, each skill layering upon the previous (Chall, 1983): prereading (stage 0), initial reading and decoding (stage 1), confirmation and fluency (stage 2), reading for learning the new (stage 3), multiple viewpoints (stage 4), construction and reconstruction (stage 5). The first three stages identifies the early literacy skills for learning to read.

Stage 0 of prereading is the stage where preschool children get used to printing letters by being read books by adults or older children. A common phenomenon at this stage is that children 'pretend' to read and retell stories by looking at pages of books. They start to recognize some names of the alphabet and learn letters unconsciously through signs.

Stage 1 of initial reading and decoding is the stage where children who just started school, usually 1st grade and beginning of 2nd grade, learn to read simple text. It is because they enter a school and learn letter-sound relations through phonics and use the rules by reading simple stories in practice. In this stage, their decoding skill is still not perfect, and

they are mainly able to read high-frequency words and regular words to which they can apply phonics rules.

Stage 2, which occurs around 2nd to 3rd grades, is when their decoding becomes more accurate and fluent. These skills are acquired through wide readings of familiar and interesting materials that help promote fluent reading. These three stages are the ones when children learn to read, and these skills should be connected to the next stages to deepen their learning and viewpoint through reading. Thus, these basic literacy skills support their academic learning of all the subjects.

Ehri's Reading Development Theory

Ehri (1999) focuses on the process to be able to read single words rapidly and automatically and describes the following four stages: pre-alphabetic phase, partial alphabetic phase, full alphabetic phase, and consolidated alphabetic phase. Children in the pre-alphabetic phase do not use alphabetic knowledge to read words because they have not learned it yet. Instead, they learn printed letters in their environment, such as stop signs and shop signs. They usually "remember how to read words by forming connections between selected non-alphabetic visual features of words and their pronunciations or meanings and storing these connections in memory" (Ehri, 1999, pp.84-85).

When children enter school age and learn to read in school, their reading is pushed into the partial alphabetic phase. They need to learn the shapes of upper- and lower-case letters, and both names and sounds of the alphabet. They also need to acquire phonological awareness to segment words into salient phonemes and phonological units such as onset and rime. These skills allow children to decode an enormous number of words including

unfamiliar words without depending only on their visual memory. Although there are many words in English to remember as sight words because the phonics rule cannot always be applicated, children in this phase remember how to read those words by "forming partial alphabetic connections between one or a few letters in written words and sounds detected in their pronunciations" (Ehri, 1999, p.88). Since their alphabetic knowledge is still partial, they often misread words as other words and use incorrect or unusual spellings for words.

The full alphabetic phase is the phase when their incomplete alphabetic knowledge becomes complete because they gradually "understand how most graphemes symbolize phonemes in the conventional spelling system" (Ehri, 1999, p.92). In this phase, children do not use so much decoding anymore, because words that had been decoded many times have been stored in memory as sight words. Although they sometimes use decoding as one of the reading repertoires when they encounter unfamiliar words, they are also able to analogize new words based on their known words. They can read and spell more easily and more correctly than in the previous phase.

As children spend much more time in reading and writing practice, their reading phase turns into the consolidated alphabetic phase. In this final phase of word reading, they figure out common larger letter patterns such as morphemes, syllables, and onset-rime. This recognition contributes to storing sight words in memory because it reduces the memory load. Thus, they can decode and spell multisyllabic words and unfamiliar words rapidly.

The Five Strands of Reading

After reviewing Chall's and Ehri's theories of reading development, the report by the National Reading Panel (NRP) is discussed here. NRP has greatly influenced the reading

curriculum in the US, which was established by the US congress and was requested to review reading research and determine the most effective teaching methods. Fourteen researchers and teachers were invited, then they reviewed 100,000 studies and published their final report in 2000. This large-scale meta-analysis is highly reliable having reviewed many empirical studies in the late 1990s; their work has also been cited by as many as 1531 studies so far (*e.g.,* Duke & Person, 2009; Good and Lavigne, 2017; Kennedy, 2016; Lindsay, 2007).

The summary of their report showed five essential components for early reading development: oral language/ phonemic awareness, phonics, fluency, vocabulary development, and reading comprehension (NRP, 2000). Among these five components of reading—usually called the 'big 5' —phonemic awareness and the knowledge of the alphabetic principle are the basic subskills for phonological recoding. Regarding phonemic awareness, the summary reported that phonemic awareness instruction (1) was highly effective across a range of grade and age levels, (2) significantly improved children's reading skill more than instruction that lacks any attention to phonological awareness, (3) improved their phonemic awareness, as well as reading and spelling, (4), showed the lasting effects among normally achieving children in their spelling[6].

For phonics, the NRP (2000) reported that systematic phonics instruction (1) produced significant benefits for children having difficulty learning to read regardless of their age[7], and (2) improved the ability of good readers to spell across all grade levels. Phonemic

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[6] The results did not show lasting effects among disabled readers in their spelling (NRP, 2000).

[7] The details about the effectiveness of systematic phonics in NRP (2000) are added here. Systematic phonics instruction improved kindergartners' ability to read and spell words and first graders'

awareness and phonics are complementary— “to be able to make use of letter-sound information, children need phonemic awareness” (NRP, 2000, p.10). Phonemic awareness helps learners, who had learned letter-sound relations, blend sounds to decode words and break spoken words into their constituent sounds to spell words.

Benefits that ENL Learners Receive from Phonological Recoding

Phonological word recoding has specific significant roles in their reading development. First, ENL learners who acquired phonological word recoding usually tend to learn new words more quickly and easily, which is called self-teaching hypothesis. Second, when their phonological word recoding skill becomes automatized, this ability will bridge reading comprehension.

Self-teaching hypothesis. Phonological word recoding plays a self-teaching role in early reading development, allowing learners to independently acquire new words. The self-teaching hypothesis, proposed by Jorm and Share (1983), emphasizes its crucial role in fostering children's development as skilled readers, although it may be less significant in proficient adult reading. Hamada and Koda (2008) elaborate that effective phonological recoding facilitates the connection between written words and oral vocabulary, enabling easy storage of decoded information in long-term memory.

To provide evidence supporting this hypothesis, Jorm *et al.* (1984) examined the role of phonological recoding in reading acquisition. Children were assessed for their

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ability to decode, spell and comprehend text. Among older children, phonics instruction was effective on their word-decoding and -spelling and text comprehension, but the improvement of text comprehension was not significantly effective.

phonological recoding ability at the end of kindergarten, along with tests for sight word reading and verbal intelligence. Two groups of 28 children, matched on various factors but differing in phonological word recoding skills made greater gains in reading achievement by the end of Grade 1 and 2, providing support for the self-teaching role of phonological word recoding.

Share (1995) suggests that contextual guessing and direct instruction alone are insufficient for significant printed word learning. Instead, successful phonological word recoding of unfamiliar words offers opportunities to acquire specific orthographic information, forming the basis for proficient word recognition.

McCandliss *et al*. (2003) investigated the reading progress of children with deficient phonological word recoding skills post-first grade, utilizing a 20-session intervention named Word Building[8]. Children initially exhibited deficits in phonological word recoding, reading comprehension, and phonemic awareness, with a pattern of accurate phonological recoding of initial graphemes but difficulties with subsequent ones. The intervention focused on progressively teaching each grapheme position within words, resulting in significant

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[8] According to McCandliss *et al*. (2003), the Word Building approach systematically introduced increasingly complex grapheme-phoneme units and word forms, starting from basic structures like consonant-vowel-consonant (CVC) and progressing to more intricate patterns like CCCVCC. The program focused on various phonics elements, including short vowels, long vowel sounds controlled by silent e, vowel digraphs (e.g., ee, ai, oa, ow, oy), and changes in vowel sounds in different phonetic environments. Each lesson involved manipulating letter cards to form words, with tutors guiding children through inserting, deleting, or exchanging specific cards to transform words and draw attention to different positions within words while ensuring consistent exposure to letter patterns.

improvements in phonological word recoding attempts and standardized measures of reading comprehension and phonological awareness compared to a control group, supporting the self-teaching role of phonological word recoding in improving various reading skills.

Automatic phonological recoding. Phonological recoding is necessary for reading, although it is not sufficient for reading (Hoover & Gough, 1990). Skilled reading requires automatic and strategic reading skills[9]. To improve automatic reading skills, phonological recoding needs to be automatized.

Mcquade (1983) experimented with English-speaking college students by using pseudowords to examine the process that pre-lexical phonological recoding becomes automatic with stimulus repetitions. Macquede found the readers had used phonological recoding more obviously in the beginning, but phonological recoding had been gradually altered by sight words throughout repetitions. This is how phonological word recoding becomes automatized. This process of automatization can also be explained by brain science:

> Beginning readers rely on visual recognition information and use both Broca's area[10] and the developing visual word form area to slowly analyze each word. Intermediate and skilled readers, on the other hand, rely mainly on the visual word form area to process and direct information to interconnected sites, rapidly producing meaning

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[9] Strategic reading requires background knowledge, vocabulary, verbal reasoning, and literacy knowledge (Scarborough, 2001).

[10] Broca's area, identified by Paul Broca in 1861, is a region in the left frontal lobe associated with language production difficulties known as aphasia. This area is crucial for processing vocabulary, grammar, and sentence meaning comprehension, as indicated by recent imaging studies (Soura, 2014).

> from words, with only marginal help from Broca's area when needed. (Soura, 2014, p.62)

Automatic phonological recoding is the key to bridge comprehension. If a reader requires considerable processing capacity in phonological recoding and consumes resources in working memory, their processing capacity is less available for comprehension and other high-level processes in reading, such as the generation of inferences (Perfetti & Hogaboam, 1975). Perfetti (1975) found less skilled readers used more time for word recoding than skilled readers, which suggests that failure in automatic phonological recoding may lead to diminished comprehension skills.

Phonological Word Recoding Instructions in the ENL Context

Even English-speaking children do not naturally grasp the alphabetic principle just by being exposed to books. They need to be taught how to read at school. The phonics movement gained momentum among English-speaking countries after the late 1990s, particularly in the United States and the United Kingdom. It emphasized teaching reading through the systematic instruction of phonics, focusing on the relationship between sounds and letters. In the US, the report by the National Reading Panel (2000) emphasized the significance of phonics in early literacy education, while in the UK, the "National Literacy Strategy" by the Department of Education (2011) advocated for systematic phonics teaching. In Ireland, the "Literacy and Numeracy for Learning and Life" strategy (2011) promotes phonics instruction, and in New Zealand, the "Literacy Learning Progressions" guide (2010) offers insights into teaching literacy, including phonics, across proficiency levels.

Although some argued against phonics from the perspective of the whole language approach (or top-down approach)[11], this debate has shifted from 'whether phonics should be taught' to 'how it should be taught effectively' (Hepplewhite, 2001). Cameron (2001) is critical of the opposition between these two approaches at the primary or elementary school level, as an "artificial" argument and a 'disservice' to learners because beginning language learners usually need them both. Nowadays the balanced approach—both the whole-language approach and phonics are integrated— has been recommended (Dombey, 2002; NRP, 2000; Pressley *et al*., 2002). Adam (1990) says, for children without enough literacy preparation, bottom-up instruction (phonological awareness, orthographic knowledge, phonics) should be introduced first, and as soon as they learn to read words, they should be exposed to meaningful written text to sense the utility of their bottom-up lessons.

Many researchers have proved that phonics contributes to early reading development more effectively than other reading approaches, such as the whole language approach and basal reading approach, etc. (Blachman *et al*., 1999; NRP, 2000; Stuart; 1999). Furthermore, phonics contributes more prominently to children who have difficulty reading (Blachman *et al*.,1999; Brown & Felton,1990).

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[11] The whole language approach —language should not be broken down into letters and combinations of letters because it is a complete system of making meaning with words functioning with each other in context (Huang, 2014)— led to a great debate about the pros and cons of phonics (or bottom-up approach). Krashen, known for the input hypothesis, severely criticized phonics and believed that people learn to read only by reading, not by learning through phonics (Krashen, 2014; 2019).

For the discussion of ‘how phonics should be taught effectively”, many researchers have conducted studies comparing explicit and systematic phonics to non-systematic phonics. Among many types of phonics, studies in English-speaking countries have shown that explicit and systematic phonics is more effective than implicit and unsystematic instruction or no phonics (Stuart, 1999; Ehri *et al*., 2001; Johnston & Watson, 2005; Graaff *et al*., 2009; Foorman *et al*., 1998).

Phonological Word Recoding in the ESL/ EFL Contexts

Phonological recoding plays a crucial role for ESL/EFL learners, who often encounter new words both orally and visually simultaneously (Hamada & Koda, 2008). However, research on word recognition in ESL/EFL contexts remains scarce (Han, 2015). In contrast to ENL students, ESL/EFL students face numerous challenges when it comes to acquiring phonological word recoding skills. Moreover, even if they manage to develop some level of phonological word recoding ability, it does not always guarantee sufficient reading comprehension, unlike ENL learners. This section delves into the challenges faced by EFL learners and focus on research conducted with young EFL learners in Japan. Additionally, it reviews a unique curriculum designed to foster phonological word recoding skills in Japan.

Challenges for EFL Learners

Challenges of acquiring phonological word recoding skills. Challenges in acquiring phonological word recoding skills are more pronounced for ESL/EFL learners compared to ENL students. On one hand, as noted by Shin and Crandall (2019), the L1 literacy skills of young EFL learners can be an asset in developing literacy in English. However, differences between the writing systems of their native language (L1) and English can pose difficulties

for early learners. Shin provides examples of these challenges resulting from linguistic differences, such as non-alphabetic writing systems (e.g., Chinese), different alphabets (e.g., Russian or Greek), Roman alphabets with sound or symbol differences (e.g., Spanish), and reading directions (e.g., right-to-left for Arabic or top-to-bottom for traditional Chinese and Japanese).

The larger the language gap between the learner's L1 and English, the more challenging it becomes for EFL learners. As previously mentioned, English is considered an opaque language with less consistent letter-sound relationships compared to more transparent alphabetic languages like German and Spanish. Even though German and Spanish also use an alphabetic writing system, reading in English can be more complex for learners of these languages due to the differences in consistency. For instance, Frith and Landerl (1998) found that German EFL children made more errors in phonological word recoding in English, particularly with vowels, which represent the most inconsistent aspect of English orthography.

The language gap between Japanese and English is much wider compared to alphabetic languages like German or Spanish. This is not solely due to the fact that Japanese is not an alphabetic language. The letter corresponds to a phoneme in English, whereas mora—similar to syllable—is a basic phonological unit and corresponds to a letter in Japanese. Consequently, Japanese EFL learners have fewer cues for phonological recoding of English words. As mentioned in the first chapter, Brown and Hayne (1985) found that Japanese EFL learners tend to face more difficulties in phonological word recoding. Yamada and Abe (2008) also studied adolescent Japanese EFL learners and found high accuracy rates

for real words but low rates for nonwords. An error analysis of nonword phonological word recoding revealed that less-proficient readers struggled with understanding onset-rime units. For example, they failed to pronounce nonwords like "dalf" or "durn" because they couldn't apply the pronunciations of "half" or "turn." The results of these studies above imply that Japanese EFL learners may be disadvantaged if they do not know how to read in English. When they need to rely on their L1 reading strategy inappropriately or memorization of the spellings by heart, it would be difficult to read in English effectively. Therefore, the importance of introducing phonics to develop phonological word recoding needs to be emphasized from the early reading stage.

Recognizing the challenges that Japanese EFL learners encounter in mastering phonological word recoding, Allen-Tamai (2010a) emphasizes the importance of teachers understanding both the benefits and limitations of phonics. Teachers should be aware that many English words cannot be solely decoded using phonics rules, and it is crucial to introduce phonics as one approach for phonological word recoding without overwhelming learners with numerous rules.

With these considerations in mind, phonics should be effectively introduced to develop EFL learners' phonological word recoding skills. Huo and Wang (2017) reviewed 15 studies conducted in EFL contexts and found a positive impact of phonological-based instruction, including phonics and phonological awareness instruction, on phonological word recoding. Allen-Tamai (2013) conducted a longitudinal study in the upper grades of a public elementary school in Japan and found that systematic literacy instruction, including alphabetic instruction, phonological awareness instruction, and phonics, significantly

improved their decoding ability. These findings suggest that appropriate instruction greatly contributes to fostering young EFL learners' phonological word recoding ability.

The gap between phonological word recoding and comprehension. One crucial differentiation between EFL and ENL learners in phonological word recoding lies in the strength of association between phonological word recoding and the semantic knowledge of words (Jiang, 2000; Huo & Wang, 2017). While phonological word recoding can directly facilitate ENL learners' understanding of the meaning of words, the same cannot be said for EFL learners. In the case of EFL learners, phonological word recoding alone may not always lead to comprehension. Therefore, they often need to engage in additional vocabulary learning to enhance their understanding of words.

While several studies have demonstrated the effects of phonological word recoding[12], it is important to acknowledge that these effects have certain limitations. Denton *et al*. (2004) observed the positive impact of systematic phonics on word identification among Spanish-dominant bilingual students in grades 2 to 5. However, they did not find a significant effect on word attack or passage comprehension. Nakamoto *et al*. (2007) conducted a longitudinal investigation to examine word recoding and reading comprehension in Spanish-speaking English language learners from first through sixth grades. The results indicated that the learners' word recoding and reading comprehension scores showed growth over time.

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[12] For example, Yoon (2015) have demonstrated a significant robust impact on overall reading comprehension among EFL in the early elementary grades.

However, while their word recoding development continued to improve, their reading comprehension began to lag behind starting from the third grade.

These findings above suggest that ESL learners require more targeted and careful instruction to bridge the gap between phonological word recoding and its automatization, ultimately enhancing their reading comprehension.

Literacy Curriculum to Foster Phonological Word Recoding in Japan

According to Shin and Crandall (2019), there are concerns that early English language learning might have a negative impact on children's language and literacy development in their L1. Some EFL programs choose to postpone literacy instruction for young learners during the early grades, concentrating solely on developing their listening and speaking skills. Gardner (2017) pointed out that that English education in Japanese elementary schools had predominantly centered around listening and speaking, creating difficulties for students when they transitioned to secondary school, where the emphasis shifted to grammar and reading.

English classes were introduced as regular subjects to the fifth and sixth grades in public elementary schools in 2020. With this English education reform, the curriculum now includes not only listening and speaking but reading and writing instruction for these grades. However, as mentioned in the previous chapter, the Course of Study does not give significant emphasis to phonics or developing phonological word recoding skills. The reason for this inhabitation is that explicit instruction of phonics is believed to have the potential to cause confusion among elementary students. Instead, the curriculum suggests that students should implicitly notice letter-sound relationships as they encounter spellings they have already

learned orally. The explicit teaching of the relationships between spelling and pronunciation has been deferred until the junior high school stage (MEXT, 2017a, p.78).

Let us consider the following quotation and verify what is written in the junior high school Course of Study:

> In junior high school, it is necessary to move from teaching the reading of letter names in elementary school to teaching the sounds that letters represent. Although there are exceptions, there is a basic correspondence between pronunciation and spelling in English. This correspondence should be taught after students have become somewhat familiar with the spelling of words and their pronunciations. Students should be taught these correspondences gradually, starting with the simplest ones, once they are somewhat familiar with the spelling of words and their pronunciation. (MEXT, 2017b, p.92) [translated by author]

What the passage makes clear is that phonics is supposed to be introduced in the middle school stage, however, it must be noted that it is still considered as a secondary and supplementary goal and not included in the main goals of reading. Murakami (2015) mentioned reading and writing of words and whole sentences have immediately begun after light alphabet instruction without phonics at the elementary school level, which has led to reading difficulties among Japanese EFL learners.

Hisano (2014) explains how phonics has been dealt with at the beginning of junior high school stage. Hisano says that even if phonics is introduced for a few months, after a certain period of instruction, traditional English instruction begins and phonics instruction fades away. These remarks point out efficient ways of phonics to develop phonological word

recoding has been missing after simple alphabet instructions and before reading comprehension.

As Gardner (2017) highlighted earlier, Allen-Tamai (2022) addresses the issue of bridging the gap between elementary and junior high schools in Japan. The challenge lies in the fact that junior high school students are now expected to read and write many words from the very beginning, especially after the revision of the Course of Study and the textbooks. Consequently, the amount and quality of literacy learning in elementary schools have become a significant concern. Hence, there is an ongoing debate about how phonics instruction should be approached meticulously during the early reading stage, spanning from elementary to middle school in Japan.

Young EFL research in Japan. The number of studies measuring phonological word recoding is very limited in Japan. A longitudinal study by Allen-Tamai (2013) targeted fifth graders in an elementary school in Japan, and found that the students improved their word decoding ability after continuous literacy instruction for a year. Although the literacy instruction included synthetic phonics, students acquired alphabetic knowledge and phonological awareness through instruction before phonics. They also had an opportunity to develop their oracy through a story-based curriculum. Allen-Tamai introduced literacy instruction by using ten to fifteen minutes for each class for a whole year. At the end of the academic year, the students improved their phonological awareness and word decoding ability. The word decoding ability was measured by a paper-pencil test asking them to choose one spelling corresponding to each illustration. Although this measurement does not have the

children pronounce the words, it is assumed that the phonological word recoding happens in the children's minds when they select the spellings.

Kizawa (2018), who targeted first to sixth graders in an elementary school in Japan, reported that the ability of phonological word recoding improved several months after the literacy introduction of the program among the students above grade four. Kizawa used Jolly Phonics, one of the world-wide-used methods for synthetic phonics. In their study, phonological working memory and the ability of phonological word recoding were measured through individual tests in which students were asked to pronounce the words. However, the methods for word selection, test reliability, and data analysis were not fully explained. Therefore, in addition to the lack of research, the question arose of how to measure phonological word recoding ability in the Japanese educational context.

A unique program developed in Japan. Despite the challenging situation for developing reading skills in the early stage of education in Japan, a unique program has been developed and practiced in Japan. Allen-Tamai (2010a, 2019, 2022) believes that literacy skills in English give learners 'the power to live' and have been developing curriculum and teaching materials in parallel with empirical research even before English became an official subject in public elementary schools. There are three main characteristics in her program: (1) the literacy instruction is done every unit for about 10 minutes as a routine, (2) both alphabetic knowledge and phonological awareness are developed sufficiently before introducing phonics (bottom-up approach), (3) both bottom-up and top-down approach are integrated by using the story-based curriculum. Table 3 shows the summary of the literacy program that was implemented in public elementary schools for two years in upper grades.

Table 3

The Summary of the Literacy Program (Allen-Tamai, 2022, p.23)

The 1st Year		The 2nd Year	
Bottom-Up	Top-Down	Bottom-Up	Top-Down
Names of the alphabet (uppercase) Writing the alphabet letters (uppercase/ single letter to multiple letters) Names of the alphabet (lowercase) Writing the alphabet letters (lowercase/ single letter) Phonological awareness Onso-Taiso*[1] Phonics (consonant)	Reading the manuscript of '*Little Red Riding Hood'* (420 words counted by Token) *[2]	Writing the alphabet letters (lower case/ multiple letters) Phonics (onset) Phonics (rime) Vowel (short vowels) Digraph (two letters one sound—consonant) Vowel (long vowels) Phonological word recoding	Reading the manuscript of *'Momotaro'* (477 words counted by Token) *[2]

Note.

*[1] *Onso-Taiso (Phoneme Exercise)* is the original activity developed by Allen-Tamai (2010a) for developing phonological awareness by segmenting the alphabet names into these phonemes.

*[2] The story-based curriculum (Allen-Tamai, 2010a) deals with well-known folktales such as Little Red Riding Hood or Momotaro (Peach Boy). After students recite the lines of the stories orally through *Joint-storytelling,* they read the manuscripts.

Allen-Tamai (2022) conducted a quasi-experimental study to examine the effectiveness of this program by comparing the experimental group to the control group. The experimental group included 149 students in the three schools where the program had already been introduced; the control group included 604 students in other eight schools where the program had not been introduced yet. The result showed that students in the experimental group performed significantly better in the tests measuring (1) letter knowledge (lowercase), (2) phonological awareness (onset, rime), (3) vocabulary (word spelling, word meaning) in

the end of the first year. Since the vocabulary test measures word knowledge including phonological word recoding, the first year of the program was verified to be effective to develop their phonological word recoding.

The study was continued in the second year. In the second year, the eight control groups also started the program. Therefore, the study compared the effects on the reading proficiency of the students who received the program for two years to the students who received the program for a year. Although the study did not find a difference between the two groups at this point, the comparison of the path analysis showed the effectiveness of continuing the program: the experimental group read words and sentences by using phonological awareness and the knowledge of letter-sound relationships more actively.

Research Question

The object of this study is to investigate the phonological word recoding of young Japanese EFL learners from various angles. The first research question is whether there is a difference among the different levels of the words reflecting the complexity of phonological word recoding. The study compared three tiers reflecting different levels of complexity: the emergent tier (Tier 1), consisting solely of CVC words with single consonants and short vowels; the beginner tier (Tier 2), including CVC/CCVC/CVCC words with consonant digraphs and/or clusters; and the transitional tier (Tier 3), comprising CVC words with single consonants and long vowels. It was hypothesized that Tier 2 would be more challenging than Tier 1 due to the presence of consonant digraphs and clusters, which complicate phonological word recoding (McLeod et al., 2001; Tunmer & Nesdale, 1985). Additionally, Tier 3 was expected to be the most demanding, as certain teaching methods emphasize a sequential

progression from short to long vowels, considering the complexity of phonological word recoding (Templeton, 1998; Martinez, 2011; Heye & Flanigan, 2014; Allen-Tamai, 2019).

The second research question investigates the relationship between phonological word recoding and semantic word knowledge. Some might predict that knowing the meaning of a word will help with phonological word reading, and that idea supported by the lexical route is not to be dismissed. However, the focus of this thesis is on early EFL learners who are in the process of learning how to read words aloud, thus the thesis attempts to understand the mechanism of the phonological route rather than the lexical route.

The third question is what kind of error characteristics there are in their phonological recoding. The item analysis and the error analysis were conducted to explore the reality of the young Japanese EFL learners' phonological word recoding. It is hypothesized that their phonological word recoding will be affected not only by the complexity (single consonants, consonant digraphs/ clusters, short vowels, long vowels) but also their L1. For example, the consonants that do not exist in the Japanese language, such as /f/, /v/, /ɹ/, and /ð/, would be more difficult for them to pronounce. The descriptive study to answer these three research questions above is conducted quantitatively and qualitatively in Chapter 3.

The last four exploratory questions are investigated qualitatively in Chapter 4. Expanding on the findings from Chapter 3, this chapter delves into the additional analyses to explore the following aspects:

(1) The process of automatization of their phonological word recoding skill.

(2) The relationship between phonological word recoding and word recognition.

(3) The students' respond to the literacy program fostering phonological word recoding ability.

(4) Their motivation towards reading.

These exploratory investigations aim to provide a more comprehensive understanding of their early literacy skills, including their phonological word recoding ability, as well as their interactions with the curriculum and engagement in literacy learning.

CHAPTER 3

DESCRIPTIVE STUDY OF PHONOLOGICAL WORD RECODING

This chapter explores young Japanese EFL learners' phonological word recoding from various perspectives. As mentioned in the literature review, when learners learn the relationships between alphabetic principles, the complexity— single consonants, consonant digraphs, consonant clusters, short vowels, and long vowels (vowel digraphs)—affects their performance in phonological word recoding. The phonological word recoding test (PWR test) in this study, reflecting this complexity, was developed based on the Tiered Spelling Inventory from Hayes and Flanigan's (2014) tests. Although these tests have been used mainly for ENL or ESL learners in English-speaking countries, they were used to assess the development of young Japanese EFL learners' phonological word recoding.

Phonological word recoding ability largely affects the understanding of the meaning of a word because the *phonological route*—first, the letters are converted to sounds, and then the pronounced words are accessed by their semantic lexicon— is actively used, especially when novice learners understand word meanings. To examine the process of the *phonological route*, the relationships between the PWR and word meaning (WM) tests were analyzed.

Further, the errors that occurred in the PWR test were analyzed. After examining the results of classical item analysis, the errors in each item were analyzed phonetically in detail. The first error analysis reports the error types for each word, and the second reports the error types found across words. Error types for each word are reported initially, followed by a comprehensive analysis of errors across words, which aims to summarize the phonological word recoding characteristics of the participants.

Two tests were administered to 121 sixth graders to measure their abilities, and interviews were conducted with 33 students who were selected among them. The actual phonological word recoding skills of the participants were explored through PWR testing and analysis.

Method

The research was conducted at two schools in one ward of Tokyo in Japan. This region has promoted elementary English education since 2006 under its unique educational policy independent of the national curriculum to some extent. In 2006, one unit-hour of English class was introduced to grades one to six. The board of education of the district decided to implement a new curriculum developed by Allen-Tamai (2010a, 2019, 2022) in 2014. The curriculum was an integrative curriculum to foster both oracy and literacy based on a story-based curriculum and systematic literacy. The students at the research sites received special literacy instruction from grade three and above. They learn the alphabetic letters and their names and are trained to develop their phonological awareness from grade three. They learn the alphabetic principle through phonics for phonological word recoding in grades five and six. The details will be explained in the next chapter.

Participants in the PWR Test and WM Test

The participants were 121 sixth graders (63 girls, 58 boys) from two schools. The students in both schools had English classes every week from the first through fourth grades, and twice a week from the fifth through sixth grades. School A had two classes and there were 34 students (18 girls, 16 boys) in total. The researcher taught them English directly as an English teacher for two years when they were in the fifth and sixth grades. School B had

two classes and there were 87 sixth graders (45 girls, 42 boys). The researcher did not teach them but observed one of the classes when they were in the fifth and sixth grades. As well as School A, another JTE who was well-trained for the same curriculum taught English to them.

Participants in the additional Recalling Interview

33 students (16 girls, 17 boys) out of the 121 students were selected based on the result of the PWR test scores and their motivation measured in a questionnaire. The students were placed into the four categories: (1) high PWR test score + high motivation (HPHM); (2) high PWR test score + low motivation (HPLM); (3) low PWR test score + high motivation (LPHM); (4) low PWR test score + low motivation (LPLM); and two students from each category were selected from each class. However, the numbers of selected students have a slight variation because permission was not obtained from some parents. Also, the students in School A were so highly motivated that it was difficult to find less motivated students who scored the PWR test well. Instead of the missing students, other students were selected from different categories. Students 1 to 8 (HPHM learners), students 9 to 12 (HPLM learners), students 13 to 23 (LPHM learners), students 23 to 33 (LPLM learners) participated in the recalling interview.

Instruments

The PWR test were used to measure participants' ability to read words aloud; the WM test were used to measure their understanding of the meaning of written words. The PWR test measured the phonological word recoding ability of monosyllabic words including short or long vowels. Individual participants were asked to pronounce each word on a computer screen. The WM test measured their orthographic and receptive knowledge of the words. In

addition to the PWR test, the recalling interview was conducted on a subpopulation of students to interpret the errors they had made during phonological word recoding.

PWR Test

The participants were administered a test aiming to measure their ability of phonological word recoding. They were asked to read aloud print words. The test was conducted in two sessions. The test in the first session had twenty monosyllabic words including short vowels: ten CVC words only including single consonants and ten CVC/ CVCC/ CCVC words including either a digraph or consonant cluster, or both. The test in the second session had five monosyllabic words including long vowels. They were CVC words without digraphs or consonant clusters.

The words were selected referring to the Tiered Spelling Inventory created by Hayes and Flanigan (2014). The inventory is constituted of three tiers: the emergent tier (Tier 1), the beginner tier (Tier 2), and the transitional tier (Tier 3). The first ten words in the first session corresponded to Tier 1; the last ten words corresponded to Tier 2; the five words in the second session corresponded to Tier 3. Although Hayes and Flanigan's inventory contained words with r-colored vowels such as *-ar* in *harp* or *-or* in *short* and some abstract vowel digraphs such as *ou* in *pouch* and *oi* in *join* in the transitional tier (Tier 3), those words were excluded because the participants had not been taught.

As in the test by Hayes and Flanigan, the test in this study did not include pseudowords. It is because this study also aims to understand phonological word recoding within word knowledge including the relationship with word meaning. Also, taking into consideration of the educational effect on the children, pseudowords were not used. Since the

words in the test were selected from materials used in class, the words were familiar to most students. Also, words were selected so that every short vowel is equally included, and a wide range of consonants is covered. All the words were selected based on a pilot test conducted in the previous year (Kobayashi, in press). Appendix A shows test items used in the test.

WM test

Word knowledge in this study is defined as knowing the word's meaning after reading its spelling. The WM test used the item style developed by Allen-Tamai (2010b), which had based on Dale and O'Rourke (1986). The students were asked to write the meaning of the word in Japanese if they have known the meaning. The words used in the PWR test were again used in the WM test.

Recalling Interview

The recalling interview was conducted on the subpopulation of the students to examine the participants' errors better. The researcher asked the selected students to read aloud the words that they had mispronounced in the PWR test. When the students made the same error again, the researcher asked why they read in that way. When the students did not make the same error, the researcher reminded them how they had mispronounced the words in the PWR test and asked them to recall what they had been thinking. To elicit students' thoughts, the researcher avoided offering the correct answer immediately. Instead, the researcher asked questions or offered scaffolding to understand the cognitive process of their phonological recoding. The conversation was recorded with a voice recorder and some observation notes were also made during the interview. These qualitative data were used to carry out further analysis of errors that the students had made in the PWR test performance.

Procedure

The tests and interviews were conducted from the end of 2021 to the beginning of 2022 (see Table 4). The tests were divided into two sessions by considering the amount of time that young learners can focus on in a single session. Soon after the PWR test, the corresponding WM test was conducted on the same day. The 121 students (34 students from School A and 88 students from School B) participated in the first session, and 75 out of the 121 students (28 students from School A and 47 students from School B) took part in the second session. The reason for the decrease in participation in the second session was some students who were absent to prepare for the entrance exam of junior high school during that period. After the test were scored, the subpopulation of the participants was selected based on the first session results, and the recalling interview was conducted.

Table 4

Test and Interview Procedure

School	Test	Date	Participant
School A	Tier 1 and 2 (PWR + WM)	Nov. 26th, 2021	34
	Tier 3 (PWR + WM)	Jan.19th, 2022	28
	Interview	Jan. 24th to Mar.14th ,2022	13
School B	Tier 1 and 2 (PWR + WM)	Dec. 1st, 2021	88
	Tier 3 (PWR + WM)	Jan. 21st, 2022	47
	Interview	Jan. 25th to Mar.1st ,2022	20

PWR Test Using Computers

Computers were used to record the participants' oral production because it was impossible to conduct face to face assessment due to the prevalence of COVID-19. Multiple laptop computers were installed in a few classrooms in each school. Each student sat at a

desk where a computer was placed. Each computer was connected to test administrators[13] by using Zoom, a cloud-based video conferencing service. Each student was asked to put on a headphone with a microphone and follow the instruction given by the test administrator on the screen. Each participant was first given two practice questions and then started to answer questions. The first session including these practice items lasted for about seven minutes. The video made by the researcher showed each word automatically on the screen (see Appendix B). Each word was presented for eight seconds, and a chime was inserted so that the participants could notice when the next item appeared. The test administrators were trained for approximately 75 minutes to minimize the differences which might be caused by their administrative styles. The responses from the participants were recorded by recording-appropriate functions in the Zoom application. All of these test procedures had been developed by pilot tests conducted in the previous year (Kobayashi, in press). The second session was conducted in the same manner as the first session. It was conducted approximately one and a half month after the first session.

WM Test

The WM test was a paper-pencil test. The students worked on this test soon after finishing the PWR test individually in the space outside the classroom where the computers were installed for the PWR test. Although there was not any time constraint, almost all the students finished within about five minutes.

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[13] The administrators were undergraduate or graduate students majoring in English education and Japanese teacher of English working in the research site.

Recalling Interview

The interview was conducted individually for approximately 20 minutes for each participant during recess time or after school. The researcher asked questions to examine why the students mispronounced the words. Depending on the individual, the researcher changed the approach of asking questions and sometimes offered scaffolding to help them read the words. The recalling interview focused on the words from Tier 1 and 2 and not all words were examined because of the limited time. The interviews were recorded by using a voice recorder and the recorded data was transcribed. The tables in Appendix C show the students' ID and the words they recalled with errors during the interview.

Ethics

The consent for the study was obtained from the school principals and the homeroom teachers in each school (see Appendix D and E). The researcher explained the purpose, procedure, schedule, and educational benefit of the study, and the duty of confidentiality following the printed consent form. In the phonological word recoding test using Zoom, from the viewpoint of protecting their privacy, only the audio recording was made with their video turned off.

For the interview, consent for the interview was obtained not only from the school principals and homeroom teachers but also from their parents. In addition to the consent form, the researcher also wrote a letter to the parents requesting permission to conduct the research. The interviews were conducted only on those students who have been permitted by their parents and themselves to participate in the study.

Data Analysis

The results of the analysis corresponding to the first three research questions are presented as follows. First, the differences in the complexity of phonological word recoding among the three tiers of the PWR test were examined. Second, the relationship between phonological word recoding and the understanding of word meaning was examined to determine the possible phonological route. Third, item and error analyses were conducted to understand how well young Japanese EFL learners acquire phonological word recoding ability and what kinds of errors occur in their phonological word recoding.

As explained previously regarding the PWR test, Tier 1 included only CVC words made of single consonants and short vowels; Tier 2 additionally included CCVC, CVCC, and CCVCC words with consonant clusters and digraphs; and Tier 3 included CVC words made of single consonants and long vowels. Thus, these tiers reflect the complexity of the alphabetic principle and the order of the phonics instructions that the participants were given.

Development of the Evaluation Criteria

Students' productive performance in the PWR test was digitized as follows: Each pronounced word was scored as 1 for intelligible pronunciation or 0 for unintelligible pronunciation, depending on their evaluation as intelligible or not intelligible by the two raters. The first rater was the researcher, and the second rater was a doctoral student in the same field who also has experience teaching English to young Japanese EFL learners. This evaluation refers to the Lingua Franca Core (LFC; Jenkins, 2000). Jenkins (2000) developed the LFC by analyzing conversations between speakers of English as a second language and established the minimum standard required for mutual understanding in English. The LFC

indicates some features of pronunciation for intelligibility while allowing for a diversity of pronunciations of English as an international language (IL). The criteria are as follows: (1) individual consonant phonemes; (2) continuous consonants; and (3) differences between long and short vowels.

The LFC for individual consonant phonemes states that almost all the consonants except for /θ/ and /ð/[14] must be pronounced correctly and one must be particularly careful with minimal pairs (e.g., /b/ and /v/, /l/ and /r/, /f/ and /v/). According to one of the phonetic features of the LFC, fortis plosives /p/, /t/, and /k/ should be pronounced with aspiration when they appear at the beginning of a stressed syllable (e.g., *pig*, *tie*, *cap*). If the puff of air is not produced in these plosives, it becomes harder for a listener—especially nonbilingual English speakers—to recognize the sound as voiceless, potentially leading to confusion with sounds such as /b/, /d/, and /g/ (Jenkins, 2000)[15]. Some variations are allowed only in /θ/ and /ð/ because the substitutions of /θ/ with /t/ and /ð/ with /d/ are often used by many L1 speakers of English, and they are easier to produce for the majority of L2 speakers of English (Jenkins, 2000).

After the final consonant of a word, a vowel is often inserted. This phenomenon is called *paragoge*, and it is only found in ILs and not in the first language (Jenkins, 2000).

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[14] Jenkins mentioned that the substitution that the Japanese speakers tend to perform—replacing /ð/ with /z/——is unintelligible because it is less familiar to all English speakers, as it relates to an international language.

[15] If the word-initial plosives before the nucleus are misidentified as voiceless, some words will be identified as different words (e.g., *pig* as *big*, *tie* as *die*, *cap* as g*ap*).

Because a schwa is often inserted, it is also called *schwa paragoge.* Jenkins stated that *paragoge* does not affect intelligibility, at least if the syllable to which the vowel is added is not stressed. It is assumed that paragoge will also be found in this study, because an open CV structure tends to be preferable for Japanese EFL learners (Makino, 1977). Therefore, the evaluation determines whether stress is placed on the paragoge syllable.

For continuous consonants (consonant clusters), the two ways L2 English speakers commonly simplify difficult English pronunciation are *deletion* and *addition*. The deletion of consonants is a threat to intelligibility. Jenkins (2000) raised the example of a Taiwanese learner pronouncing the word *product* as [ˈpɒdʌk] by deleting /r/ and /t/and reported that it was unintelligible. The addition approach comprises *epenthesis* and *paragoge*[16]. Paragoge is the addition of a vowel at the end of a word, as explained above, while epenthesis is the addition made between sounds (Jenkins, 2000). Jenkins mentioned that consonant epenthesis occurs among L1 speakers and vowel epenthesis is seen in ILs. This is occasionally problematic when an epenthetic syllable is stressed. Otherwise, addition does not affect intelligibility compared to deletion. Jenkins (2000) raised the example that Japanese EFL learners pronounced the word *product* as /pəˈrɒdʌkʊtə/ by inserting a vowel after each consonant and reported that it was perfectly intelligible. Thus, same as paragoge on word-

[16] *Epenthesis* is "the addition of a sound word-initially or between sounds." In L2 speech, a vowel is often inserted; *paragoge* is "the addition of a vowel word-finally, with schwa paragoge being found only in ILs and not in first languages," and another linguistic phenomenon where a sound is added at the end of a word (Jenkins, 2000).

final consonants, the evaluation will be based on whether stress is placed on the epenthetic syllable.

There is more variance in sounds in vowels than in consonants, not only among L2 speakers but also among native English speakers. Thus, Jenkins (2000) claimed that the maintenance of quantity (relative length) is more important than quality (articulation point). The LFC requires a fortis/lenis[17] differential effect on the preceding vowel length. The same short vowel becomes relatively longer and lax when the consonant following it is a lenis sound rather than a fortis. For example, the sound length of the short vowel *a* in *mad* becomes longer than that in *mat*. When the two raters assess whether vowel length affects intelligibility, this idea is followed.

Jenkins (2000) also mentioned diphthongs. The researcher's study includes three diphthongs, /eɪ/, /aɪ/, and /oʊ/. Although several diphthongs are common to all native speakers' varieties, diphthong substitutions do not normally cause problems because even L1 accents of English vary in their use. However, Jenkins also explained that substitution affects intelligibility when pronunciation produces a different recognizable word. Acknowledging the variety of vowels, however, this study evaluates the three diphthongs as they are—/eɪ/, /aɪ/, and /oʊ/. This is based on the researcher's belief, from the perspective of a teacher, that students need to learn how to produce diphthongs. Without knowing and learning how to pronounce

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[17] In the case of plosive (stop) consonants, voiceless sounds where the vocal cords (e.g., /k/, /t/, /p/) are fully open have more force compared to voiced sounds where the vocal cords are mostly closed (e.g., /g/, /d/, /b/). Therefore, the closure of the vocal tract and the tension of each articulatory organ are stronger to counterbalance this. The former is referred to as "fortis" or "hard" sounds, while the latter is called "lenis" or "soft" sounds (Takebayashi, 1996).

diphthongs at the beginning of their literacy training, they could miss the opportunity to learn these sounds, because diphthongs do not exist in the Japanese language.

Based on the idea of the LFC, the criteria for the evaluation of the PWR test conducted in this study were developed. The criteria are described below and were referred to by the two raters when they assessed whether a pronounced word was intelligible.

(1) Consonants: Consonants must be pronounced correctly. However, only substitutions of /θ/ with /[t] and /ð/ with [d] are acceptable. Regarding word-final consonants, the schwa paragoge is permissible as long as the paragoge syllable is not stressed.

(2) Continuous consonants: Deletion is not permissible. Vowel epenthesis is permissible if the epenthetic syllable is not stressed.

(3) Vowels: Pronouncing short vowels followed by longer fortis sounds is not permissible. For short vowels, the substitution of /ɪ/, /æ/, and /ɑ/ with [i], [a], and [o] is permissible. For long vowels, the substitution of /eɪ/ and /oʊ/ with [e] and [oR] is not permissible.

Inter-rater reliability was calculated based on evaluations by the two raters. As sufficient inter-rater reliability estimates were obtained (r=.98, d=.47), only the scores rated by the first rater were used in the analysis. Analyses evaluating the Cronbach's alpha coefficients revealed sufficient test reliability (Tier 1: $\alpha = .78$; Tier 2: $\alpha = .80$; Tier 3: $\alpha = .67$). The reason for the lower reliability of Tier 3 was most likely the low number of items; Cronbach's alpha values can be quite small when the number of items is fewer than 10 (Pallant, 2020).

Effect of Complexity of the Alphabetic Principle on PWR Test Performance

This section discusses how the complexity of the alphabetic principle affected performance on the PWR test, by comparing the scores on the three tiers. The descriptive statistics of the 121 students who took Tiers 1 and 2 are shown in Table 5. The descriptive statistics of the 74 students who took all three tests are presented in Table 6, and the related box plots are shown in Figure 3. The tables and Figure 3 show that the overall scores of Tier 1 are higher than those of Tier 2, and Tier 2 has greater variance than the other two tests. Further, the overall scores of Tier 3 are relatively low (M = 1.86, Mdn =2.00, SD = 1.48), although the Tier 3 test had only half the number of items. Given the small number of items in each test, it was considered important to determine the distribution of each test score. Therefore, a Shapiro-Wilk test was performed; the results revealed that the distribution of the Tier 1 test departed significantly from normality (p < .001). Further, the Tier 2 (p <.05) and Tier 3 test scores (p <.001) were not normally distributed.

Table 5

Descriptive Statistics of Tiers 1 and 2 of the PWR Test

	N	*k*	*M*	*Mdn*	*SD*	*IQR*	Skewness	Kurtosis
Tier 1 (PWR)	121	10	7.47	8.00	2.41	2	-1.32	1.37
Tier 2 (PWR)	121	10	6.34	7.00	2.77	5	-.58	.45
Total	121	20	13.81	15.00	4.67	5	-1.8	.948

Note. N = number, *k* = number of items, *M* = mean, *Mdn* = median, *SD* = standard deviation, *IQR* =interquartile range

Table 6

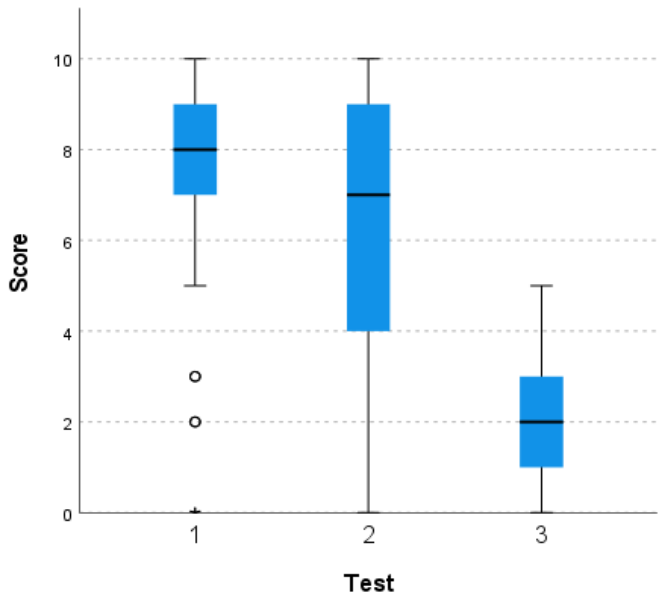
Descriptive Statistics of the Three Tiers of the PWR Test

	N	*k*	*M*	*Mdn*	*SD*	*IQR*	Skewness	Kurtosis
Tier 1	74	10	7.47	8.00	2.38	2	-1.31	1.56
Tier 2	74	10	6.47	7.00	2.75	5	-.54	-.52
Tier 3	74	5	1.86	2.00	1.48	2	.42	-.57
Total	74	25	15.81	16.50	5.35	7	-.86	.76

Note. N = number, *k* = number of items, *M* = mean, *Mdn* = median, *SD* = standard deviation, *IQR* =interquartile range

Figure 3

Box Plot Results Based on the Three Tiers of the PWR Test



First, the Wilcoxon signed-rank test was conducted to examine the difference in scores between Tiers 1 and 2. A significant difference was found between the two tiers ($Z = -4.9$, $p < .001$), and the effect size was large ($r = -.45$). A Friedman test was then conducted to examine the difference in scores for all three tiers. Because of the difference in the number of items, the dependent variable was the percentage of correct responses for each person rather

than the raw scores; significant differences were found among the three tiers (X^2 (2) = 36.226, $p < .001$). To find differences between the groups, individual Wilcoxon signed-rank tests were performed as post-hoc tests. Statistically significant differences were found among all pairs within the three tiers: Tier 1 and 2 (Z = -3.19, $p = .001$), Tier 2 and Tier 3 (Z =4.93, $p < .001$), and Tier 1 and Tier 3 (Z =-5.78, $p <.001$). Each effect size was medium to large (r = -.37, r = .57 and r = .67, respectively).

Despite two notable differences: (1) a decrease in the sample size from N = 121 to N = 74 when comparing the three tiers, and (2) Tiers 1 and 2 consisting of 10 points while Tier 3 had only five points, with a minimal variance, both analyses yielded consistent results. These analyses illustrated that students' performance varied depending on the complexity of the alphabetic principles. Additionally, each effect size indicated that Tier 3 was significantly more challenging than the other two tiers.

Relationship Between Phonological Word Recoding and Word Knowledge

The second research question addressed the relationship between phonological word recoding and word knowledge to examine the phonological route. As explained in the previous chapter, the phonological route indicates the process by which readers understand the meaning of a word after orthographic letters are converted into phonological language. This process is actively used when learning new words, and gradually takes place via the lexical route as phonological word recoding is automatized. Thus, it is hypothesized that the novice learners in this study actively use the phonological route.

Table 7 shows the descriptive statistics of the scores of 121 students on the PWR and WM tests for Tiers 1 and 2, and the scores of 74 students for these two tests for Tier 3. As not all the tests were normally distributed, Spearman's correlation was conducted to examine the correlations between the PWR and WM tests in each tier. All the correlation coefficients between the PWR and WM test scores were statistically significant: Tier 1 (r_s = .57, df = 119, p < .01); Tier 2 (r_s = .72, df = 119, p < .01); and Tier 3 (r_s = .44, df = 72, p < .01). Therefore, there were moderate to strong positive correlations between the PWR and WM tests in all three tiers, with Tier 2 showing the strongest correlation among the three tiers.

Table 7

Descriptive Statistics of the PWR and WM Tests for Each Tier

	N	*k*	*M*	*Mdn*	*SD*	*IQR*	Skewness	Kurtosis
Tier 1 (PWR)	121	10	7.47	8.00	2.41	2	-1.32	1.37
Tier 1 (WM)	121	10	6.38	7.00	2.16	3	-.58	.13
Tier 2 (PWR)	121	10	6.34	7.00	2.77	5	-.58	.45
Tier 2 (WM)	121	10	5.77	6.00	3.03	5	-.33	-.96
Tier 3 (PWR)	74	5	1.86	2.00	1.48	2	.42	-.57
Tier 3 (WM)	74	5	2.20	2.00	1.40	2	.33	-.65

Note. N = number, *k* = number of items, *M* = mean, *Mdn* = median, *SD* = standard deviation, *IQR* =interquartile range

Second, to examine the effect of phonological word recoding on word knowledge, multiple regression analysis was conducted. The descriptive statistics of the scores of 74 students on the PWR test for each tier (predictor variables) and their total scores on the WM test (dependent variable) are presented in Table 8. Applying the enter method, it was observed that the three levels of the PWR test explained a significant amount of variance in the WM

test, F (3, 70) = 64.554, $p <$. 001, R^2 =.74, $R^2_{adjusted}$ = .72. This result indicates that the three tiers of the PWR test explain 72% of the variance in the WM test scores. Table 9 shows that the PWR test scores for all the tiers statistically predict the total scores of the WM test (Tier 1: $\beta = .20, p = 008$; Tier2: $\beta = .52, p < .001$; Tier 3: $\beta = .33, p < .001$). The results show that the PWR test score of Tier 2 has the greatest impact on WM test scores (17% of variance), followed by Tier 3 (7% of variance) and Tier 1 (2% of variance). Tier 1 had little impact on the WM test because the students performed well overall.

Table 8

Descriptive Statistics of the PWR Test for Each Tier and the WM Tests

	N	*k*	*M*	*SD*
Tier 1 (PWR)	74	10	7.47	2.38
Tier 2 (PWR)	74	10	7.47	2.75
Tier 3 (PWR)	74	5	1.86	1.48
WM tests	74	25	14.61	5.45

Note. N = number, *k* = number of items, *M* = mean, *SD* = standard deviation

Table 9

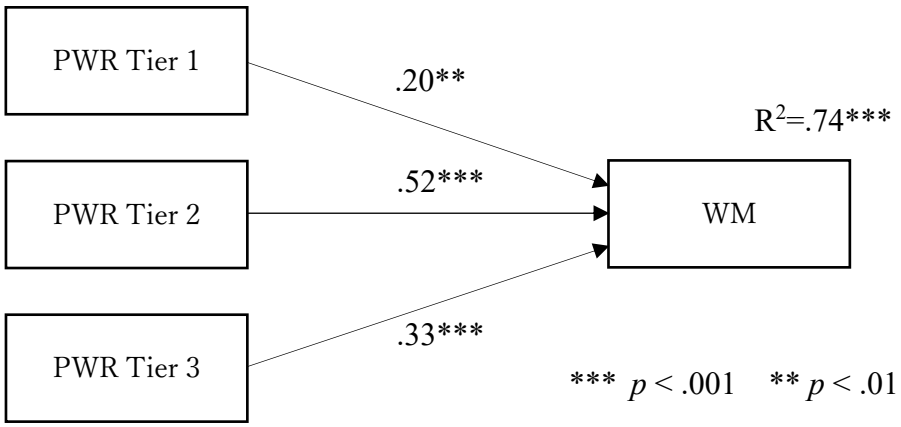
Standard Multiple Regression Analysis Summary Predicting Word Knowledge with Each Tier of the PWR test

Predictor variable	*B*	*SEB*	β	*rs*
Tier 1 (PWR)	.45	.17	.20**	.17
Tier 2 (PWR)	1.02	.16	.52***	.40
Tier 3 (PWR)	1.21	.27	.33***	.28
Constant	2.36	1.15		

Note. $R^2 = .74$, *Change in* $R^2 = .72$, *** $p < .001$ ** $p < .01$

Figure 4

Relationship Between the PWR and WM Test Scores



Difficulty of Phonological Word Recoding

To understand the students' phonological word recoding ability, item and error analyses were conducted. Item analysis clarified the difficulty of each item, whereas error analysis clarified the error characteristics. Error analysis was conducted in two steps: analyzing individual errors and exploring common features among the errors.

Item Analysis

Classical item analysis was used to calculate the item facility (IF) and the upper-lower item discrimination index (ID). IF is "a statistic used to examine the percentage of students who correctly answer a given item" (Brown, 2005, p. 66). Thus, a higher IF value indicates that more students have answered correctly. According to Brown (2005), items with IF ≤ .30 are considered very difficult, and those with IF ≥ .70 are considered very easy. ID indicates "the degree to which an item separates the students who performed well from those who did poorly on the test as a whole" (Brown, 2005, p. 68). A higher ID indicates a larger gap

between high- and low-proficiency learners. According to Brown (2005), items with ID ≥ .40 are regarded as those showing clear differences between high- and low-proficiency learners.

In Tier 1, the average of the IF was .75, ranging from .41 to .89 (see Table 10). *Pig* (.80), *sun* (.84), *jam* (.87), *hot* (.89), *bus* (.78), *fig* (.77), *vet* (.73), and *dog* (.71) had IF values above .70, indicating that they were very easy items. *Bed* (.65) was a relatively difficult item. *Rat* (.41) was the most difficult item among the 10 words in Tier 1, but this does not mean that the item was very hard because it was above the IF value of .30. Regarding ID, all the ID values except for *hot* (.26) were above the value of .40, indicating that the other nine items effectively differentiated high-proficiency learners from low-proficiency learners.

Table 10

Item Facility and Item Discrimination of the Tier 1 Test

	dog	*vet*	*jam*	*pig*	*sun*	*hot*	*bed*	*fig*	*bus*	*rat*	*M*
IF	.71	.73	.87	.80	.84	.89	.65	.77	.78	.41	.75
ID	.54	.51	.40	.45	.46	.26	.43	.40	.54	.60	.46

Note. IF = item facility, ID = item discrimination, *M* = mean

In Tier 2, the average IF value was .46, ranging from .34 to .79 (see Table 11). *Long* (.79), *when* (.77), *help* (.75) scored above .70, indicating that they were very easy items. *Fast* (.69), *frog* (.68), *ship* (.60), *this* (.60), *black* (.56), *lunch* (.56), and *drum* (.34) were relatively difficult. However, none of the items were found to be too difficult. Regarding ID, all the ID values except for *long* (.26) were above .40; thus, all the items in the Tier 2 test effectively differentiated between good and poor performers.

Table 11

Item Facility and Item Discrimination in the Tier 2 Test

	ship	*when*	*long*	*black*	*drum*	*frog*	*this*	*help*	*fast*	*lunch*	*M*
IF	.60	.77	.79	.56	.34	.68	.60	.75	.69	.56	.63
ID	.80	.46	.26	.66	.60	.43	.74	.54	.54	.60	.56

Note. IF = item facility, ID = item discrimination, *M* = mean

In Tier 3, the average of the IF was .46, ranging from .37 to .61 (see Table 12. Contrary to the results of Tiers 1 and 2, none of the items showed a value above .70, which means that all five items were relatively difficult. In addition, the ID value shows that the items effectively separated students with high scores from those with low scores.

Table 12

Item Facility and Item Discrimination in the Tier 3 Test

	bake	*wine*	*bean*	*rope*	*cube*	*M*
IF	.39	.61	.37	.49	.45	.46
ID	.74	.84	.95	.74	.84	.82

Note. IF = item facility, ID = item discrimination, *M* = mean

These results overlap with those of the first analysis: (1) CVC words including consonant digraphs and clusters were found to involve phonological word recoding more difficult than CVC words consisting of single consonants and short vowels and (2) CVC words including long vowels were the most challenging. There were 11 items with an IF value ≥ .70, which means that there were many words for which the participating students scored very high. The items *rat*, *drum*, *bake*, *bean*, and *cube* were especially low, with an IF value < .45. Many learners may have been unfamiliar with these words. Despite the overall high IF value, the ID of all the items, except for *hot* and *long*, was above .4, indicating that

almost all the items could effectively differentiate between high- and low-proficiency learners in their phonological word recoding performance.

Error Analysis

To understand the difficulties in learners' phonological word recoding, an error analysis was conducted. When the researcher rated 0 (unintelligible) in the PWR test, the mispronounced phoneme was detected and coded on a score sheet. For example, in the case of /t/ in *vet*, the errors were coded as *"mispronounced as d," "vowel insertion," or "unpronounced."* Each coded error was calculated to account for the percentage of the total number of errors in the word represented. These were then aggregated by each phoneme. To understand why the errors occurred, the recall interview data were analyzed.

Dog (see Table 13). The largest number of errors occurred in the final consonant /ɡ/. Among 34 errors, 76% of the errors were caused by a mispronunciation of the final letter "*g."* The students pronounced [k][18] instead of /ɡ/. When Student 16, who had failed to pronounce the word, was asked to pronounce it again in the recall interview, she pronounced it correctly. It was observed that 5.9% of errors were caused by vowel insertion after the final consonant. Since they pronounced the final consonant /ɡ/ as [gɯ], the monosyllabic English word /dɑg/ was pronounced with two morae (two syllables), [do] and [gɯ][19]. Furthermore, stress was placed on both the vowels in each mora, which is why these productions were evaluated as

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[18] As per Kawai (2016), the characteristics of English articulation, including vowels and consonants, are depicted using phonemic symbols (/ /). The actual outputs generated by the participants are represented using phonetic symbols ([ ]).

[19] The participants' actual outputs included Japanese pronunciations. The phonetic symbols representing those sounds were listed in Appendix F.

unintelligible. In the recall interview, Student 22 explained that the first two letters of the word were pronounced as [do], and the final letter was pronounced as [gɯ]. She did not segment the syllable into onset or rime, even though the students were taught using onset-rime phonics.

Regarding the initial consonant /d/, only one type of error was found. It was observed that 8.8% of the errors were due to the misidentification of *d* as *b*. Student 13, who made this error, explained that she had been confused with *b* and *d*, but the same error did not occur when she was asked to pronounce the word again in the recall interview. Another student who made this error pronounced the word as *bag* [bag].

For the nucleus /ɑ/, only one error occurred (2.9%). Student 15, who made this error, pronounced the word as *dig* [dɪg], but she reflected on this and shared that the error was just a sloppy mistake in the recall interview.

Table 13

Error Types Occurred in "dog"

Item (error *n*.)		Error Types	Count	%
dog	/d/	Misidentification as *b*	3	8.8
(34)	/ɑ/	Mispronunciation as [ɪ]	1	2.9
	/g/	Devoicing	26	76.5
		Strong vowel insertion	2	5.9
		Unpronounced	1	2.9
	Others	Silence	1	2.9

Vet (see Table 14). The largest number of errors occurred in the initial consonant /v/. Among 32 errors, 62.5% of the errors were caused by a mispronunciation of /v/ as [b]. Most students who made this error pronounced the word as *bet* [bɛt], and one student pronounced

the word as *bed* [bɛd]. The English phoneme /v/ is one of the most difficult pronunciations for Japanese EFL learners because the sound does not exist in the Japanese language, which is why /v/ was replaced with [b] (Makino, 1977). Students 6 and 29, who made this type of error, were able to pronounce it accurately in the recall interview. Student 29 shared, "I knew what it meant, so I could read it," which means that he read the word using the lexical route. Student 31, who had also made this type of error, first mispronounced this as *bet* [bɛt] in the recall interview, but she was able to pronounce the word correctly after the researcher asked her about the differences in the pronunciations between /b/ and /v/. She explained that /v/ has a vibration (fricative noise), whereas /b/ must be pronounced by putting the lips together (bilabial sound). Meanwhile, Students 17, 20, 26, and 28, who repeated the same error in the recall interview, had some difficulty in pronouncing /v/. Student 28 said, "I know how to pronounce the sound of the letter *v*, but it is hard especially when I have to say it in front of others." Students 20 and 26 had difficulty understanding the sound /v/. Student 20 said, "The sounds of the letters *b* and *v* are almost the same." He explained that *b* should be pronounced as [ba] and *v* as [bɯ]. Student 26 also explained that *v* should be pronounced as [bɯ]. Even after the researcher asked him to repeat after her, he could not mimic the correct sound. When the researcher asked both Students 20 and 26 to pronounce the name *v*, they both answered as [bɯi], which is how Japanese speakers often pronounce the name *v*.

Regarding the nucleus /ɛ/, 25% of errors were caused by a mispronunciation as [ɪ]. Students 13 and 32, who made this type of error, explained that the sound of *e* in vet should be pronounced as [i] because the name of *e* is pronounced so. Furthermore, Student 13 explained that the sound of *v* should be pronounced as [vi], not /v/, so the word was

pronounced as [vit]. While the *romaji* notation—which makes Japanese pronunciations readable to foreign language speakers— is helpful to pronounce *e* as /ɛ/, because the Japanese vowel /e/ is almost the same as /ɛ/, Student 32 mentioned that he did not understand *romaji* very well.

Table 14

Error Types Occurred in "vet"

Item (error *n*.)		Error Types	Count	%
vet	/v/	Mispronunciation as [b]	20	62.5
(32)		Mispronunciation as [p]	1	3.1
		Unclear	1	3.1
	/ɛ/	Mispronunciation as [ɪ]	8	25
		Mispronunciation as [æ]	1	3.1
	/t/	Strong vowel insertion	1	3.1
		Mispronunciation as [d]	1	3.1
		Unclear	1	3.1
	Others	Silence	1	3.1

Note. Since the same student had made multiple errors in different sounds, the total count of errors became bigger than the number of errors (n = 32).

Jam (see Table 15). The largest number of errors occurred in the final consonant /m/. Among 15 errors, 40% were caused by a mispronunciation as [n] or [N][20]. Student 18, who had pronounced the final consonant as [N] in the test, was able to explain that the sound of *m* should be pronounced by keeping the lips together, but the pronunciation was still unclear and sounded like [dʒaN]. The lack of intelligibility, in this case, might not only be due to the final consonant pronunciation but also due to the vowel pronunciation. If she had pronounced the nucleus /æ/

[20] The Japanese sound of [N] has a voiced uvular nasal characteristic and is different from the English sound of /n/.

correctly, without altering the Japanese vowel sound /a/, her production would have been intelligible.

Another 13.3% of the errors were caused by a strong vowel insertion after /m/; the word was pronounced as [jaˈmɯ]. They pronounced the final consonant /m/ as [mɯ], and the monosyllabic English word /jæm/ was pronounced with two morae (two syllables), [ja] and [mɯ]. Furthermore, stress was placed on both vowels in each mora, which is why these productions were judged as unintelligible. The student who made the same type of error for *dog* repeated the error for this item. This error can occur easily because the word is used as a loanword in Japanese and pronounced as [jaˈmɯ]. Student 20 pronounced it in this way in the recall interview, so the researcher asked him the reason for this. He said, “It is embarrassing if I pronounce it like an English sound and I am not understood. I can pronounce words using English pronunciation when I am sure how to pronounce them in English. I was not confident when I pronounced the part of *ja*.”

The remaining 13.3% of the errors were caused by an unclear pronunciation of /m/. Student 32, who made this type of error, showed difficulty in understanding the sound of /m/ in the recall interview. He could not answer at all when the researcher wrote the two letters *m* and *n* in a notebook to confirm whether he knew the sound of /m/. Next, the researcher presented the pronunciation of the words as a model and asked what the final sound was. He then asked, “You mean *m* sounds [mɯ]?” This case demonstrates that the student recognized English sounds using Japanese ones.

The errors in the nucleus /æ/ were not found to a large extent (13.3%) because the evaluation criteria in this study followed the LFC precept that some variance in the

pronunciation of vowels is not a threat to intelligibility (Jenkins, 2000). Thus, while some students pronounced the item as [dʒam], it was judged as a correct answer. As described above, only the pronunciation of Student 18 was judged as unintelligible because the production was heard as [dʒaN] rather than [dʒam]. The type of error that occurred in the nucleus was a mispronunciation as [o]. Student 30, who made this error, explained that the produced sound became different if she gave more attention to the pronunciation of /æ/. When she repeated after the researcher's pronunciation, the pronunciation of *a* sounded like [ea], not /æ/.

Table 15

Error Types Occurred in "jam"

Item (error *n*.)		Error Types	Count	%
jam	/æ/	Mispronunciation as [o]	2	13.3
(15)	/m/	Mispronunciation as [n] or [N]	6	40.0
		Strong vowel insertion [mɯ]	2	13.3
		Unclear	2	13.3
		Unpronounced	1	6.7
	Others	Silence	2	13.3

Pig (see Table 16). The largest number of errors occurred in the final consonant /g/. Among 25 errors, 44% were caused by a mispronunciation as [k]. The final voiced consonant became devoiced. Most students who made this type of error pronounced the word as [pɪk]. This error presents a threat to intelligibility because it leads to misunderstanding the term as a different word: *pick*. There were other errors in this sound, such as a mispronunciation of [ŋ] or strong vowel insertion after the sound. The student who had pronounced the word as

[piQˈgɯ] by strongly inserting an unnecessary vowel was the same individual who had made the same type of error for the words *dog* and *jam*.

Regarding the initial consonant /p/, the sound was mispronounced as /b/ (16%) or /d/ (8%). This might be because the letters *p*, *b*, and *d* were confusing for some students, with their letter shapes resembling circles and straight long lines. Student 26, who had pronounced the word as *big* [bɪg], explained that he had misrecognized the word as *big* because they both have the same rime *-ig.*

As for the nucleus /ɪ/, there were three different errors (only one error for each error type). Some explanations need to be added about the error types of overlengthening, as for [i]. The length of the nucleus in this item permits a slightly longer pronunciation compared to a different word such as *pit* or *pick*. This is because, as explained in the previous chapter, the length of a vowel sound is differentiated depending on whether the preceding consonant is a fortis or lenis consonant (Jenkins, 2000). Therefore, the pronunciation that sounded like [pig] was judged as a correct answer. In the error that had been detected here as overlengthening, as [i], the student also made an error in the pronunciation of /g/ and mispronounced the word as [pik]. As an alternative word *peek* exists, this error poses a threat to intelligibility.

As for different types of errors, 8% of the errors were due to their unclear pronunciation and 4% of errors were due to their silence. Student 31, who did not repeat the same error in the recall interview, explained that she chose the pronunciation she felt right in the recall interview. She was also able to explain how to produce each phoneme.

Table 16

Error Types Occurred in "pig"

Item (error *n*.)		Error types	Count	%
pig	/p/	Mispronunciation as [b]	4	16
(25)		Mispronunciation as [d]	2	8
	/ɪ/	Overlengthening to [i]	1	4
		Mispronunciation as [ɛ]	1	4
		Mispronunciation as [ɑ]	1	4
	/g/	Devoicing	11	44
		Mispronunciation as [ŋ]	2	8
		Strong vowel insertion [gɯ]	1	4
	Others	Unclear	2	8
		Silence	1	4

Note. Since one student had made multiple errors in the nucleus and the final consonant, the total count of errors became bigger than the number of errors (n = 25).

Sun (see Table 17). The largest number of errors occurred in the nucleus /ʌ/. Among 18 errors, 72.2% were caused by a mispronunciation as [ɯ]. Student 13, who made this type of error, expressed the sound of *s* as [sɯ] and the pronunciation of *un* as [ɯn]. Student 16, who also made the same error, pronounced the initial consonant as [sɯ] and was not able to pronounce either the nucleus or the rime *-un*. The researcher then taught her how to pronounce each phoneme, but she pronounced the word as [sɯˈʌn] because she recognized the sound of s as [s]. Students 27 and 30 explained the difficulty of the phonological recoding of *u*. Student 27 was aware of the mistake and said, "I often make this kind of mistake even if I pay attention." Student 30 shared, "I often forget about the sound of *u* and end up with [ɯ]. I might make the same mistake if I need to read it again in a week." Student 31, who did not repeat the same error in the recall interview, explained that she chose the one she felt was right after pronouncing both [sɯn] and [sʌn] in her mind. In the nucleus /ʌ/, there were various other types of errors such as mispronunciations as [ɪ], [ɑ], [eɑ], and [eɪ].

Regarding the initial consonant /s/, 16.7% of the errors were caused by a mispronunciation as [ʃ]. Although Student 18 had pronounced the word as [ʃɯn] in the test, she was able to read it accurately in the recall interview and explain how to pronounce each phoneme. She recalled the test and said, “I may have been able to read but I was nervous. I realized my mistake when I took the word meaning test soon after the test.”

There were a few errors in the final consonant /n/. While the deletion of the sound comprised 11.1% of the errors, unclear pronunciation comprised 5.6% of them.

Table 17

Error Types Occurred in “sun”

Item (error *n*.)		Error Types	Count	%
sun	/s/	Mispronunciation as [ʃ]	3	16.7
(18)	/ʌ/	Mispronunciation as [ɯ]	13	72.2
		Mispronunciation as [ɪ]	2	11.1
		Mispronunciation as [ɑ]	1	5.6
		Mispronunciation as [eɑ]	1	5.6
		Mispronunciation as [eɪ]	1	5.6
	/n/	Unpronounced	2	11.1
		Unclear	1	5.6

Note. Since same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 18).

Hot (see Table 18). Although the total number of errors in this item was not much (*n* =11), the largest number of errors with various error types was found in the nucleus /ɑ/. It was noted that 18.2% of the errors were caused by a mispronunciation as [aR], and 9.1% of the errors were caused by the mispronunciations (for each) as [ɛ], [æ], [ɝ], or [ɪr].

Regarding the final consonant /t/, 27.2% of errors were caused by strong vowel insertion after the sound. They pronounced the final consonant /t/ as [to] and read the word as [hoQto], which is the same way the word is usually pronounced in Japanese as a loanword. Again, the same student who made the same type of error in *dog*, *jam*, and *pig* made this error.

In 18.2% of the errors, students had not pronounced any single phoneme and remained silent. Student 16, who made this type of error, tried to explain how to pronounce each phoneme in the recall interview. She pronounced the first sound of h as [N], the nucleus as [a], and the final consonant as [tɯ]. The first letter *h* was misidentified as *n*, and the pronunciation of each sound was influenced by the Japanese *kana* sound.

Table 18

Error Types Occurred in "hot"

Item (error *n*.)		Error Types	Count	%
hot	/h/	Mispronunciation as [b]	1	9.1
(11)	/ɑ/	Mispronunciation as [aR]	2	18.2
		Mispronunciation as [ɛ]	1	9.1
		Mispronunciation as [æ]	1	9.1
		Mispronunciation as [ɝ]	1	9.1
		Mispronunciation as [ɪr]	1	9.1
		Unpronounced	1	9.1
	/t/	Strong vowel insertion	3	27.2
	Others	Silence	2	18.2

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 11).

Bed (see Table 19). The largest number of errors occurred in the final consonant /d/. Among 40 errors, 55% were caused by a mispronunciation as [t]. The final voiced consonant /d/ was devoiced. In 15% of the errors, only the final consonant was not pronounced. In 7.5%

of the errors, plural-*s* was inserted, and the word was pronounced as *beds* [bɛdz]. In 5% of the errors, an unnecessary vowel was inserted after the sound, and the word was pronounced as [beQˈdo], in the way that Japanese speakers usually say *bed* in Japanese as a loanword.

Regarding the nucleus /ɛ/, 15% of the errors were caused by mispronunciations using relatively close sounds, such as [ɪ] (10%) or [æ] (5%). Student 16 had mispronounced the word as [bɪd] in the test and repeated the same error in the recall interview. When the researcher asked why she read it that way, she said, “Because it goes straight to [bi].” She pronounced the first two letters as [bi] because she might have recognized the sound of *b* as [bi] or the sound of *e* as [i] as a long vowel. The researcher then taught her how to pronounce the nucleus and asked her to pronounce the rime *-ed* by hiding the initial consonant. Although she was able to pronounce the rime correctly, she was unable to pronounce *bed* successfully. She became confused and pronounced [bɪd] and [vɪd] repeatedly. When the researcher pointed at the nucleus pronunciation, she was able to correct the mistake. She said, “I always tend to pronounce the sound of *e* as [i]. I think I’m not good at *a, i, e, o, u*.” Although she thought that the error occurred because of the vowel, the excerpt above also shows that the nucleus sound had been mispronounced because she recognized the sound of *b* by inserting an unnecessary vowel.

As for the initial consonant /b/, 7.5% of the errors were caused by a misidentification as *d*. One of the students had mispronounced the word as *dog* [dɑg]. Although this is a minority error, it shows that the misidentification of the initial letter leads to associations with different words that learners know, and they cannot be conscious of other ensuing letters. In the other 5% of the errors, the initial consonant was mispronounced as /v/.

Table 19

Error Types Occurred in "bed"

Item (error *n*.)		Error Types	Count	%
bed	/b/	Misidentification as *d*	3	7.5
(40)		Mispronunciation as [v]	2	5
		Unclear	1	2.5
	/ɛ/	Mispronunciation as [ɪ]	4	10
		Mispronunciation as [æ]	2	5
		Mispronunciation as [eɑ]	1	2.5
		Mispronunciation as [ɑ]	1	2.5
		Unclear	1	2.5
	/d/	Devoicing	22	55
		Unpronounced	6	15
		Plural-*s*	3	7.5
		Strong vowel insertion	2	5
		Mispronunciation as [g]	1	2.5
	Others	Unclear	3	7.5

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (n = 40).

Fig (see Table 20). The largest number of errors occurred in the final consonant /g/. Among 29 errors, 48.3% were caused by a mispronunciation as [k]. The final voiced consonant was devoiced. It was observed that 3.4% of the errors were caused by strong vowel insertion after /g/, and the word was pronounced as [figɯ]. Student 22, who made this type of error, explained that the first two letters are pronounced as [fi] and the final consonant is pronounced as [gɯ]. Even though phonics had been introduced through an onset-rime unit in class, this student was more familiar with segmenting the word after the nucleus and inserting an unnecessary vowel after the final consonant. In 6.9% of the errors, the final consonant was not pronounced. There were other errors such as the mispronunciation of the consonant *s* as [ʃ] or [n]. The students who made these errors pronounced the word as *fish* [fɪʃ] or *fin* [fɪn].

They might have associated the different words that they knew solely based on the first two letters.

Regarding the initial consonant /f/, there were two different types of errors caused by mispronunciations as [h] and [b], but both errors were minor. The student who mispronounced it as [h] read the words in a completely different way: [hant]. The other student who mispronounced it as [b] read the word as big [bɪg]. The latter error might have occurred because of the same rime *-ig*. Although Japanese speakers sometimes use the loanword of *fig* and pronounce it as [Φigɯ], no one had pronounced the final consonant as [Φ][21].

Regarding the nucleus /ɪ/, 6.9% of the errors were caused by a mispronunciation as [ɛ]. Student 16, who made this error type, said, "I couldn't pronounce [ɪ] for *i* but was confused with [e] again," because she had been confused with the two sounds when recalling her error in *bed*. Further, 3.4% of the errors were caused by overlengthening into [i]. Although vowel lengthening can occur when a fortis consonant comes after the vowel, here, a student also made an error in the final consonant and pronounced the word as [fik].

Table 20

Error Types Occurred in "fig"

Item (error *n*.)		Error Types	Count	%
fig	/f/	Mispronunciation as [h]	1	3.4
(29)		Mispronunciation as [b]	1	3.4

[21] The sound of [Φ] is a sound unique to the Japanese language. It is a fricative consonant and the sound is produced by narrowing the two lips in the same way as when pronouncing the vowel [u].

Item (error *n*.)	Error Types	Count	%
/ɪ/	Mispronunciation as [ɛ]	2	6.9
	Overlengthening	1	3.4
	Mispronunciation as [a]	1	3.4
	Mispronunciation as [o]	1	3.4
	Mispronunciation as [ɯ]	1	3.4
/g/	Mispronunciation as [k]	14	48.3
	Strong vowel insertion	1	3.4
	Mispronunciation as [ʃ]	1	3.4
	Mispronunciation as [n]	1	3.4
	Mispronunciation as [nt]	1	3.4
	Unclear	2	6.9
Others	Unpronounced	2	6.9

Note. Since the same student had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 29).

Bus (see Table 21). The largest number of errors occurred in the nucleus /ʌ/. Among 25 errors, 28% were caused by a mispronunciation as /ɪ/. Further, 16% of the errors were caused by a mispronunciation as /ɯ/. Student 13, who made this type of error, said, "I read the word as it is," which suggests possible romanization. After the researcher reminded the student of the five short vowels, she was able to pronounce the word correctly. Furthermore, as soon as the student pronounced the word correctly, she said, "Oh, this word means *bus* [baˈsɯ]!" This excerpt shows that the student read the word through the *phonological route*.

Other errors included mispronunciations as [o] and [ɛ]. Student 15, who mispronounced the word as [bɛs] in the test, reflected on the error in the recall interview and said that the sound of the letter *u* was difficult. Student 16, who mispronounced it as [bɪs] in the test, was able to read the word correctly after mumbling "*B* [bi]…[ʌs]…." The student recalled the error and said, "I made a mistake with the letter *u* again," because she also made the same error with the word *sun.* Student 18, who also mispronounced this as [bɪs], explained that she was wondering whether its meaning was *bus* or *bath* because both words

are pronounced with the same pronunciation in Japanese. This excerpt shows that the student tried to read the word using a *lexical route*. She said, “I become less confident and more nervous when I see words that I haven’t come across very often.”

Regarding the initial consonant /b/, 24% of the errors were caused by a mispronunciation as [d]. Students possibly misidentified the letter *b* as *d*. Student 26, who made this type of error, pronounced the word as [dʌs]. One student who made this error pronounced the word as *dish* [dɪʃ]. Notably, 8% of the errors were caused by a mispronunciation as [ð]. The other student who made this error was pronouncing the word as [ðɪs]. Student 21, who also pronounced the word as [ðɪs] in the test, recalled the error and explained that she was confused with the letters *b* and *d*.

Three types of errors were observed for the final consonant /s/. There were errors caused by mispronunciations as [z], [ns], and [ʃ] (4% for each error type). In 8% of the errors, the final consonant was not pronounced. It can be interpreted that these errors might not have occurred because of the final sound itself but the complexity coming from the letter *b* or the pronunciation of the nucleus /ʌ/.

Table 21

Error Types Occurred in “bus”

Item (error *n*.)		Error Types	Count	%
bus (25)	/b/	Misidentification as *d*	6	24.0
		Mispronunciation as [ð]	2	8.0
	/ʌ/	Mispronunciation as [ɪ]	7	28.0
		Mispronunciation as [ɯ]	4	16.0
		Mispronunciation as [o]	1	4.0
		Mispronunciation as [ɛ]	1	4.0
		Overlengthening	1	4.0

Item (error n.)	Error Types	Count	%
/s/	Mispronunciation as [z]	1	4.0
	Mispronunciation as [ns]	1	4.0
	Mispronunciation as [ʃ]	1	4.0
	Unpronounced	2	8.0
Others	Unpronounced	1	4.0

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (n = 25).

Rat (see Table 22). The largest number of errors occurred in the initial consonant /ɹ/. Among 68 errors, 64.7% were caused by a replacement /l/ or Japanese-/ɾ/. Since the Japanese sound of /ɾ/ is a "flap" sound, it is difficult for Japanese EFL learners to discriminate and articulate [l] and [ɹ] (Ohtaka, 1998, Tsujimura, 1996). Although Students 8, 13, and 21 made this type of error in the test, they were able to rectify and pronounce the sound correctly in the recall interview after the researcher pointed at the letter *r* and asked them to pronounce it with English pronunciation. In the interview, Student 21 shared that she knew the slight difference between the sounds of /l/ and /ɹ/. Student 23, who also made this type of error, explained the difference between the English sound of /ɹ/ and the Japanese sound of /ɾ/. He explained that the sound of [ɹ] is smoother than Japanese-[ɾ] by demonstrating how to pronounce the first two letters *ra*— [ɹa] and [ɾa]. However, it seemed to be challenging for Students 9 and 16 to pronounce the sound of /ɹ/ even after this was pointed at by the researcher. Both students explained that it was difficult to combine the first two sounds—[ɹ] and [æ]. Student 32 also showed difficulty in combining the first two sounds. When the researcher demonstrated the sounds [ɾ] and [æt] and taught the student how to combine the onset and rime, he tried to understand the pronunciation by using the Japanese sound; he said, "[ɾaQˈto]?"

Regarding the nucleus /æ/, 19.1% of the errors were caused by a mispronunciation as [ɛ]. Student 9, who made this error, explained the difficulty in combining the sounds of [ɪ] and [æ] in the recall interview. Instead, he pronounced the word as [ɹɛt] even after the researcher showed him how to pronounce the sound [æ]. Although Student 15 was able to pronounce the single sound of [æ] correctly, the pronunciation of the sound was altered with [ɛ] when he pronounced the whole word. Meanwhile, some students were confused with the sound of /æ/. Student 8 was confused with the sound of [æ] and she thought the sound was pronounced as [eə]. Student 30 said, "The more I make a conscious effort to pronounce the sound of *a* correctly, the less I can produce the right sound." Student 16 pronounced the first two letters as [ɾʲa] with Japanese pronunciation. There were other different errors, such as mispronunciations as [o], [ɯ], [aɪ], and [ɪ] or overlengthening.

As for the final consonant /t/, 2.9% of the errors were caused by a mispronunciation as [n]. Further, 2.9% of the errors were caused by strong vowel insertion. Student 16, who made this type of error, explained that the sound of *t* should be pronounced as [tʃɯ]. In 1.5% of the errors, a pause was inserted before the final consonant and the final two sounds were not combined smoothly. The error type was labeled "failure of blending"[22].

Table 22

Error Types Occurred in "rat"

Item (error *n*.)		Error Types	Count	%
rat	/ɹ/	Replacement with [l] or Japanese-[ɾ]	44	64.7
(68)		Unclear	1	1.4

[22] Blending, as discussed in the earlier literature review, refers to the process of combining the sounds represented by letters to pronounce a word (Harris & Hodge, 1995).

Item (error *n*.)	Error Types	Count	%
/æ/	Mispronunciation as [ɛ]	13	19.1
	Mispronunciation as [o]	3	4.4
	Mispronunciation as [ɯ]	2	2.9
	Mispronunciation as [aɪ]	1	1.5
	Mispronunciation as [ɪ]	1	1.5
	Overlengthening	1	1.5
/t/	Mispronunciation as [n]	2	2.9
	Strong vowel insertion	2	2.9
	Mispronunciation as [d]	2	2.9
	Failure of blending	1	1.5
	Unpronounced	1	1.5
Others	Unpronounced	4	5.9

Note. Since the same students had made multiple errors in different phonemes, the total count of the errors became bigger than the number of errors (*n* = 68).

Ship (see Table 23). The largest number of errors occurred in the nucleus /ɪ/. Among 49 errors, 29.2% were caused by an overlengthened sound, as [i]. As Jenkins (2000) mentioned about the consonant phonetic feature related to the fortis-lenis distinction, contrary to other previous items such as *pig* or *fig*, the vowel preceding the lenis consonant /p/ should not be lengthened. However, many students lengthened the nucleus sound as [i] and pronounced the word as [ʃip]. This error presents a threat to intelligibility because it leads to misunderstanding, for example, as the alternative word *ship*. The researcher asked some students who made this type of error whether they had intended to pronounce [ʃɪp] or [ʃip] in the recall interview. The researcher showed two spellings of *ship* and *sheep*, and Student 6 was able to distinguish and pronounce both words correctly. Regarding Students 15, 24, and 29, the researcher pronounced two words [ʃip] and [ʃip] and asked them which they had pronounced in the test. Students 15, 20, and 21 answered [ʃip], while Student 29 answered [ʃɪp] in the interview. Even though the nucleus was pronounced longer, Student 20 explained that he had known the word *ship* and wanted to pronounce it as [ʃɪp]. Meanwhile, Student 21

explained that she made the error because she thought that the meaning of the word was *sheep*.

Regarding the initial consonant /ʃ/, 27.8% of the errors were caused by a mispronunciation as [s]. Makino (1997) mentioned that Japanese EFL learners often simplify the sound of /s/ with [ʃ] because the sound of /s/ does not exist in the Japanese language. In this study, the opposite—the replacement of /ʃ/ with [s]—was found. Although Student 21 had pronounced the word as [sɪp] in the test, she was able to read the word correctly in the test. However, when the researcher asked her to explain the sound of *sh* in the interview, she answered, without much confidence, that it was [s]. Student 28, who also made this type of error, explained that the sounds of *sh* and *s* were the same. Student 13, who had pronounced it as [sap] in the test and pronounced it as [saˈi ˈpɯ] in the interview, explained the sound of *sh* as [sa] and stated that she did not know how to pronounce the sound of *h* in the interview. This excerpt shows that she did not recognize the two letters as one unit of sound. In 1.4% of the errors, the pronunciation was unclear and the digraph sounded like /tw/. In the recall interview with Student 16, who made this type of error, it was noted that she tried to pronounce the two letters separately. However, after the researcher explained that the two letters need to be pronounced as one sound and asked her how to pronounce the sound, she thought for a while and answered as [ʃ] correctly.

Because of the first digraph letter of sh, some students associated different words such as shop (2.8%) or shrimp (1.4%). In 5.8% of the errors, students remained silent because they could not pronounce any sound.

Table 23

Error Types Occurred in "ship"

Item (error *n*.)		Error Types	Count	%
ship	/ʃ/	Mispronunciation as [s]	20	27.8
(49)		Unclear	1	1.4
	/ɪ/	Overlengthening	21	29.2
		Mispronunciation as [ɑ]	5	6.9
		Mispronunciation as [ɛ]	2	2.8
		Mispronunciation as [o]	2	2.8
		Mispronunciation as [eɪ]	1	1.4
		Mispronunciation as [eə]	1	1.4
	/p/	Mispronunciation as [lt]	1	1.4
		Mispronunciation as [n]	1	1.4
		Strong vowel insertion	1	1.4
	Others	Unpronounced	4	5.6
		Mispronunciation as *shop*	2	2.8
		Mispronunciation as *shrimp*	1	1.4

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (n = 68).

When (see Table 24). The largest number of errors occurred in the nucleus /ɛ/. Among 28 errors, 21.4% were caused by a mispronunciation as [ɑ]. Although Student 16 pronounced only the first letter in the test, she pronounced it as [wɑn] after the researcher asked her to combine the onset and rime. It can be interpreted that she pronounced it this way because she was pronouncing the sound of /w/ as [wɑ] by inserting an unnecessary vowel. Further, 17.9% of the errors were caused by a mispronunciation as [ɪ]. Student 17, who made this error, explained that the pronunciation of *e* was [ɪ] in the recall interview. Student 13 recalled her error and explained that the sound of *win* [wɪn] was familiar because the word had appeared

in the script of *Momotaro*[23]. There were other errors, such as mispronunciations as [eɪ], [æ], and [eə].

Regarding the initial consonant digraph /w/, there were mispronunciation errors such as [ɹ], [s], and [v]. As presented above, Student 13 had mispronounced the word as *win* [wɪn] in the test. Before providing the answer, she tried to explain the sound of each letter. However, she could not do so successfully because the digraph *wh* was not recognized as a single sound. As for the final consonant /n/, some students could not pronounce the sound clearly (17.9%), and other students could not produce this sound at all (10.7%).

Table 24

Error Types Occurred in "when"

Item (error *n*.)		Error Types	Count	%
when (28)	/w/	Mispronunciation as [ɹ]	2	7.1
		Mispronunciation as [s]	1	3.6
		Mispronunciation as [v]	1	3.6
	/ɛ/	Mispronunciation as [ɑ]	6	21.4
		Mispronunciation as [ɪ]	5	17.9
		Mispronunciation as [eɪ]	2	7.1
		Mispronunciation as [æ]	1	3.6
		Mispronunciation as [eə]	1	3.6
		Unpronounced	1	3.6
	/n/	Unclear	5	17.9
		Unpronounced	3	10.7
		Mispronunciation as [m]	1	3.6

Note. Since the same student had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (n = 28).

[23] *Momotaro* is a well-known Japanese folk tale. The students engaged in a story-based activity using *Momotaro*.

Long (see Table 25). The largest number of errors occurred in the initial consonant /l/. Among 25 errors, 40% were caused by a mispronunciation as [ɹ]. Although the pronunciation of the English-/ɹ/ sound is difficult to articulate for Japanese EFL learners, some students had learned how to pronounce the sound but ended up applying it to the pronunciation of *l*. This error poses a threat to intelligibility because it would lead to misunderstanding this as a different word, namely, *wrong*. Student 17 said, "Because of the letter *o* after *l*, I think I pronounced the sound of *l* as [ɹ]." Four percent of the errors were caused by a misidentification of the letter *l* as uppercase *I*. Student 13 recalled the error and said, "I thought the first letter was *I*, but now I know it's *l*."

Regarding the final consonant digraph *ng*, there were various errors caused by mispronunciations such as [nk] (16%), [g] (8%), [k] (4%), and [ngʊ] (4%). In any case, the digraph *ng* had apparently been recognized as two separate sounds. As for the nucleus /ɑ/, there were a few errors caused by mispronunciations such as [ɪ] (8%) and [ʌ] (4%).

Table 25

Error Types Occurred in "long"

Item (error *n*.)		Error Types	Count	%
long (25)	/l/	Mispronunciation as [ɹ]	10	40
		Misidentification with *I*	1	4
		Mispronunciation as [b]	1	4
	/ɑ/	Mispronunciation as [ɪ]	2	8
		Mispronunciation as [ʌ]	1	4
	/ŋ/	Mispronunciation as [nk]	4	16
		Mispronunciation as [g]	2	8
		Mispronunciation as [k]	1	4
		Mispronunciation as [ngʊ]	1	4
		Unpronounced	1	4

Item (error *n*.)	Error Types		Count	%
	Others	Unpronounced	2	8
		Mispronunciation with *big*	1	4

Note. Since the same student had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 25).

Black (see Table 26). The largest number of errors occurred in the nucleus /æ/. Among 55 errors, 44% were caused by mispronunciations as [ɑ] and Japanese-[o]. Most of the productions with this error were perceived as *block*. Student 15, who made this type of error, explained that the sound of *l* was pronounced as [lo] and the sound of *a* was not given enough attention. When the researcher asked her to be conscious of the sound of *a*, she was able to pronounce the word correctly. Student 31, who also made this type of error, said, "I knew this word as *block* [blɑk]." Students may have judged the word by sight. There were various other errors in the nucleus, such as mispronunciations as [ɛ] (7.3%), [ɪ] (5.5%), [ɯ] (3.6%), [aɪ] (1.8%), and [ɑr].

As for the consonant cluster /bl/, 10.9% of the errors were caused by the deletion of the second sound. Student 27, who made this error in the test, was able to pronounce *ack* and *lack* alone correctly. However, he failed to pronounce the word when reading the entire word *black*. He attempted to pronounce the word differently several times by mumbling [balɯk], [bʌlk], and [bɑrk], but could not pronounce it correctly. The researcher then made him repeat after her pronunciation, saying [læk] repeatedly because he could not pronounce these sounds only when he tried to combine them with the sound of [b]. This scaffolding helped him notice his error, and he was able to pronounce the word correctly. He explained that the pronunciation of /l/ was difficult because it was confusing with the sound of /ɹ/. Student 19,

who also made this error, showed the same difficulty in combining [b] with [læk]. When the researcher asked her to pronounce only the consonant clusters [bl], she did not know how to pronounce them.

In addition, 5.5% of the errors were caused by vowel epenthesis between the two consonants. Students had pronounced the sounds as [bal] or [bɪl] in the test, but not as [bɯl]. In the recall interview, Student 21 showed difficulty in combining the first sound of [b] with other sounds of [læk] without inserting vowels after each consonant. When the researcher asked her to pronounce these sounds in order, she was able to pronounce the nucleus [æ] alone, next the rime [æk], and then [læk] by putting one consonant before the rime correctly,. However, when the sound of [b] was added on top, she failed to pronounce /blæk/ but said [bɯˈlaQˈkɯ] with a Japanese accent[24]. Since Japanese is an open-syllable language, it is difficult to pronounce consonant clusters without inserting a vowel between the two sounds (Kubozono, 1995), and monosyllabic English words that are used in Japanese loanwords are treated as having a greater number of morae (Sugio, 1996). This phenomenon is known as *vowel epenthesis* (Kubozono, 1998).

As for the first letter of the consonant cluster, 5.5% of the errors were caused by the misidentification of the letter *b* as *d*. Along with this misidentification, some students misidentified the letter *l* as upper-case *I*. It was observed that 16.4% of the errors were caused

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[24] While epenthesis can be observed among L1 learners, it is noteworthy that a schwa sound is often inserted (McLeod et al., 2001). For example, in the case of the word *plate* /pleɪt/, it might become [pEleɪt]. The vowel epenthesis, which is considered as an error in this research, qualitatively differs from those observed among L1 learners. As previously mentioned, when the inserted vowel is stressed, it is deemed to be an error.

by this mistake, and the sound of *l* was pronounced as [ɪ]. These students had pronounced the word as [bɪæk], [bɪak], or [bɪk]. Further, 3.6% of the errors were caused by a mispronunciation as [aɪ]. It can be assumed that the students who made this error also misidentified the letter *l* as upper-case *I* and adopted the long vowel rule that they had been taught in class—*if there are more than two vowel letters in one word, the first vowel is read as a long vowel while the second one loses its sound.* These students might have thought that there were two vowels, *i* and *a,* and they should be read as [aɪ]. Student 24 said, "The first two letters *b* and ***i (I)*** are [ba], but I didn't understand how to pronounce *ac*. The last letter *k* is [k]." Although this answer presents many problems, it is clear that the student misidentified the letter *l* as upper-case *I*. However, when the researcher pointed out that the second letter is not *i* but *l*, the student was able to pronounce the word correctly. In another type of error, in 9.1% of the cases, students had mispronounced the sound of /l/ as [ɹ]. In 1.8% of the errors, the students were able to combine [b] and [læk] naturally and there was a pause between the two sounds.

Only a few errors occurred in the final consonant digraph *ck*. A few students had mispronounced the sound as [g], [ŋ], or [tʃk]. The mispronunciation as [tʃk] can be assumed with the letter *ck* possibly having been recognized as *ch*. Moreover, another 1.8% of the errors were caused by strong vowel insertions after [k].

Finally, in 16.4% of the errors, students had not pronounced any sound. Although Student 18 remained silent and could not pronounce the word at all in the test, she was able to pronounce it correctly in the recall test. When the researcher asked her the reason for this, she said, "I only knew the sound of *ck* but I was too nervous to read the word."

Table 26

Error Types Occurred in "black"

Item (error *n*.)		Error Types	Count	%
black	/bl/	Deletion of the second sound	7	12.7
(55)		Vowel epenthesis	3	5.5
	(/b/)	Misidentification as *d*	3	5.5
	(/l/)	Misidentification as *I* and pronounced as [ɪ]	9	16.4
		Replacement with /ɹ/	5	9.1
		Misidentification as *I* and pronounced as [aɪ]	2	3.6
		Fail of blending	1	1.8
		Unclear	1	1.8
		Unpronounced	1	1.8
	/æ/	Mispronunciation as [ɑ] or Japanese-[o]	11	44
		Mispronunciation as [ɛ]	4	7.3
		Mispronunciation as [ɪ]	3	5.5
		Mispronunciation as [ɯ]	2	3.6
		Mispronunciation as [aɪ]	1	1.8
		Mispronunciation as [ɑr]	1	1.8
		Unpronounced	1	1.8
	/k/	Mispronunciation as [g]	1	1.8
		Mispronunciation as [ŋ]	1	1.8
		Mispronunciation as [tʃk]	1	1.8
		Strong vowel insertion	1	1.8
	Others	Unpronounced	9	16.4
		Pronounced only the first sound	1	1.8

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 55).

Drum (see Table 27). Regarding the consonant cluster /dɹ/, 15.2% of the errors among 79 errors were caused by the deletion of the second sound, and 6.3% of the errors were caused by vowel epenthesis between the two consonants. The largest number of errors occurred in the first sound of the consonant cluster /d/. Notably, 25.3% of the errors were caused by a misidentification of the letter *d* as *b*. Although the misidentification of *b* and *d* was seen in other items, such as *bed* and *bus*, the number of this type of error was especially large for this item. Student 2 had read the word as *dream* [drim] in the test and as *brown*

[braʊn] in the test. When the researcher asked him to pronounce each sound in the interview, he noticed the misidentification of *d* as *b.* The student said, “Oh, it was [d]! I just noticed that now. I often mistake *b* for *d* and vice versa.” Soon after the student noticed the mistake, he was able to read the word correctly. Although Student 18 could not read the word at all in the test, she was able to read it correctly in the recall interview. The student appeared to lack confidence, and the researcher asked her the reason for this. She responded, “I confused *d* with *b*.” Student 27 had not been able to pronounce all the sounds and he had been confusing *d* with *b* in the test. In the interview, he pronounced it as *balloon* [bəˈlun] confidently. After the researcher asked him to read and pronounce the letters backward, [m], [ʌm], [rʌm], and [drʌm], he was able to read the word correctly. There were five more students who had mispronounced the word as *balloon* [bəˈlun]. Further, one student had pronounced the word as black [blæk]. Misidentification of the first error led to the misidentification of the entire word.

As for the second sound of the consonant cluster, 22.8% of the errors were caused by the replacement of the sound [ɹ] with Japanese-[ɾ]. Some students had also done vowel epenthesis and pronounced the sounds as [dɯRa] or [doRa]; Students 13, 19, and 32 expressed these pronunciations in the recall interview. Student 33 pronounced the word as [doˈ… ɾaˈmɯ] with a Japanese accent. Although the researcher asked her to pronounce it using the English pronunciation, she paused after saying [do] and could not pronounce the whole word. When the researcher asked why it was pronounced as [doˈɾaˈmɯ], she answered “I put two separate sounds [do] and [ɾaˈmɯ] together.” Further, 15.2% of the errors were caused by the deletion of the sound [ɹ]. Student 15, who had pronounced the word close to

the sound of *dorm* [dɔrm] in the recall interview, explained that *dr* had been pronounced as [dɔr] and the nucleus *u* had not been paid attention to. She intended to pronounce the sound [ɹ] but the sound was actually pronounced as [ɔr]. The excerpts above related to the errors—the replacement of [ɹ] with Japanese-[ɾ], the vowel epenthesis, and the deletion of the sound [ɹ]—show the difficulties pertaining to consonant clusters.

Regarding the final consonant /m/, 12.2% of the errors were caused by a mispronunciation as [N]. In 10.1% of the errors, the sound of *m* was not pronounced. Further, 15.2% of the errors were caused by a mispronunciation as [u:]. Five students who not only made this error but also misidentified the letter *d* as *b* read the word as *balloon* [bəˈlun]. Regarding the nucleus *u*, 11.3% of the errors were caused by a mispronunciation as [ɯ]. Student 11 said, "I often pronounce the short vowel *u* in a *romaji* way." There were various other errors, such as mispronunciations as [o], [i], [ɪ], [e], [ɑr], and [ɔr]. Moreover, 6.3% of the errors occurred because the sound of the vowel was not pronounced. In 6.3% of the errors, students had pronounced only the first sound; in another 6.3% of the errors, students remained silent and could not pronounce any sound.

Table 27

Error Types Occurred in "drum"

Item (error *n*.)		Error Types	Count	%
drum	/dɹ/	Deletion of the second sound	12	15.2
(79)		Vowel epenthesis	5	6.3
	(/d/)	Misidentification as *b*	20	25.3
	(/ɹ/)	Replacement with /l/ or Japanese-/ɾ/	18	22.8
		Failure of blending	1	1.3
	/ʌ/	Mispronunciation as [u:]	12	15.2
		Mispronunciation as [ɯ]	9	11.3

Item (error *n*.)	Error Types	Count	%
	Mispronunciation as [o]	5	6.3
	Unpronounced	2	2.5
	Mispronunciation as [i]	2	2.5
	Mispronunciation as [ɪ]	2	2.5
	Mispronunciation as [e]	1	1.3
	Mispronunciation as [ɑr]	1	1.3
	Mispronunciation as [ɔr]	1	1.3
/m/	Mispronunciation as [N]	12	12.2
	Unpronounced	3	3.8
	Strong vowel insertion	2	2.5
	Mispronunciation as [k]	1	1.3
	Mispronunciation as [mp]	1	1.3
Others	Pronounced only the first sound	5	6.3
	Unpronounced	5	6.3
	Spelled out	1	1.3
	Unclear	1	1.3

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 79).

Frog (see Table 28). As for the consonant cluster /fɹ/, 13.5% of the errors among 37 errors were caused by vowel epenthesis, and 10.8% of the errors were caused by the deletion of the first sound of the consonant cluster. Regarding the first sound of the consonant cluster /f/, students mispronounced the sound as [h] or [Φ] (8.1%) and they had also done vowel epenthesis. Hence, they pronounced the sound as [fɯ] or [Φɯ]. Student 19 had pronounced the word as [ΦɯˈɾoQˈgɯ] using Japanese pronunciation, which means that the English monosyllabic word had been pronounced with three syllables and four morae. Although the researcher asked her to pronounce the word a few more times, she could not correct the pronunciation.

The largest number of errors occurred in the consonant cluster in the second sound of the consonant cluster /ɹ/; 45.9% of the errors were caused by a mispronunciation as [l] or Japanese-[ɾ]. Student 25, who had replaced the sound of /ɹ/ with Japanese-[ɾ], was able to

mimic the sound of [ɹ] correctly by repeating after the researcher's pronunciation in the recall interview. When he pronounced the word alone, however, /ɹ/ became Japanese-/ɾ/. In addition, 10.8% of the errors were caused by the deletion of the sound /ɹ/. Student 19, who made this error, recalled the error in the interview and mentioned, "It was difficult to combine the first and second sounds." Student 33, who pronounced the word as [hɔg], explained that she intended to blend [f] and [ɹ]. This excerpt implies that some students have difficulty combining two consecutive consonants even if they know each consonant. Thus, some practice is required to pronounce consonant clusters.

As for the final consonant /g/, 29.7% of the errors were caused by a mispronunciation as [k]. The final voiced consonant /g/ turned into a voiceless sound. It was observed that 13.5% of the errors were caused by a mispronunciation as [ŋ] and 5.4% of the errors were caused by a mispronunciation as [nk]. Student 13, who had mispronounced this as [ŋ] in the test, was confusing [ŋ] with [g] in the recall interview. After the researcher asked her to spell /ŋ/, she answered "*ng"* and finally noticed the mistake. However, even after she was able to pronounce the word correctly, she repeated the same error when the researcher asked her to read it again. Student 25 pronounced the sound as [nk] in the test and [ng] in the interview. He said, "I combined [n] and [g] and pronounced as [ng]." Although the student understood how to pronounce the sounds of *g* and *ng* differently, the errors above occurred when reading the whole word.

Table 28

Error Types Occurred in "frog"

Item (error *n*.)		Error Types	Count	%
frog	/f/	Vowel epenthesis	5	13.5
(37)		Deletion of the second sound	4	10.8
	(/f/)	Replacement with [h] or [Φ]	4	10.8
		Mispronunciation as [v]	1	2.7
	(/ɹ/)	Replacement with [l] or Japanese-[ɾ]	17	45.9
	/ɑ/	Mispronunciation as [ɪ]	2	5.4
		Mispronunciation as [o]	1	2.7
	/g/	Mispronunciation as [k]	11	29.7
		Mispronunciation as [ŋ]	5	13.5
		Mispronunciation as [nk]	2	5.4
		Unclear	2	5.4
		Failure of blending	1	2.7
		Deletion	1	2.7
		Mispronunciation as [z]	1	2.7
	whole	Unpronounced	3	8.1

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 37).

This (see Table 29). The largest number of errors occurred in the digraph /ð/. Among 48 errors, 35.4% were caused by a mispronunciation as [tʃ]. Student 31, who made this error, explained that the sound of *th* was [tʃi]. Student 17 said, "I knew the sound of *th*, but I just made a mistake in the test." Further, 18.8% of the errors were caused by a mispronunciation as [t]. Student 19, who made this error, shared "I knew the sound of *th*, but I forgot that and pronounced [t] and [h] separately." Student 30 did not understand the sound of *th* very well. She said, "I only know *ng* and *ck* among the sounds of the two letters." As Jenkins (2000) and Makino (1977) mentioned, Japanese EFL learners often simplify the sound of /ð/ with [z], and 4.1% of the errors observed were related to the mispronunciation as [z].

Regarding the nucleus /ɪ/, 8.3% of the errors were caused by a mispronunciation as [i]. The sound of [ɪ] became lengthened and tensed. As the vowel precedes the lenic consonant /s/, the nucleus should not be lengthened (Jenkins, 2000). This error presents a threat to intelligibility because it could lead to misunderstanding the term, for example, as *these*. Of the errors, 2.1% were caused by a mispronunciation as [o]. Student 32 pronounced the rime as [os]. Even after the researcher corrected the pronunciation of the rime, he read the word as [ðɯˈɪs] and could not combine the onset and rime very well. Regarding the final consonant /s/, 10.4% of the errors were caused by a mispronunciation as [z]. Further, 8.3% were caused by the mispronunciation as [ʃ]. One student (2.1%) had pronounced this as "*this is* [ˈðɪsˈɪz]." Eight students (16.7%) pronounced no sounds.

Table 29

Error Types Occurred in "this"

Item (error *n*.)		Error Types	Count	%
this (48)	/ð/	Mispronunciation as [tʃ]	17	35.4
		Mispronunciation as [t]	9	18.8
		Mispronunciation as [z]	2	4.1
		Mispronunciation as [dʒ]	1	2.1
		Mispronunciation as [vh]	1	2.1
	/ɪ/	Overlengthening	4	8.3
		Mispronunciation as [o]	1	2.1
		Mispronunciation as [ɯ]	1	2.1
		Mispronunciation as [e]	1	2.1
	/s/	Mispronunciation as [z]	5	10.4
		Mispronunciation as [ʃ]	4	8.3
		Unclear	1	2.1
		Mispronunciation as [t]	1	2.1
		Mispronunciation as [ks]	1	2.1
	Others	Mispronunciation as *this is*	1	2.1
		Unpronounced	8	16.7

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 48).

Help (see Table 30). The largest number of errors occurred in the nucleus /ɛ/. Among 33 errors, 24.1% were caused by a mispronunciation as [ɪ] and 6.1% caused by a mispronunciation as [ɑ]. Student 29 said, "I knew the sound of *h* should be pronounced as [ha], [çi], [Φɯ], [he], or [ho], but I didn't know how to blend the sounds of *h* and *e*."

Regarding the consonant cluster /lp/, 15.2% of the errors were caused by vowel epenthesis between the sounds. Further, 12.1% of the errors were caused by the deletion of the first sound /l/. In 6.1% of the errors, students could not produce any sound in these consonant clusters. As for the first sound /l/, 6.1% of the errors were caused by a misidentification of the letter *l* as upper-case *I*. As for the second sound /p/, 12.1% of the errors were unclear pronunciations.

In 27.2% of the errors, students could not produce any sound and remained silent.

Table 30

Error Types Occurred in "help"

Item (error *n*.)		Error Types	Count	%
help	/ɛ/	Mispronunciation as [ɪ]	8	24.2
(33)		Mispronunciation as [ɑ]	2	6.1
		Mispronunciation as [o]	1	3.0
	/lp/	Strong epenthesis	5	15.2
		Deletion of the first sound	4	12.1
		Unpronounced	2	6.1
		Failure of blending	1	3.0
	(/l/)	Misidentification as *I*	2	6.1
	(/p/)	Unclear	4	12.1
		Unpronounced	1	3.0
		Mispronunciation as [k]	1	3.0
		Strong vowel insertion	1	3.0
	Others	Unpronounced	9	27.2

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (n = 33).

Fast (see Table 31). The largest number of errors occurred in the nucleus /æ/. Among 37 errors, 27% were caused by a mispronunciation as [ɑr] and 10.8% by a mispronunciation as [ɜr]. These errors may have occurred because the word was judged as *first*. Student 15, who pronounced the word as [fɑrst], was able to correct her error after pronouncing each sound. The fact that she still appeared unconfident suggests that she may have needed more practice. Student 29 also pronounced this as [fɑrst] in the test. When the researcher asked him why he had read the word that way, he explained that he was familiar with it because they learned months and dates in class. This explanation shows that the student initially misidentified the word *fast* as *first*. Next, 18.9% of the errors were caused by a mispronunciation as /ɪ/, and 10.8% by a mispronunciation as [ɛ]. There were other errors, such as mispronunciations as [eɪ], [əe], and [eə]. When Student 29 (as presented above) tried to correct the pronunciation from [fɑrst] to [fæst] with the researcher's scaffolding, it seemed to be difficult to pronounce the sound of [æ]. It also seemed difficult to combine the sound with [f] or [st], and his pronunciation became [əe] rather than /æ/.

Regarding the consonant cluster /st/, 13.5% of the errors were caused by the deletion of the first sound /s/, and 10.8% by the deletion of the second sound /t/. In 2.7% of the errors, an unnecessary vowel was strongly inserted after [t].

Table 31

Error Types Occurred in "fast"

Item (error *n*.)		Error Types	Count	%
fast	/f/	Unclear	1	2.7
(37)		Mispronunciation as [tʃ]	1	2.7

Item (error *n*.)	Error Types	Count	%
/æ/	Mispronunciation as [ɑr]	10	27.0
	Mispronunciation as [ɪ]	7	18.9
	Mispronunciation as [ɜr]	4	10.8
	Mispronunciation as [ɛ]	4	10.8
	Mispronunciation as [eɪ]	1	2.7
	Mispronunciation as [əe]	1	2.7
	Mispronunciation as [eə]	1	2.7
/st/	Deletion of the first sound	5	13.5
	Deletion of the second sound	4	10.8
(/t/)	Strong vowel insertion	1	2.7
Others	Unpronounced	2	5.4

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 37).

Lunch (see Table 32). The largest number of errors occurred in the nucleus /ʌ/. Among 52 errors, 27% were caused by a mispronunciation as [ɯ]. Student 33, who made this type of error, was wondering whether the sound should be pronounced as [ɯ], [ju], or [ɑ] in the recall interview. The student explained that the short vowel sounds of *u* and *o* were confusing. Student 27 made this type of error not only when reading *lunch* but also for *sun* and *bus*. Even after the student learned how to pronounce the nucleus [ʌ] through reading the words *sun* and *bus* during the interview, he was not able to adapt this knowledge principle to read the term *lunch*. However, the student was able to correct the error when the researcher mentioned that the short vowel sound of *u* should not be pronounced as [ɯ] in a *romaji* way. There were other errors, such as mispronunciations as [au], [o], [ɔr], [eɪ], [u], and [ɑr].

Regarding the initial consonant /l/, 21.2% of the errors involved the replacement of [l] with [ɹ]. Although Student 2 was able to distinguish and pronounce both the single sounds of *l* and *r*, the pronunciation of *l* became /r/ when pronouncing the whole word. Further, 3.8% of

the errors occurred because the letter *l* was misidentified as upper-case *I* and pronounced as /ɪ/.

Regarding the consonant cluster /ntʃ/, 5.8% of the errors were caused by the deletion of the first consonant /n/. In the recall interview, even after Student 33 was able to explain how to pronounce each sound correctly, she read the word as [lɑrtʃ] by deleting the sound [n]. She said, "I thought the sound of [n] was supposed to be pronounced weakly." As for the second consonant /tʃ/, which is also a consonant digraph, 7.7% of the errors were caused by a mispronunciation as [t]. Another 7.7% of the errors were caused by a mispronunciation as [k]. Student 19, who made this type of error, did not understand the digraph *ch*. When the researcher checked whether she understood another digraph, *sh*, she did not understand that sound either. In 9.6% of the errors, students could not pronounce any sound of the word and remained silent.

Table 32

Error Types Occurred in 'lunch'

Item (error *n*.)		Error Types	Count	%
lunch	/l/	Replacement with [ɪ]	11	21.2
(52)	/ʌ/	Mispronunciation as [ɯ]	14	27.0
		Mispronunciation as [aʊ]	2	3.8
		Mispronunciation as [o]	1	1.9
		Mispronunciation as [ɔr]	1	1.9
		Mispronunciation as [eɪ]	1	1.9
		Mispronunciation as [u]	1	1.9
		Lengthening to [ɑr]	1	1.9
	/ntʃ/	Deletion of the first sound	3	5.8
	(n)	Mispronunciation as [nɪ]	1	1.9
	(tʃ)	Mispronunciation as [t]	4	7.7
		Mispronunciation as [k]	4	7.7
		Mispronunciation as [s]	2	3.8

Item (error *n*.)	Error Types	Count	%
Others	Unpronounced	7	13.4
	Pronounced only the initial sound	2	3.8
	Unclear	1	1.9

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (n = 52).

Bake (see Table 33). The largest number of errors occurred in the nucleus /eɪ/. Among 45 errors, 28.9% were caused by a mispronunciation as /aɪ/, and the word was pronounced as *bike* [baɪk]. Further, 15.6% of the errors were caused by a mispronunciation as [a]. It can be assumed that this error came from *romanization*. In addition, 11.1% of the errors were caused by a mispronunciation as [eR]. Since diphthong sounds do not exist in the Japanese language, Japanese EFL learners tend to replace the sound /eɪ/ with [eR]. Although Students 11 and 12 made this type of error in the test, they were able to pronounce the word correctly in the recall interview. Student 25, who made the same error, was able to correct the error after the researcher taught him that the sound of *a* should be pronounced as [eɪ]. Student 33 repronounced the word correctly immediately after saying [beRk]. When the researcher asked why the pronunciation was restated, she said, “I’ve never heard [beRk], so I thought it might be [beɪk].” Another 11.1% of errors were caused by a mispronunciation as [ɛ]. Student 31, who made this type of error, was reminded of the spelling rule taught in class by the researcher. However, she read the word with a Japanese accent and pronounced the diphthong /eɪ/ as two separate vowels [e] and [ɪ]. She said, “I’m trying to pronounce /eɪ/ accurately, but I said it in a Japanese accent because the sound was hard to pronounce.” There were other errors, such as mispronunciations as [ɑr], [i], [ʌ], and [æ].

Regarding the initial consonant /b/, 11.1% of the errors were caused by a misidentification of the letter *b* as *d*. Three students who made this type of error pronounced the word as *duck* [dʌk]. As for the final consonant /k/, 4.4% of the errors were caused by strong vowel insertion after the sound.

Finally, in 4.4% of the errors, the word was pronounced as *black*. This is because the students judged the word based on the initial and final consonants and mispronounced the nucleus. In another 4.4% of the errors, students could not pronounce any sound and remained silent.

Table 33

Error Types Occurred in "bake"

Item (error *n*.)		Error Types	Count	%
bake	/b/	Misidentification as *d*	5	11.1
(45)	/eɪ/	Mispronunciation as [aɪ]	13	28.9
		Mispronunciation as [ɑ]	7	15.6
		Mispronunciation as **[eR]**	5	11.1
		Mispronunciation as [ɛ]	5	11.1
		Mispronunciation as [ɑr]	3	6.7
		Mispronunciation as [i]	3	6.7
		Mispronunciation as [ʌ]	3	6.7
		Mispronunciation as [æ]	1	2.2
	/k/	Strong vowel insertion	2	4.4
	Others	Mispronunciation as *duck*	3	6.7
		Unpronounced	2	4.4

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (n = 45).

Wine (see Table 34). The largest number of errors occurred in the nucleus /aɪ/. Among 29 errors, 65.5% were caused by a mispronunciation as /ɪ/. It is assumed that the students pronounced this sound as a short vowel. Student 1, who made this type of error, explained

that she noticed it soon after answering the test. Student 9, who was able to read correctly in the recall interview, said, “I remember I pronounced it as [wɪn] in the test, but I can do it now by reviewing the spelling rule of two vowels taught in class.” However, it took time for Student 24 to correct the error in the interview. First, the student was wondering whether the word should be pronounced as [wɪn] or [wɛn]. The student could not understand the researcher’s input regarding the spelling rule of two vowels in a word. Then, the researcher provided another form of scaffolding by saying, “If you read the word as [wɪn], the vowel is [ɪ]. If you read it as [wɛn], then the vowel is [ɛ]. I want you to read the vowel as [aɪ].” However, he was not able to correct the error. Next, the researcher taught him how to pronounce the long vowel [aɪ] and asked him how to pronounce the rime *-ine,* but he kept pronouncing the rime as [ɪn]. Finally, he was able to pronounce the word correctly when the researcher let him combine the onset and rime after making him pronounce the rime [aɪn] repeatedly to become familiar with the sound. There were other errors, such as mispronunciations as [i] and [i]. One student mispronounced using [ɛ] and read the word as wet [wɛt].

Regarding the final consonant, the sound of [n] was not pronounced in 13.8% of the errors. Only one person did not pronounce any sound in the test (3.4%).

Table 34

Error Types Occurred in “wine”

Item (error *n*.)		Error Types	Count	%
wine (29)	/aɪ/	Mispronunciation as [ɪ]	19	65.5
		Mispronunciation as [i]	4	13.8
		Mispronunciation as [ɛ]	2	6.9

Item (error *n*.)	Error Types	Count	%
/n/	Unpronounced	4	13.8
	Mispronunciation as [t]	1	3.4
Others	Unpronounced	1	3.4

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (n = 31).

Bean (see Table 35). The largest number of errors occurred in the nucleus /i/. Among 47 errors, 29.8% were caused by a mispronunciation as [eR]. Student 20, who made this error, explained why he read it this way by stating the spelling rule of two vowels in a word in the recall interview. Although he explained that the second vowel should not be pronounced, he still pronounced the word as [beRn]. When the researcher asked how to pronounce the first vowel, his response was [e]. He did not understand that the first vowel should be pronounced as a long vowel. Student 11, who made this error in the test, was able to read the word correctly in the interview. He recalled the error in the interview and said, " I think I read *ea* **normally** in the test." What he means by saying "normally" is that he had read the word in the *romaji* way. The student also said, "I could read it now because I was aware of the two vowels now." There were various other errors related to the long vowel [i], such as mispronunciations as [ɛ], [eə], [aɪ], and [ɑr]. In 2.1% of the errors, the students pronounced the first letter *e* as [ɪ] and the second letter *a* as [aR]. In another 2.1% of the errors, the students mispronounced the first letter *e* as [ɪ] as well and the second letter *a* as [e]. Student 31, who could not pronounce any sound in the test, was wondering whether the word should be pronounced as [bɛn] or [bɑrn] in the interview. When the researcher reminded her of the spelling rule of two vowels in a word, she was able to pronounce the word correctly.

Regarding the initial consonant /b/, 12.8% of the errors were caused by a misidentification of the letter *b* as *d*. In 2.1% of the errors, the sound of /b/ had not been pronounced clearly. As for the final consonant /n/, in 6.4% of the errors, the sound was not pronounced at all. Finally, in 19.1% of the errors, students had not pronounced any sound and remained silent.

Table 35

Error Types Occurred in "bean"

Item (error *n*.)		Error Types	Count	%
bean	/b/	Misidentification as *d*	6	12.8
(47)		Unclear	1	2.1
	/i/	Mispronunciation as [eR]	14	29.8
		Mispronunciation as [ɛ]	7	14.9
		Mispronunciation as [eə]	4	8.5
		Mispronunciation as [aɪ]	2	4.3
		Mispronunciation as [ɑr]	2	4.3
		Mispronunciation as [ɪˈaR]*	1	2.1
		Mispronunciation as [ɪˈe]*	1	2.1
	/n/	Unpronounced	3	6.4
		Mispronunciation as [k]	1	2.1
		Mispronunciation as [nɪ]	1	2.1
	whole	Unpronounced	9	19.1

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 31).

Rope (see Table 36). The largest number of errors occurred in the nucleus /oʊ/. Among 37 errors, 62.2% were caused by a mispronunciation as [oR]. Students 1, 20, 25, and 31 made this type of error in the test. Student 1 recalled the error and said, "I knew the long vowel of *o* should be pronounced as [oʊ], but I confused it with the Japanese accent." Students 20 and 25 explained that they had pronounced it as [oR] because it is usually

represented as an extension bar (ー) in Japanese *kana*. Student 31 was not able to correct the sound even after the researcher taught her that the long vowel of *o* should be pronounced as /oʊ/. There were other errors, such as mispronunciations as [ɑ], [o], and [aɪ].

Regarding the initial consonant /ɹ/, 51.3 % of the errors were caused by replacement with [l] or Japanese-[ɾ]. As for the final consonant /p/, a few students could not produce any sound (5.4%). Finally, several students could not pronounce any sound and remained silent (10.8%).

Table 36

Error Types Occurred in "rope"

Item (error *n*.)		Error types	Count	%
rope (37)	/ɹ/	Replacement with [l] or Japanese-[ɾ]	19	51.3
		Misidentification as *n*	1	2.7
	/oʊ/	Mispronunciation as [oR]	23	62.2
		Mispronunciation as [ɑ]	6	16.2
		Mispronunciation as [o]	2	5.4
		Mispronunciation as [aɪ]	1	2.7
	/p/	Unpronounced	2	5.4
		Strong vowel insertion	1	2.7
	whole	Unpronounced	4	10.8
		Mispronunciation as *dog*	1	2.7

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 37).

Cube (see Table 37). The largest number of errors occurred in the initial consonant /k/. Among 41 errors, 17.1% were caused by a mispronunciation as [tʃ]. In Japanese, another word tube is pronounced as [tʃub]. It is assumed that they made this error due to the Japanese pronunciation of the loanword. Student 4, who made this error in the test, became aware of it soon before the interview. He recalled the error in the interview and said that the letter *c* was

misidentified as *ch*. Although Student 12 could not pronounce any sound in the test, he was able to read the word correctly in the recall interview. When the researcher asked him why he could not read the word at all in the test, he said, “I was confusing the word with [tʃub].”

Regarding the nucleus [ju], 14.6% of the errors were caused by a mispronunciation as [u]. There are two different ways of pronouncing the long vowel u: [ju] as in *cube* or *cute* and [u] as in *flute* or *blue*. Student 11, who made this type of error, recalled it and said, “My teacher said the long vowel *u* is pronounced as [ju] or [u].” Although Student 31 was able to explain that the sound of *u* was [ju], the student pronounced the word as [kuːb]. Another 14.6% of the errors were caused by a mispronunciation as [ɑr] and 7.3% by a mispronunciation as [ʌ]. Student 2 pronounced the nucleus as [u] in the test but as [ʌ] in the interview. When the researcher asked why he had read it this way, he was found to be focusing on the meaning of the word. He said, “I don’t know this word. I’ve seen it but I don’t know the meaning. It might be a vegetable.” The researcher then asked why he pronounced the letters *cu* as [kʌ], and he was silent for a while. Next, the researcher asked him how to pronounce *wine*; he might have noticed that the first vowel should have been pronounced as a long vowel and said, “Oh, it should be pronounced as a long vowel. I missed the final letter *e*. When I spell words including *u*, I often misspell this as *a*. So, I was too conscious of the pronunciation of *u* but not of the last letter.” There were various other errors in the nucleus, including mispronunciations as [ɯ], [ɯˈa], and [i].

Regarding the final consonant /b/, 14.6% of the errors were caused by a misidentification of the letter *b* with *d*. Three students who had misidentified in this way read the word as *card*. Student 20, who mispronounced the word as *card* in Japanese

pronunciation ([caRˈdo]), was able to read the word correctly in the interview. When the researcher asked why he had pronounced it as *card* in the test, he explained that he had been confusing the letter *d* with *b*, but he could not explain why he had pronounced the vowel as [aR]. There were other errors related to the final consonant /b/, such as strong vowel insertion after the sound (4.9%) and unclear pronunciation (4.9%). In another 4.9% of the errors, the sound was not produced.

Finally, in 17.1% of the errors, students could not pronounce any sound and remained silent. Furthermore, some students mispronounced the word as *clap* (12.2%) or *club* (2.4%). Although it is difficult to understand why some students mispronounced these words, it is clear that they could not identify a long vowel as the nucleus.

Table 37

Error Types Occurred in "cube"

Item (error *n*.)		Error types	Count	%
cube	/k/	Mispronunciation as [tʃ]	7	17.1
(41)		Mispronunciation as [s]	1	2.4
		Mispronunciation as [g]	1	2.4
	/ju/	Mispronunciation as [u]	6	14.6
		Mispronunciation as [ɑr]	6	14.6
		Mispronunciation as [ʌ]	3	7.3
		Mispronunciation as [ɯ]	2	4.9
		Mispronunciation as [ɯˈa]	1	2.4
		Mispronunciation as [i]	1	2.4
	/b/	Misidentification as *d*	6	14.6
		Strong vowel insertion	2	4.9
		Unclear	2	4.9
		Unpronounced	2	4.9
		Misidentification as *p*	1	2.4
	Others	Unpronounced	7	17.1
		Mispronunciation as *clap*	5	12.2
		Mispronunciation as *club*	2	4.9

Note. Since the same students had made multiple errors in different phonemes, the total count of errors became bigger than the number of errors (*n* = 41).

Further Analysis

Additional error analysis was conducted to investigate the common characteristics among the errors. A primary error analysis revealed the following eight common characteristics: (1) declarative and procedural knowledge, (2) process of automatization, (3) the lack of phoneme perception of confusing sounds, (4) the influence of Japanese orthography, (5) devoicing of voiced obstruent geminates, (6) paragoge and vowel epenthesis, (7) vowel epenthesis and deletion, and (8) misidentification of letters.

Declarative and procedural knowledge. Phonics is an instructional method used to teach the alphabetic principle. The purpose of introducing phonics is to help students acquire the skill of phonological word recoding using their knowledge of the alphabetic principle. However, knowledge of rules and utilizing skills are not the same. This distinction can be explained by using the theory of declarative and procedural knowledge. The former indicates mere "information," while the latter indicates "skill" and "habitual learning" for applying that knowledge (Morgan-Short, 2015). To transform declarative phonics knowledge into procedural knowledge, some phonetic challenges may hinder this progression. The recall interviews unveiled that certain students encountered difficulties in articulating particular phonemes despite their awareness of the sounds. Additionally, some students could pronounce individual sounds but faced challenges when combining them, indicating difficulties in sound blending.

Some students faced challenges in accurately articulating certain sounds despite their ability to recognize them while listening. Student 28, who showed difficulty in pronouncing the sound of /v/, was able to explain how to pronounce the sound, and he might have been

conscious of the unique sound that does not exist in the Japanese language. However, he was anxious about producing this sound, especially when he had to say it in front of others (see the excerpt of Student 28 for *vet*). The comment by Student 30, who showed difficulty in producing the short vowel /æ/, implied that her mispronunciation was not due to a lack of knowledge about the letter-sound relationship but due to the difficulty in producing the unique sound of /æ/ (see the excerpt of Student 30 for *rat*). Takebayashi (1996) considers the sound of /æ/ as one of the most unique English sounds for Japanese EFL learners. In this regard, Student 30 said, "The more I make a conscious effort to pronounce the sound of *a* correctly, the less I can produce the right sound."

Difficulties in sound blending were also identified in the interview round with some students. Although both Students 2 and 17 were able to distinguish the sounds of /l/ and /ɹ/, they mispronounced the sound of /l/ as [ɹ] when they read the whole word (see the excerpt of Student 2 for *lunch* and that of Student 17 for *long*). Student 17 explained the difficulty in combining the sound of [l] and the nucleus vowel of *o*. Students 15 and 20 also showed difficulties in combining the sound of [æ] with other sounds (see the excerpt of Student 15 for *rat* and that of Student 20 for *jam*). Student 20, who showed difficulty in combining the sounds of [dʒ] and [æ] when he read the word *jam*, explained the reason why he had pronounced the word with a Japanese accent first in the recall interview, saying, "It is embarrassing if I pronounce it like an English sound and not be understood. I can pronounce words using English pronunciation when I am sure how to pronounce them in English. I was not confident when I pronounced the part of *ja*-." His comment shows that he knew what the correct English sound was, but simultaneously confronted the difficulties in English

pronunciation, especially when blending those unique English sounds. Blending sounds requires more cognitive work than simply pronouncing a single sound.

Blending multiple consonants is also demanding for Japanese EFL learners because Japanese is an open-syllable language (Kubozono, 1995). Several students showed difficulties in pronouncing the consonant cluster even though they could pronounce each consonant separately (see the excerpts of Students 19, 21, and 27 for *black*; Student 33 for *frog*; Student 33 for *lunch*; and Student 15 for *drum*). The excerpt of Student 21 revealed that the word *black* was mispronounced as [bɯˈlaQˈkɯ] by adding vowels after each consonant to avoid the difficulty in the sound blending of [b] and [l]. The excerpts of Students 19 and 21 showed that difficulty in pronouncing the consonant cluster /bl/ caused them to mispronounce the word *black* as [bæk] by deleting [l]. Student 33 intended to pronounce the consonant clusters properly; she mispronounced the word *frog* as [hog] and *lunch* as [lɑrtʃ]. Student 15 also intended to pronounce the consonant cluster properly; she mispronounced the word *drum* as [dɔrm]. A common feature of these errors is that the consonant closer to the vowel in a consonant cluster is merged with the vowel sound. These error features found in consonant clusters suggest that being able to pronounce each consonant does not necessarily guarantee that the consonant clusters will be pronounced accurately.

Process of automatization. Even after acquiring procedural knowledge, there remains a considerable journey before consistently demonstrating the relevant behavior with complete fluency or spontaneity, rarely making any errors (Dekeyser, 2007). The skill acquisition theory developed by Dekeyser (1997) delineates distinct three stages: declarative, procedural,

and automatic. Automatizing the procedural knowledge requires extensive practice to reduce reaction time, error rates, and interference from other tasks for learners.

Multiple instances demonstrated that students were not able to read a word correctly in the PWR test, even though they could do in the interview. Some students who made an error in the test were able to pronounce the same word accurately in the recall interview (see the excerpts of Student 17 for *this*, Students 6 and 29 for *vet*, and Students 11 and 12 for *bake*). Moreover, some of the students were already aware of their errors after the test (see the excerpts of Student 18 for *sun*, Student 1 for *wine*, and Student 4 for *cube*). These excerpts show that the students could have performed the test successfully if they had been more conscious or had sufficient time to think.

Student 17 explained the reason why she only made an error due to the mispronunciation of /ð/ as [t] in the test, saying, “I knew the sound of *th*, but I just made a mistake in the test.” Student 18 explained the reason why she had mispronounced the word *sun* as [ʃɯn] only in the test, saying, “I may have been able to read but I was nervous. I realized my mistake when I was taking the word meaning test soon after the test.” She was also able to explain how to pronounce each phoneme correctly. These excerpts show that they understood the letter-sound correspondences and had the skills to use this knowledge in their phonological word recoding, but they failed to use this knowledge properly in the test for some reason.

As Student 18 described, the affective factor is one of the reasons. Another factor leading to students’ limited utilization of alphabetic principle knowledge in the test could be time constraints. Student 31 mispronounced the word *sun* as [sɯn] in the test, but she did not

repeat the same error in the recall interview. She explained that she chose the one she felt was right after pronouncing both [sɯn] and [sʌn] in her mind. In the interview, she spent sufficient time rehearsing before reading the word aloud. Student 33 mispronounced the word *bake* as *black* [blæk] in the test and mispronounced the word as [beRk] at first in the interview. However, immediately after pronouncing it as [beRk], she correctly repronounced the word as [beɪk]. When the researcher asked her why she repronounced the word, she said, "I've never heard [beRk], so I thought it might be [beɪk]." Students 31 and 33 could have read the words correctly if they had enough time to think of the correct pronunciation, as they did in the recall interview.

The excerpts above present the cases of students who did not repeat their errors in the interview without any scaffolding by the researcher. Although some students repeated the same error that they made in the test at first, they were able to correct it later with the researchers' scaffolding. The researcher simply directed their attention to the incorrect pronunciation. Students who mispronounced the sound of /v/ as [b] or /ɹ/ as Japanese-[ɾ] were able to fix their errors after the researcher asked them the difference between the sounds that they had confused them with (see the excerpt of Student 31 for *vet* and that of Student 23 for *rat*). These excerpts show that the students lacked the awareness of monitoring their production although they had sufficient knowledge and skills for phonological word recoding.

Lack of phoneme perception of confusing sounds. Along with the errors presented above, errors sometimes occur even though students know how to pronounce each sound of a word, and more errors occur in some phonemes. This is because these phonemes are

generally confusing for Japanese EFL learners. Makino (1977) summarized the English sounds that Japanese EFL learners find problematic (see Table 38). In this study, two students mispronounced the sound of /ð/ as [z] in *this*; four students mispronounced the sound of /f/ as [h] or [Φ] in frog; three students mispronounced the sound of /s/ with [ʃ] in *sun*; and 20 students mispronounced the sound of /v/ as [b] in *vet*. The errors occurred in the case of confusing consonants, as Makino (1997) described. Student 20, who made an error in the pronunciation of /v/, explained that the sounds of the letters *b* and *v* were almost identical. Moreover, he explained that the letter *b* should be pronounced as [ba] and *v* as [bɯ]. Student 26, who failed to repeat after the researcher's accurate pronunciation of the word *vet*, also explained that the sound of *v* should be pronounced as [bɯ]. These excerpts reveal that some students perceived sounds in the English language by relying on their Japanese phonological awareness.

Table 38

Confusing Consonants for Japanese EFL Learners (Makino, 1977, p. 115)

English		Japanese
/ð/	→	z, zi/ [dʒi]
/f/	→	h, fu / [Φu], hi/ [çi]
/s/	→	s si/ [ʃi]
/v/	→	B

Takebayashi (1996) reported that Japanese EFL learners usually have difficulty in distinguishing English-/ɹ/ and Japanese-/ɾ/, even though the two sounds have little in common

phonetically. Further, a large number of errors with the sound of /ɹ/ mispronounced as Japanese-[ɾ] or [l] was found in this study (see Tables 22, 27, and 36).

English vowels are confusing for Japanese EFL learners, who use only five vowels: [a], [i], [u], [e], and [o]. As Makino (1977) summarized the problematic English vowel pronunciations for Japanese EFL learners, the contrast of the vowels in *bit – bet, men – man, pat – pot, pat – putt, cot – cut* are difficult to distinguish (see Table 39). The confusion between /ɪ/ and /ɛ/ was found in all words including the nucleus /ɛ/ (see Tables 14, 19, 24, and 33). Makino (1977) explained that these sounds are difficult to distinguish because they are both lax vowels in which the tongue position is lower than that of Japanese-/i/. The confusion between /æ/ and /ɛ/ was also found in this study (see Tables 22, 26, and 31). Makino (1977) asserts that both sounds /æ/ and /ɛ/ are produced in front, which makes them sound similar for Japanese EFL learners. The excerpt of Student 8 for *rat* revealed that she perceived the sound of /æ/slightly differently from the sound that the teacher had instructed. Although she had pronounced the word as [ɛt] in the test, in the interview, she recognized the sound as [eə][25].

[25] In this case, however, the sound of [eə] is also used in some regions (Takebayashi, 1996).

Table 39

Confusing Short Vowels for Japanese EFL Learners (Makino, 1977, p. 112)

Short vowel	Keywords
ɪ – ɛ	bit – bet
ɛ – æ	men – man
æ – ɑ	pat – pot
æ – ʌ	pat – putt
ɑ – ʌ	cot – cut

In addition to the short vowels, this study included five long vowels. Three of these were diphthongs. When these vowel sounds are produced, the tongue moves or glides from one vowel sound to another (Harris & Hodge, 1995). The glided sounds from one vowel to another form one syllable, with the stronger first element acting as a syllabic primary vowel and the second element acting as a secondary vowel (Takebayashi, 1996). Because Japanese has only five vowels, Japanese EFL learners tend to split a diphthong into two vowels (Sugio, 1996). Although the interview revealed one case where the diphthong /eɪ/ was pronounced as [eˈɪ] with two different morae (see the excerpt of Student 31 for *bake*), more students mispronounced the diphthongs by lengthening the first vowel. Five students mispronounced the diphthong /eɪ/ as [eR] and 23 students mispronounced the diphthong /oʊ/ as [oR] (see Table 40). The excerpts of Students 1 and 31 revealed that they had difficulty in perceiving the diphthong /oʊ/ because of the influence of L1.

Table 40

Errors Related to Diphthong

Item	Error Type	Count	%
bake /eɪ/	Mispronunciation as /eR/	5	11.1
rope /oʊ/	Mispronunciation as /oR/	23	62.2

Influence of Japanese orthography. First, the influence of *romaji* notation was found. *romanization* is "the transliteration of the orthography of a language, such as that of Arabic, into Latin alphabetic letters" (Harris & Hodge, 1995, p. 222). Japanese pronunciations are also translated to make them readable to foreign-language speakers. They create Japanese sounds by combining a consonant and a vowel from Japanese-[a], [i], [u], [e], and [o], such as [ba], [bi], [bu], [be], and [bo]. Many students made errors because of the romanization of words, including the short vowel *u* (see Table 41). The excerpt of Student 11 for *drum* shows that the student knew that he made an error because of the influence of romanization. The excerpts of Students 27 and 30 indicate that they knew that they often made such errors (see the excerpt of Student 27 for *sun* and that of Student 30 for *sun* and *bus*). Student 27 said, "I often make this kind of mistake even if I pay attention." Similarly, Student 30 shared, "I often forget about the sound of *u* and end up with [ɯ]. I might make the same mistake if I need to read it again in a week."

Table 41

Errors Related to Romanization Effects (Short Vowel u)

Item	Error Types	Count	%
sun	Mispronunciation as [ɯ]	13	72.2
bus	Mispronunciation as [ɯ]	4	16.0
drum	Mispronunciation as [u]	12	15.2
	Mispronunciation as [ɯ]	9	11.3
lunch	Mispronunciation as [ɯ]	14	27.0

Romanization also affected the pronunciation of words, including long vowels. Although the students had learned the long vowel spelling rule—*the first vowel should be read as the long vowel and the second vowel should not be pronounced when a word has two*

letters representing vowels or semi-vowels—the words including long vowels were mispronounced because of romanization. Table 42 shows that the nucleus of /eɪ/ (*a_e*) was mispronounced as [aɪ] [ɑ] or [aR], /i/ (*ea*) as [e], /aɪ/ (i_e) as [ɪ] or [i], and /ju/ (u_e) as [ɯ]. There were 23 errors in *bake*, 25 errors in *bean*, 23 errors in *bike*, and two errors in *cube*. Student 11, who made this type of error with *bean*, recalled his error and said, "I think I read *ea* as in a normal way in the test." What "normal" meant in his comment is assumed to be romanization.

Table 42

Errors Affected by Romanization (Long Vowels)

Item	Error Type	Count
bake /eɪ/	Mispronunciation as [aɪ]	13
	Mispronunciation as [ɑ]	7
	Mispronunciation as [aR]	3
bean /iː/	Mispronunciation as [eR]	14
	Mispronunciation as [e]	7
	Mispronunciation as [eə]	4
wine /aɪ/	Mispronunciation as [ɪ]	19
	Mispronunciation as [i]	4
cube /ju/	Mispronunciation as [ɯ]	2

In addition to romanization, Japanese graphemes using *kana* letters also affected students' phonological word recoding. As represented with *romaji* notation, the phonology of Japanese is simple, with almost all syllables consisting of just one consonant, followed by one vowel (Sampson, 1985). This syllabic unit is represented by using *kana* letters, such as ば、び、ぶ、べ、ぼ ([ba], [bi], [bu], [be], [bo]). As one *kana* letter is always pronounced as one sound, the orthography seen in English digraphs is unfamiliar to Japanese EFL

learners. The recall interview revealed that a few students recognized the digraphs as two different sounds (see the excerpts of Student 13 for *when*, Student 16 for *ship*, and Student 19 for *this*).

As reported in the previous error feature, the diphthong of /eɪ/ and /oʊ/ were frequently mispronounced as [eR] and [oR]. The error comes not only from the confusing English sounds that do not exist in the Japanese language but also from the Japanese-specific orthographic symbol of the extension bar written as "ー." The preceding vowels are lengthened using this extension bar. The excerpts of Students 20 and 25 for *rope* show that they had pronounced the diphthong /oʊ/ as [oR] because the word is often used as a loanword in Japanese and written as "ロープ" [roRp].

Devoicing of Voiced Obstruent Geminates. Among the errors in the phonological recoding test, the switching of voiced and voiceless sounds was common. As Table 43 shows, the final consonants of *dog*, *pig*, *bed*, *fig*, and *frog* should be voiced sounds. However, many students replaced them with voiceless sounds. The final voiceless sounds of *vet*, *rat*, and *black* were also replaced with voiced sounds, but this was less common.

Table 43

Flip of Voiced and Voiceless Sounds

	Item	Error Types	Count
Devoicing	*dog*	[g] → [k]	26
	pig	[g] → [k]	11
	bed	[d] → [t]	22
	fig	[g] → [k]	14
	frog	[g] → [k]	11
Voicing	*vet*	[t] → [d]	1
	rat	[t] → [d]	2
	black	[k] → [g]	1

The phenomenon in which voiced sounds are pronounced voicelessly is called *devoicing*, whereas the opposite is called *voicing*. Voicing and devoicing are common in many languages (Takebayashi, 1996). Regarding English word-final consonants, Takebayashi (1996) points to a phenomenon among international languages: some people devoice the final consonant in the words ending with voiced stop-consonants, such as /b/, /d/, or /g/, as in *club*, *God*, and *flag*. Even if the sounds are devoiced, this does not mean that the voiced sounds are pronounced with the voiceless sounds of /p/, /t/, and /k/ with strong aspiration. Therefore, the errors found in this study in which the final voiced consonants /g/ and /d/ were devoiced and pronounced as the voiceless sounds of [k] and [t] with aspiration are considered unnatural as international language use. If there is an alternative word, such as *pig* and *pick*, these instances of devoicing become a threat to intelligibility. The question arises as to why these devoicing errors occurred in many instances in this study.

Kawahara (2012) explained that *devoicing* usually occurs among native Japanese speakers to avoid *voiced obstruent geminates*[26] that are not allowed in Japanese. However, some loanwords from foreign languages including English have *voiced obstruent geminates*, such as *dog* [doQgu] and *bag* [baQgu]. Native Japanese speakers usually devoice voiced obstruent geminates and pronounce those words as [doQku] or [baQku] because of their L1 tendency to avoid voiced obstruent geminates. Thus, it is assumed that these devoicing errors

[26] Geminates consist of the same consonant pronounced twice (Oxford Learner's Dictionary), also known as a double consonant (Takebayashi, 1996). Japanese geminates are written by using the smaller size of ッ, such as ペット (pet [peˈQˈto]), ラッパ (trumpet [ɾaˈQˈpa]), and ガッコウ (school [gaˈQˈkoɯ]).

occurred significantly in this study. The excerpt of Student 29 for *dog* describes how its loanword was pronounced as [doQku].

Among the test items, only four words—*dog*, *pig*, *bed*, and *frog*—were loanwords including *voiced obstruent geminates*. Although *fig* is less commonly used as a loanword and is not an obstruent geminate, many errors occurred in the item. It is assumed that some students applied devoicing to *fig*, which is a less-known/unfamiliar word.

Paragoge and Vowel Epenthesis. Vowel additions were found after the final consonant, which is called *paragoge*. Following the evaluation criteria, paragoge cases in which the added syllable was stressed were judged as having an unintelligible pronunciation. Although schwa paragoge is often seen among L1 and L2 learners (Jenkins, 2000), the results in this study revealed some problematic cases in which students added Japanese-[ɯ] or [o]. Because stress is also added to the paragoge syllable, in the case of monosyllabic CVC words, the words became CVCV words with two syllables and two morae.

Table 44 shows the errors related to the paragoge with stress in 15 items. The number of errors of this type in each item was relatively small. However, it is worth mentioning that only one student made this type of error more than 11 times. In addition, four other students made this type of error more than thrice. All these five students were at the bottom level in the PWR test for Tiers 1 and 2. The other fifteen students—eight at the bottom, six at the middle, and one at the top—made one or two errors related to paragoge with stress. This means that some students had the habit of adding vowels after the final consonant with a Japanese accent.

Among the 25 items, the paragoge with stress occurred in 15 items. The Japanese sound of [ɯ] was added after the velar and bilabial sounds, while the Japanese sound of [o] was added after the dental/alveolar sounds. Although *frog* and *black* are words ending with velar sounds, no instance of paragoge with stress occurred. It was also revealed that this type of error rarely occurred in words ending with /n/ or /s/ (alveolar sounds), such as *sun, when, wine, bean*, and *bus, this*. Instead, some students mispronounced the sound of /n/ as Japanese-[N].

Table 44

Paragoge with Stress

Place of Articulation	Item	Error Types	Count
Velar	*dog*	/g/→ [gɯ]	2
	pig	/g/→ [gɯ]	1
	*fig**	/g/→[gɯ]	1
	*bake**	/k/→ [kɯ]	2
Bilabial	*ship*	/p/→ [pɯ]	1
	help	/p/→ [pɯ]	1
	rope	/p/→ [pɯ]	1
	jam	/m/→ [mɯ]	2
	drum	/m/→ [mɯ]	2
	cube	/b/→ [bɯ]	2
Dental/Alveolar	*bed*	/d/→ [do]	2
	*vet**	/t/→ [to]	1
	hot	/t/→ [to]	3
	rat	/t/→ [to]	2
	*fast**	/t/→ [to]	1

Note. The words with asterisk are those not normally used as a loanword.

Vowel epenthesis is another method of vowel addition. It is the act of adding a vowel or a schwa to a consonant cluster. Along with the paragoge, if the epenthetic syllable is

stressed, the pronunciation poses a threat to intelligibility. Table 45 shows the errors and the number of vowel epenthesis with stress. There were six items including a consonant cluster, and the errors of vowel epenthesis were found in *dr* (*drum*), *bl* (*black*), and *fr* (*frog*), but not in *lp* (*help*), *st* (*fast*), and *nch* (*lunch*). This shows that students tended to make this type of error, especially for words that included a consonant cluster in the initial positions. Although Takebayashi (1996) stated that Japanese learners tend to insert the Japanese-[ɯ], students sometimes inserted various and random vowels.

Table 45

Vowel Epenthesis with Stress

Item	Error Type	Count
drum	Inserting [o] or [ju]	5
black	Inserting [i] or [a]	*3*
frog	Inserting [ɯ]	*5*

It is assumed that both paragoge and vowel epenthesis with stress occur because of the Japanese syllable structure. Syllable structures in English and Japanese are largely different. Most Japanese syllables are open, with no syllable-final consonants (CV), whereas most English syllables are closed, with one or more consonants (CVC). The recall interview revealed that many students segmented the monosyllabic words after the nucleus, even though they had been instructed using onset-rime phonics (see the excerpts of Student 22 for *dog*, Student 22 for *fig*, and Student 33 for *drum*). These excerpts clarify that the inability to segment a word with an onset-rime unit carries the risk of adding unnecessary vowels within consonant clusters or after the final vowels.

Vowel epenthesis and deletion. The error characteristic of vowel epenthesis has been reported previously; thus, the error type of deletion is also discussed here. Both vowel epenthesis and deletion are typical phenomena in which ESL and EFL learners pronounce consonant clusters (Jenkins, 2000). Jenkins emphasized that deletion is more problematic for intelligibility than vowel epenthesis. However, L1 learners also experience the stage to make an error of deletion. McLeod et al. (2001) states that deletion is a typical and long-lasting stage in the development of consonant clusters (McLeod et al., 2001).

Table 46 compares the frequency of the two types of errors that occurred in this study. Compared with vowel epenthesis, a greater number of deletion errors were found. Although Jenkins (2000) stated that this type of error is common among Taiwanese EFL learners because of their L1 influence, while vowel epenthesis is commonly seen among Japanese EFL learners, the results of this study do not support this claim. More deletions were found compared to vowel epenthesis. Since the participant students had received sufficient training in phonological awareness and phonics, it is suspected that they did not exhibit as many vowel insertion errors as average Japanese EFL learners do.

Focusing on the deletion errors, the second sound was deleted in the items of *drum*, *black*, *frog*, and *fast*, while the first sound was deleted in the items of *help* and *fast*. Ohala (1999) attributes factors influencing consonant cluster deletion to the position of the cluster (initial or final), the relationship between the two consonants in the cluster (e.g., stop-liquid, stop-glide), and the sonority hypothesis. Concerning the cluster's position, the second sound was consistently dropped in initial cluster words, while both first and second sounds were deleted in final cluster words. Concerning the relationship between the two consonants in a

cluster, based on error observations in pronouncing *drum*, *black*, *frog*, and *help*, students struggled with producing liquid sounds after/before stop or fricative sounds. Although the sonority hypothesis suggests that the consonant with the lowest sonority[27] tends to be omitted or assimilated into a neighboring sound (Ohala, 1999), this pattern was only evident in the case of the word *fast*.

Table 46

Vowel Epenthesis and Deletion

Error Types	Item	Count
Vowel epenthesis	*drum*	5
	black	3
	frog	5
Deletion of the second sound	*drum*	12
	black	6
	frog	5
	fast	4
Deletion of the first sound	*help*	5
	fast	*5*

Drawing from the typical acquisition of consonant clusters, the deletion of either consonant within clusters is observed not only in EFL learners but also in ENL children, suggesting that it constitutes an intralingual error. Intralingual errors, also referred to as

[27] Vowels, being the most sonorous, are followed in sonority by glides, liquids, nasals, fricatives, and stops, respectively, in a syllable (Ohala, 1999) .

developmental errors, are commonly observed in L1 learners as well, due to the characteristics of the target language (Shirahata *et al*., 2019) .

Misidentification of letters. The letters *b*, *d*, and *p* were confusing for young Japanese EFL learners because they all have a circle and a long vertical line. Allen (2010) emphasized that it takes more time for Japanese EFL learners to acquire lowercase than uppercase knowledge because of the few discriminatory features of the lowercase form. Table 47 shows the total number of errors related to misidentifications of the letters including *b*, *d*, and *p*. Only the number of errors in *drum* was large. It is assumed that the increase in the number of phonemes may have overloaded the students' processing capacity of recognizing each letter correctly. Because of these errors related to the misidentification of letters, some words were pronounced differently, such as *big* or *dig* (for the item *pig)*. Other cases clarified that the misidentification of letters caused students to associate different words. For example, *dog* was misidentified as *bag*, *bake* as *duck*, *cube* as *card*, *bus* as *dish*, and *drum* as *balloon*.

Table 47

Misidentification of Letters (b, d, and p)

Item	Count	Detailed Error Type	Count
dog (d → b)	3	[bɑg]	2
		[bæg] (*bag*)	1
pig (p → b)	4	[bɪg] (*big*)	3
		Others	1
pig (p → d)	2	[dɪg] (*dig*)	2
bed (b → d)	3	[dɛd]	2
		[dɑg] (*dog*)	1
bus (b → d)	6	[dʌs]	4
		[dos]	1

		[dɪʃ] (*dish*)	1
drum (d → b)	20	[bɹʌm]	3
		[brum]	6
		[bɹ**ɯ**m]	2
		[bəˈlun] (*balloon*)	5
		[blæk] (*black*)	1
		Others	3
bake (b → d)	5	[dʌk] (*duck*)	3
		Others	2
cube (b → d)	6	[kud]	1
		[kʌd] or [k**ɯ**d]	1
		[kɑrd] (*card*)	4

Note. The mispronounced sounds are underlined.

Table 48 lists the errors in which the lowercase *l* was misidentified as uppercase *I*. This type of error occurred for the items *long*, *black*, and *help*. Consequently, the sound of /l/ was mispronounced as [ɪ] or [aɪ]. The largest number of errors in *black* also suggests that an increase in the number of phonemes made it challenging for students to process each letter.

Table 48

Misidentification of Letters (Lowercase l)

Item	Error Type	Count
long	/l/ →[aɪ]	1
black	/l/ → [ɪ]	9
	/l/ → [aɪ]	2
help	/l/ → [ɪ]	2

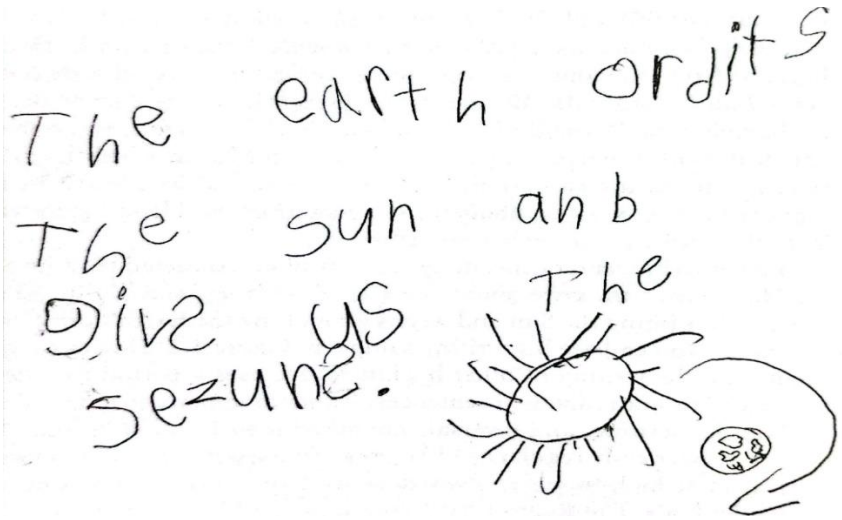
Errors in the misidentification of letters *b*, *d*, and *p* occurred not only among low-proficiency learners but also among middle- or high-proficiency learners, while errors in the misidentification of the letter *l* occurred only among low-proficiency learners. A few students

knew that they often confused these letters (see the excerpts of Student 2 for *drum* and Student 13 for *dog*). Most students were able to recognize the letters that they misidentified after the researcher asked them to explain each letter (see the excerpts of Students 21 and 27 for *drum*, Student 13 for *long*, and Student 18 for *black*).

Figure 5 shows a writing sample of a first-grade ENL child, presenting misspellings related to *b*, *d,* and *s*. Therefore, the misidentification of letters occurred not only among EFL learners but also among ENL children, implying that it is an intralingual error.

Figure 5

Writing Sample of a First-Grade ENL Reader/Writer
(Hayes & Flanigan, 2014, p. 106)



The misidentification of letters also occurred in consonant digraphs. Table 49 presents the errors related to the misidentification of consonant digraphs and their frequency. Although the items in Tier 2 contained six different digraphs, the error occurred in all the letters except

sh and *wh*. There were 17 errors in which *th* was misidentified as *ch*. It is assumed that this error occurred because both the digraphs contain the same letter *h*. There were four instances in which *ch* was misidentified as *ck*. This may be because both the digraphs have the same letter *c*. There were four errors in which the digraph *ck* was misidentified as *ng*, and one error in which the digraph *ng* was misidentified as *ck*. This may be because both the digraphs are usually used as the final consonants of a word. Some students might have known that both digraphs are the sounds coming at the end of a word but still do not understand how to pronounce the sounds.

Table 49

Misidentification of Consonant Digraphs

Item	Error Type	Count
this	*th→ch*	17
lunch	*ch→ck*	4
long	*ng→ck*	1
black	*ck→ng*	4

Discussion

The PWR and WM tests with three different complexities were conducted with 121 students. In addition, a follow-up recall interview was conducted with 33 of the 121 students. Using quantitative and qualitative data, the phonological word recoding of young Japanese EFL learners was examined from various perspectives.

The PWR test was developed based on the Tiered Spelling Inventory (Hayes & Flanigan, 2014). Tier 1 was composed of 10 CVC words in which the nuclei were short

vowels; Tier 2 comprised 10 CVC, CCVC, and CVCC words, including a digraph, a consonant cluster, or both; and Tier 3 consisted of five CVC words, including long vowels. The students' performances on the test were assessed by two raters, following the shared criteria developed based on the LFC (Jenkins, 2000). Sufficient interrater reliability was obtained (r=.98, d=.47).

Quantitative analysis revealed the differences between each tier of the PWR test reflecting the complexity and the relationships between phonological word recoding and word knowledge. The Wilcoxon signed-rank test and a Friedman test showed that there were significant differences among the three tiers. Therefore, it can be concluded that words that include digraphs and consonant clusters make phonological word recoding more complex than those that include only single consonants. In addition, words with a nucleus of short vowels make phonological word recoding more complex than words with a nucleus of long vowels. These findings clarify that such complexities affect EFL learners' phonological word recoding.

Next, the PWR and WM test scores were compared to examine the phonological route theory in the context of students' phonological word recoding. The phonological route involves converting spellings into sounds in order to comprehend their meaning, whereas the lexical route simultaneously selects both word spellings and their meanings. According to findings from L1 research, novice learners usually adopt the phonological route to acquire vocabulary first, and their phonological route gradually replaces the lexical route as they experience phonological recoding of the same words many times (Ehri, 2005; Soura, 2014). In the current study, a multiple regression analysis was conducted to examine how well the

PWR test scores explained the WM test scores. The results showed that the three tiers of the PWR test explained as much as 72% of the variance in the WM test scores. Moreover, the PWR test scores for Tiers 2 and 3 statistically predicted the WM test scores. Tier 2 explained 16% of the variance and Tier 3 explained 7% of the variance in the WM test scores. Thus, it can be concluded that Japanese EFL learners also adopt the phonological route. In addition, for the students who participated in the study, knowledge of consonant digraphs/clusters and long vowels had a significant impact on improved vocabulary learning.

A limitation of these statistical analyses based on the PWR and WM tests is that the number of items for Tier 3 was smaller than that of the other two tiers. The small number of items in Tier 3 caused a lower reliability ($\alpha = .67$) in this case compared to the other two tiers. The Tiered Spelling Inventory by Hayes and Flanigan (2014) provides five words for Tier 1, 15 for Tier 2, and 20 for Tier 3. Given the high scores achieved for Tiers 1 and 2 in this study, it may be beneficial for future research with similar participants to consider adjusting the number of items in each tier.

In addition to statistical analyses, classical item analysis was conducted to understand the difficulties in students' phonological word recoding. In Tier 1, all the items except for *bed* and *rat* presented IF values > .70, indicating that they were very easy. There were more items showing IF values < .70 in Tier 2. All items, except for *long*, *when*, and *help*, had IF =.30 .70. In Tier 3, all five items had an IF =.30–.70. However, none of the items were too difficult, indicating that the IF values were < .30. These results overlap with those of earlier studies comparing the complexity of the three ties. In addition, the ID values showed clear gaps between high- and low-proficiency learners for all items, except for *hot* and *long*.

Error analyses were conducted to understand the difficulties in students' phonological word recoding more precisely. The first error analysis attempted to classify the error types found in each item. The percentage of each error relative to the total number of errors was also calculated. Qualitative data from the recall interview provided more information about the errors. Based on the primary error analysis, further analysis was conducted to determine the common characteristics among the errors. The following eight features were identified. The first error features relating to *declarative and procedural knowledge* and *the process of skill acquisition* describe the current status of student learning. Ehri (1999) termed this as "the partial alphabetic phase," wherein students' alphabetic knowledge is still partial, and they often misread words as other words.

Next, the following error features caused by L1 interference were identified: *lack of phoneme perception of confusing sounds, the influence of Japanese orthography, devoicing of voiced obstruent geminates,* and *paragoge and vowel epenthesis.* The phonetic, phonemic, and orthographic features differ greatly between English and Japanese. Moreover, this test included many words that are used as loanwords in Japanese. Therefore, it can be concluded that many errors were due to interlingual factors. The final common error features were *deletion in consonant cluster* and *the misidentification of letters*. As novice ENL children also make these errors, they can be categorized as intralingual errors.

CHAPTER 4

EXPLORATORY STUDY OF PHONOLOGICAL RECODING PROCESS

In the preceding chapter, the phonological word recoding ability of young Japanese EFL learners was primarily assessed through test results. Building upon the findings from that chapter, this chapter delves into the additional analyses concerning the students' word recognition and their responses to their curriculum. Qualitative data was gathered through interviews with the same students who participated in the previous chapter. Notably, most young Japanese EFL learners currently lack systematic literacy instruction. Thus, the current chapter aims to shed light on the perspectives of actual young Japanese EFL learners' voice who have experienced a progressive literacy curriculum.

Method

Participants

The participants in this study comprised a subpopulation of sixth-grade students from schools A and B, who took both the PWR and WM tests. These same students had previously taken part in the recall interview described in Chapter 3. The students who participated in the interview were classified into four distinct groups based on their test scores and motivation levels, as follows: (1) high PWR test score + high motivation (HPHM); (2) high PWR test score + low motivation (HPLM); (3) low PWR test score + high motivation (LPHM); (4) low PWR test score + low motivation (LPLM)[28]. As the research site and participant details were

[28] To measure their motication, a five-likert scale questionnair including an item asking if they like to read English was conducted.

previously elucidated in the preceding chapter, the detailed information is excluded to avoid repetition in this chapter.

Interview

The semi-structured interview was conducted alongside the recall interview in Chapter 3. Soon after the interview to make students recall the errors that they had made in the test, the semi-structured interview was continued, focusing on the following points: (1) the process of automatization of their phonological word recoding skill, (2) the process from phonological word recoding to word recognition, (3) the literacy program fostering their phonological word recoding, (4) their motivation toward reading. Each of these points will be explained briefly.

Automatic Phonological Recoding

The previous chapter provided a comprehensive description of phonological word recoding among the students. The recall interview demonstrated the active utilization of alphabetic principle knowledge by the learners, enabling them to correct errors in their phonological word recoding. In theory, as learners encounter the same words repeatedly and engage in phonological recoding using their knowledge of alphabetic principles, the words become stored in memory as sight words (Ehri, 1999). However, the previous chapter did not examine whether students read and pronounced the words solely as sight words or still consciously applied alphabetic principle. To investigate the presence of automatization in phonological word recoding, students were asked whether they read the words at a quick glance (as sight words) or if they still thinking through what sound each letter represented (as phonological word recoding).

From Phonological Word Recoding to Word Recognition

Word recognition refers to the process of determining the pronunciation and grasping some degree of the meaning of a word in its written or printed form (Harris & Hodge, 2014). The findings from the previous chapter established a significant causal relationship between phonological word recoding and word comprehension. Unlike young ENL learners, novice EFL learners are assumed to have limited oral vocabulary. Consequently, they may encounter situations where they can read a word but do not fully understand its meaning. How do students perceive this gap in word recognition? Additionally, phonological word recoding plays a self-teaching role to learn new vocabulary independently (Share, 1995). Do students actively attempt to learn vocabulary based on their phonological word recoding skills? To answer these questions, the semi-structured interview probed students about their experiences when they encountered words whose meanings they did not know, despite being able to read them aloud.

The Context of the Curriculum to Foster Their Phonological Word Recoding Ability

The item analysis conducted in the previous chapter provided evidence that students who received a systematic literacy program developed by Allen-Tamai (2010a; 2019; 2022) achieved high proficiency in phonological word recoding. Additionally, these students demonstrated a high metalinguistic ability, as evidenced by their explanations of their phonological word recoding during the recall interview. As reported by MEXT (2014), the issue of delayed and insufficient instruction for elementary students, despite their advancing abstract thinking abilities, requires urgent attention. This emphasizes the importance of engaging in discussions to implement appropriate curriculums that effectively nurture early

literacy skills. Therefore, the semi-structural interview explored how students responded to the systematic literacy curriculum aimed at fostering phonological word recoding.

Specifically, the HPHM and HPLM students were questioned about when they realized that they gained the ability to read English words and which activities facilitated the development of their phonological word recoding. Conversely, the LPHM and LPLM students were asked to describe the challenges they encountered during class and their feelings when facing difficulties in phonological word recoding.

Motivation toward Reading

According to Cameron (2001, p.157-158), EFL learners "need to feel positive about reading and writing in the foreign language, to understand why literacy is useful and to enjoy tackling a text in the foreign language, confident that they will be able to get something from it." Alongside the student's responses to the curriculum, their reading motivation was also investigated. The HPHM and HPLM students were asked about the reasons they enjoyed reading in English. On the other hand, the HPLM and LPLM students were asked to explain why they did not find reading in English very enjoyable.

Procedure

The transcribed interview data were analyzed using co-occurrence network analysis, employing KH coder, a freely available software designed for quantitative content analysis of text-based data. This software identifies frequently used morphemes and generates a co-occurrence network analysis, presenting a network diagram that connects extracted words exhibiting significant co-occurrence patterns. To obtain proper results, it is important to conduct data cleaning repeatedly like the following procedure (Ushizawa, 2018; Nishimura &

Shimizu, 2021): (1) synonyms with different notations (such as '*easy*' and '*not difficult*') were unified if they were used with the same meaning; (2) the words that can be written in *Kanji* were converted into *Kanji*; (3) the over-segmented words (such as '*fifth*' and '*grade*' not as '*fifth grade*') were extracted as a single word. Moreover, certain redundant comments were simplified, and some expressions were unified as specific terms (such as '*digraph*'). Throughout this data-cleaning process, utmost care was taken to ensure that the original meaning of the extracted words remained intact.

Data Analysis

Each question was carefully interpreted, ensuring a comprehensive understanding of the children's perspectives and voices. The analysis of their responses using KH coder enriched our insights into the data. Figures 6 to 10 present the co-occurrence network of words derived from the analysis of all comments related to each respective question (see Appendix H). Notably, exceptional comments were excluded from this analysis. The size of the circles in the figures represents the frequency of appearance in the student's comments.

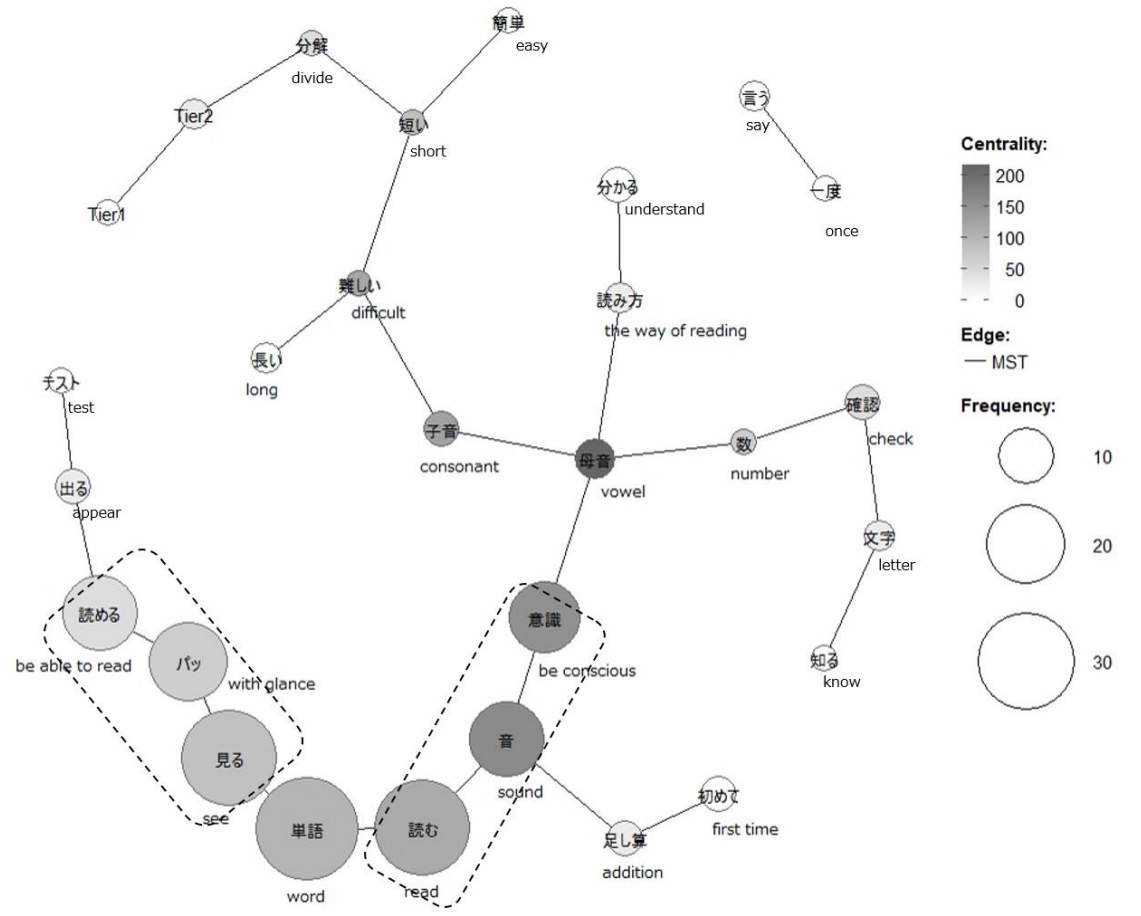
Furthermore, the KH coder offers different co-occurrence network analyses, such as centrality analysis and subgraph analysis. Figure 6 employed the result of centrality analysis, where darker colors indicate centrality mediating multiple words. Conversely, Figures 7 to 10 utilized subgraph analysis, where classified subgroups are represented with distinct colors, facilitating the interpretation of the analysis.

Phonological Word Recoding: Sight Words vs. Alphabetic Principle

Figure 6 illustrates the co-occurrence network depicting the process of the students' phonological word recoding. The cluster of relatively larger circles in the bottom left represents that both '*seeing with a glance*' and '*reading sounds consciously*' are employed by students. For example, student 19 explained that she could read Tier 1 words by sight, whereas she had to be conscious of each sound when reading Tier 2 words. Likewise, student 29 mentioned that he typically read words that he had encountered before as sight words, whereas he had to be conscious of each sound when dealing with unfamiliar words.

Figure 6

Co-occurrence Network: Sight Words vs. Alphabetic Principle



The words connecting to the circles of '*seeing with a glance*' and '*reading sounds conscious*' describe what kind of words students read by sight or read by using alphabetic principle. The words '*test*' and '*appear*' imply that they can read words that appeared in the test by sight. The words '*addition*' and '*first time*' imply that they use alphabetic principle when they read words that they have never seen before. In such cases, they think of each sound and blend them to pronounce the whole word.

Since the most centrally located word is '*vowel*' and it also connects to '*reading sounds consciously*', students read words especially being conscious of vowel sounds. For instance, student 5 said, "I can read words that appeared in the test. But I still pay attention to vowels because different vowel pronunciations change the word meanings." Student 9 said, "I pay attention to the number of vowels." This is because they were taught the spelling rule that the first vowel letter should be pronounced as a long vowel and the second vowel letter should be silent if the word has two vowels in a word. Student 7, who also mentioned the number of vowels, explained that reading words in Tier 2 required more time and attention because she needed to pay attention to consonant digraphs/clusters as well as the number of vowels. Student 12 shared that when he faced with an unfamiliar word, he normally combines sounds by paying attention to the vowel.

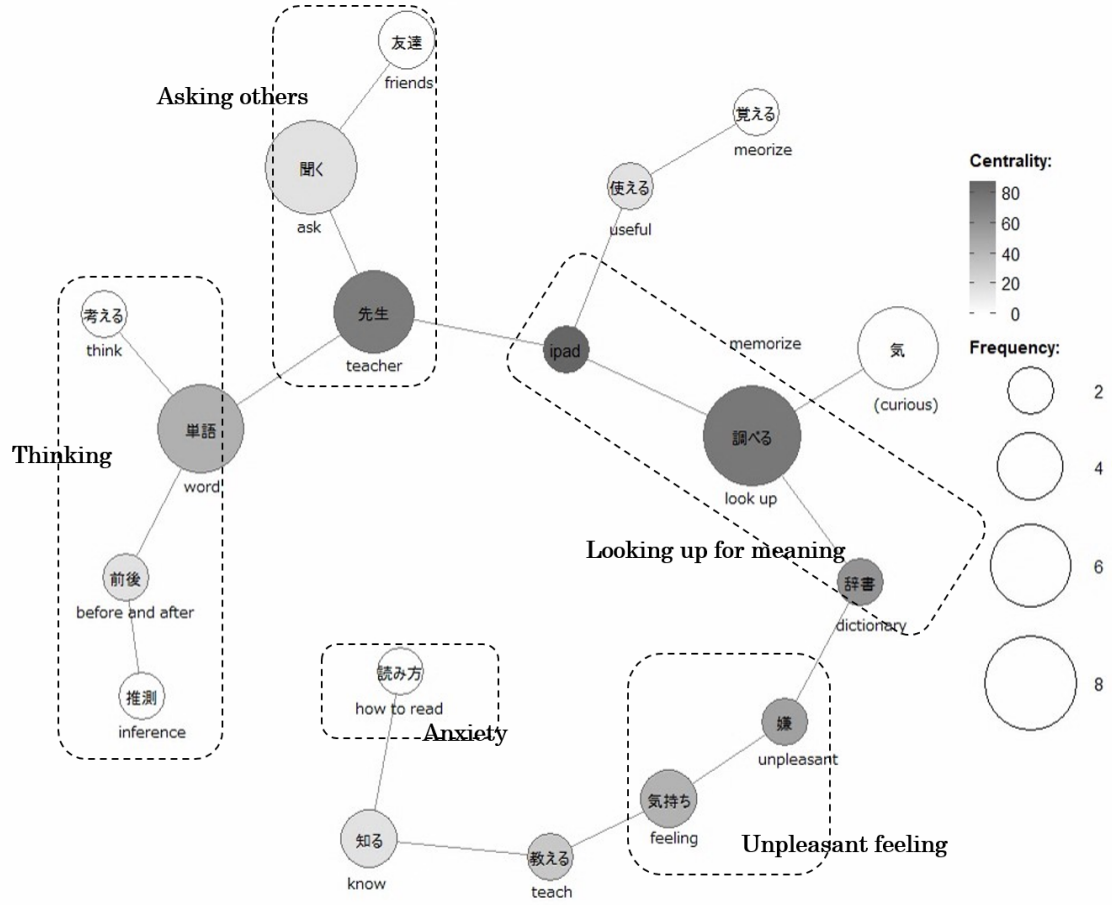
From Phonological Word Recoding to Word Recognition

Figure 7 illustrates the experiences of students when they did not know the word meaning, despite being able to read them aloud. Emotionally, a few students felt '*anxiety*' or '*unpleasant feeling'*. Students 12 and 24 explained that not knowing the meaning made them anxious about whether their phonological word recoding was correct or not. Student 25

expressed an unpleasant feeling and a desire for someone to teach the meaning. While student 11 also mentioned an unpleasant feeling when encountering unknown words, this feeling motivated him to look up the dictionary at home. Though not shown in the figure, a few students did not display special concern when they did not understand the meaning. For example, student 17 seemed content merely to be able to pronounce the word. Student 29 expressed an unconcerned attitude, saying, "It is fine if I do not know the meaning. We'll just have to learn from now on." All the other students answered that they become '*curious*' when they do not know the meaning.

Figure 7

Co-occurrence Network: Students' Experience When Encountering Unknown Words



Among the students who expressed curiosity about word meaning, approximately half merely desired to know the meaning of unknown words, while the other half proactively took actions to satisfy their curiosity, such as (1)*asking others*, (2) *looking up the meanings,* and (3) *thinking by themselves*. '*Asking others*' emerged as the most common strategy among the students. Some preferred to ask their friends, while others sought assistance from their teachers. For instance, students 19 and 32 mentioned that they typically asked their friends, while students 6, 7, and 20 sought help from their teacher. What student 7 did before asking her teacher was to reflect on whether she had encountered the word elsewhere or if it existed as a loanword in Japanese. Students 18 and 31 acknowledged the value of learning word meanings in class through phonological word recoding exercises with their English teacher.

To satiate their curiosity about word meaning, students also consulted dictionaries or conducted online searches. For example, student 8 stated that she consulted a dictionary at home when she became curious about word meanings. Student 33 utilized the supplementary material including word lists when she encountered unfamiliar words. Students 4 and 22 emphasized the importance of usefulness. Student 4 said, "Without knowing the meanings, I can't use the words in the future. This is why I ask my teacher or look them up on my iPad." Student 22 shared, "If I'm curious, I look them up. Then, I memorize only what I can use. If I don't use the word now, I just listen to it once and hope it stays somewhere in my mind."

Additionally, some students attempted to deduce word meanings on their own. As they gained experience reading longer sentences in a class, two students, students 5 and 33, reported inferring the meaning of unknown words from the context by examining the surrounding words before or after the word.

The Context of the Curriculum

The students who achieved high scores in the PW test (HP learners) and those who obtained lower scores (LP learners) were asked different sets of questions. The HP learners, including both HPHM and HPLM learners, were questioned about the moment they realized they had acquired the ability of phonological word recoding. On the other hand, the LP learners (LPHM and LPLM students) were asked about the challenges they encountered during the class, although they might have also had some successful experiences.

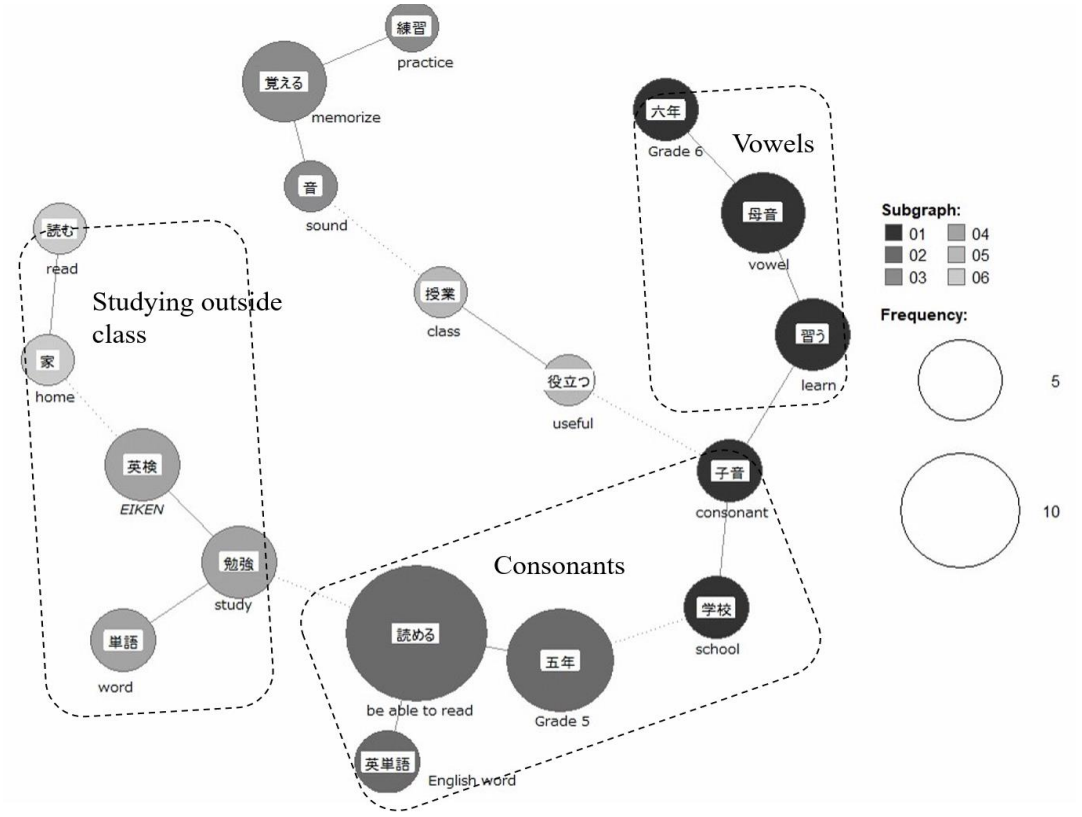
The HP learners' voices. Figure 8 depicts the perspectives of the HPHM and HPLM students on the timing and process of learning to read words. The second-largest circle indicates that a majority of students experienced a noticeable improvement in their reading ability during the study of '*consonants*' in '*Grade 5*' and '*vowels*' in '*Grade 6*'. Additionally, some students reported recognizing this change when they were studying outside of class, for instance, when preparing for the EIKEN test.

Corresponding to the students' responses mentioned earlier, the details of the phonics instruction in the literacy curriculum at the research site are explained here. The phonics instruction was incrementally introduced beginning with single consonants. Before learning phonics, by Grade 4, the students had already learned the letters and experienced some activities to foster their phonological awareness. By Grade 5, they began to learn single consonants. Acquiring single consonants was relatively straightforward because the alphabet names mostly reflect their sounds. For example, the phonemes of *b, c, d, g, p, t, v,* and *z* can be introduced to students by deleting the common vowel /i/ from /bi/, /si/, /di/, / dʒi/, /pi/, /ti/, /vi/, /zi/. Similarly, they could learn the phonemes of '*f, l, m, n, s, x*' (with /ɛ / as the common

vowel) and '*j, k*' (with /eɪ/ as the common vowel). They only needed to memorize the phonemes of *h, q, r, w, y*, and hard *c* and *g*.

Figure 8

Co-occurrence Network: What Enhanced Students' Phonological Word Recoding



After learning single consonants, they practiced reading rhyming words (e.g., *cat, mat, hat, bat*). As they became familiar with single consonants within words, they engaged in exercises where they wrote down the onset of a word after listening to teachers' pronunciation (e.g., *_at, _at, _at, _at*). Gradually, students wanted to know how to pronounce *a, e, i, o, u* in English, as the sounds differ from Japanese vowels. Consequently, vowels were explicitly introduced, starting with short vowels at the beginning of Grade 6. Soon after

getting used to the five vowels, they practiced reading and writing CVC words with single consonants and short vowel, such as the words in Tier 1. This thorough instruction in Grades 5 and 6 explains why the students considered these grades as turning points in acquiring phonological word recoding skills.

Students' comments provided an additional and more precise description of the curriculum's characteristics, which include (1) the spiral and routine approach, (2) instruction on consonant digraphs/clusters, (3) long vowel instructions, (4) benefits for high proficiency learners, and (4) the integration of bottom-up and top-down approaches. Student 8 emphasized the effects of the spiral and routine approach employed in the literacy program. She said, "Initially, I didn't know anything, but through repeated practice, I gradually grasped the sounds." As she pointed out, phonics had been introduced every class, typically for about ten minutes, as it takes time for EFL learners to master alphabetic principle and internalize this knowledge as their own skill. For example, when focusing on consonants, students would start each session by practicing the pronunciation of each sound. Then they would read words displayed by the teacher, followed by working on quizzes in the literacy textbook. This approach allowed students to master their knowledge and skills progressively. Once most students in the class acquired proficiency in single consonants, the teacher would then introduce them to the next stage of learning which involved short vowels.

Student 1 highlighted the impact of the consonant digraphs instruction. She said, "When I was in fourth grade, I couldn't read words. However, since becoming a fifth grader, my ability to read words has gradually improved. After learning about *two letters and one sound* (consonant digraphs) in grade 6, I can now read words quickly." In the curriculum,

consonant digraphs were introduced after students began to enjoy reading CVC words with single consonants and short vowels. Learning consonant digraphs further enhanced their ability to read many more words independently. Additionally, while reading and writing rhyming words (e.g., *top, mop, shop, chop, stop*), students were implicitly exposed to consonant clusters. In this way, students learned to read words that involve consonant digraphs and clusters, such as the words in Tier 2.

Student 4 expressed the significance of the long vowel instruction, stating, “I have been able to read words since the end of grade 5. *My Literacy Book* (the literacy textbook used in class) was helpful. I enjoyed listening and writing words, and I like discovering words with the same long vowels.” Regarding long vowels, students began learning how to read words with long vowels in the middle of November. Initially, they engaged in phonological awareness activities, such as identifying words with the same long vowel sounds. To distinguish long vowels from short vowels, they were taught the long vowel spelling rule: *when a word contains two vowel letters, they must read the first vowel letter as a long vowel, while the second vowel remains silent.* They grasped this rule by comparing words with short vowels to those with long vowel words, such as *cap-cape, hop-hope,* and *cut-cute*. Subsequently, they practiced reading various words with each long vowel. Mastering long vowels can be complex due to the existence of multiple spelling patterns. For instance, while learning the long vowel *o*, students practiced reading words with various spelling patterns, including *o_e* (e.g., *hope, rope*), *oa* (e.g., *boat, goat*), and *oe* (e.g., *toe, Joe*). This comprehensive approach facilitated their ability to read words incorporating long vowels more effectively.

Even students who had some ability to read words before learning phonics in school also derived substantial benefits from the literacy curriculum. As expressed by Student 7, the continuous practice of single consonants contributed to her ability to read words by sight. Furthermore, she expressed her joy in how learning vowels enabled her to read a wide range of words with confidence.

Lastly, the learners' voice also brought the advantages of integrating bottom-up and top-down approaches. Student 2 highlighted that the story-based curriculum, introduced concurrently with the literacy curriculum, significantly contributed to enhancing his reading ability. As previously mentioned in the literature review, the story-based curriculum is another unique approach developed by Allen-Tamai (2010a). Recognizing that oral language and phonological awareness form the foundation of literacy, the use of stories and folktales in the classroom is an effective method due to the challenges of fostering oracy within a meaningful context. Similar to the literacy program, students engage in approximately ten-minute storytelling activities where they recite the lines of stories orally, which is called *Joint Storytelling*. During *Joint Storytelling,* the teacher uses cut-outs on the blackboard and introduces each storyline through chants or songs, accompanied by hand gestures based on American sign language. This method exposes students to a rich amount of oral language by using various kinds of effective methods (e.g., songs and chants) and techniques (e.g., visual and kinesthetic aid) for younger learners.

Furthermore, familiar folktales, such as *Little Red Riding Hood* or *Momotaro* (a well-known Japanese folktale), are used in this context to facilitate students' understanding without the need for translations. Once students can recite the lines by heart, they are given

the written manuscripts. While phonics enables students to read words by understanding alphabetic principle (bottom-up approach), reading story manuscripts allows them to read within a meaningful context (top-down approach).

Student 2 shared how learning through Joint Storytelling contributed to his learning by saying, " I was very happy when I received the manuscript of *Momotaro.* When I recited the lines only through the teacher's voice, I couldn't say the line '*I can't believe this!*' correctly. However, when I read the manuscript, I noticed the words '*believe'* and '*this'* in the line clearly. My pronunciation improved after noticing this." His comments vividly demonstrated that literacy learning reinforced what they were learning orally and played a significant role in enhancing their metalinguistic awareness. This integration of oral and written language fostered their language holistically and proved to be highly beneficial for the student's overall literacy skills.

The LP learners' voices. Any classroom has various levels of proficiency among students. To gain insight into the challenges encountered by LP learners and their experiences of failure in phonological word recoding, the voices of the LPHM and LPLM learners were analyzed. Figure 9 illustrated the difficulties articulated by the LPHM and LPLM learners. The results partly overlap with the error analysis presented in the previous chapter, with the main difficulties being in '*confusing sounds and confusing letter shapes*' and '*consonant digraphs and vowels.*' For single consonants, confusion between the sounds of /r/ and /l/, /m/ and /n/, and difficulty in pronouncing /v/ were mentioned, along with occasional confusion between the letters of *b* and *d*. Regarding short vowels, difficulty with the pronunciation of /æ/ was highlighted, as well as encountering challenges with the romanization of the short

vowel *u.* As for the long vowels, challenges in applying the rule correctly and distinguishing /ju/ or /u/ when pronouncing words including the long vowel *u* were expressed. Also, the difficulty of pronouncing the diphthong /eɪ/ was mentioned, as Japanese EFL learners are not familiar with the pronunciations of diphthongs, and they tend to pronounce it as /e/. Despite facing difficulties in phonological word recoding, the presence of these metacognitive abilities to understand their specific challenges suggests their great learning potential. In this respect, phonics plays a significant role in contributing to their learning process.

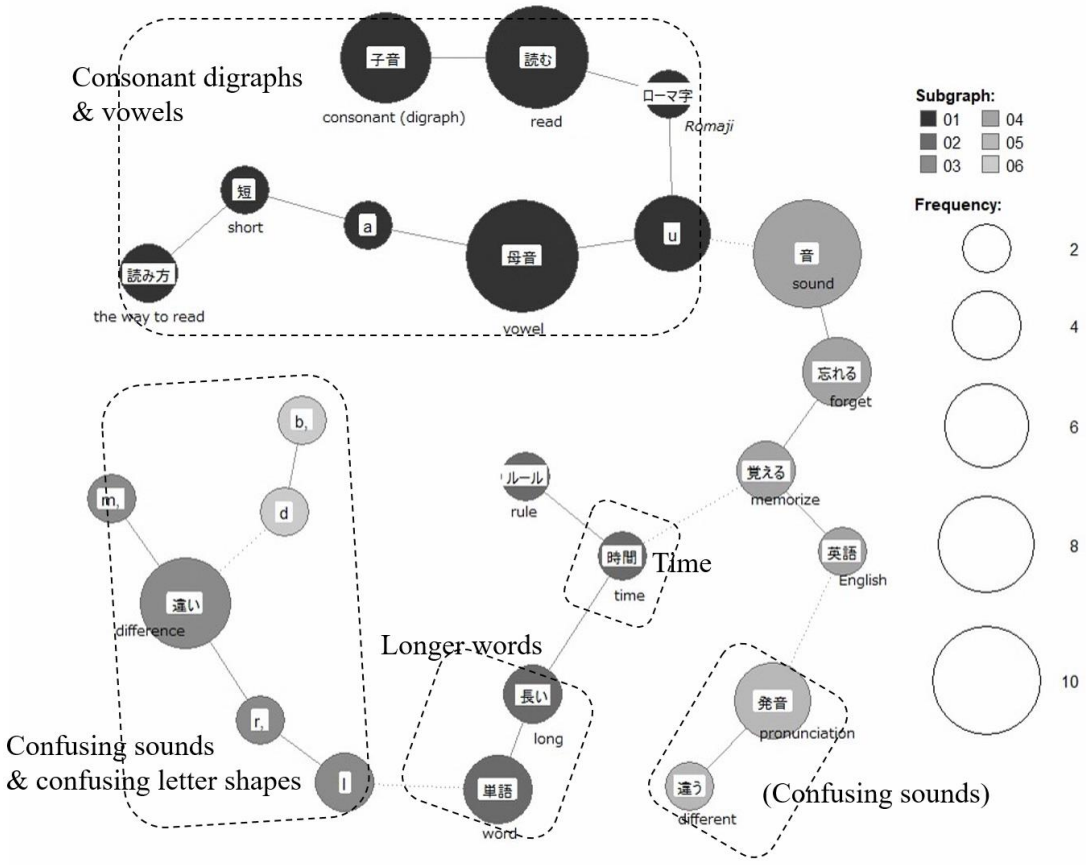
New insights from the semi-structured interview reveal that students also identified '*longer words*' and '*time*' as challenging factors for their phonological word recoding. Student 33 said, "Longer words are challenging. Without enough time to think about each letter, I can't read the word quickly." Similarly, Student 14 mentioned, "When I read a longer word, I struggle to combine each sound, and I tend to forget the previous sound when moving on to the next one." Longer words, which often contain consonant digraphs/clusters or long vowels impose an extra load on students' phonological word recoding process, requiring them to process each sound carefully and retain it in their short-term memory.

In Figure 9, the relatively large circle labeled '*sound*' connects with '*forget*' '*memorize*' and '*English,*' representing the words extracted from Student 33's comment. He emphasized the challenges he faced in understanding phonics rules and learning alphabetic principle. He said, "I sometimes forget the alphabet names, but I understand them. I am struggling with the sounds. I could write/read words if I knew the sounds. This is why I can't catch up with the class. Some sounds are easy to learn but…I don't know why I can't learn the sounds. If I knew the sounds, I could associate them with letters and read a word. The

sounds are hard." The quantitative data indicated that even LP learners possessed a certain level of ability in phonological word recoding, allowing them to reflect on their errors and difficulties. However, the data also revealed that there were a few students who significantly struggled with recognizing letters and/or sounds. These students would benefit from individualized support to address their specific challenges.

Figure 9

Co-occurrence Network: Challenges the LP Learners Faced



In Figure 10, the student's responses to encountering difficulty in phonological word recoding. When faced with challenges, some students resorted to '*vocalization,*' repeatedly

attempting to pronounce the words. Student 20 mentioned, “I vocalize something at random,” while Student 17 explained, “I vocalize again and again. When I reach the pronunciation that seemed correct, I pronounce it out.” Although their attempts may not always yield the correct pronunciation, the act of vocalizing allows them to compare their pronunciation with the target sound, aiding them in recognizing and learning from their mistakes.

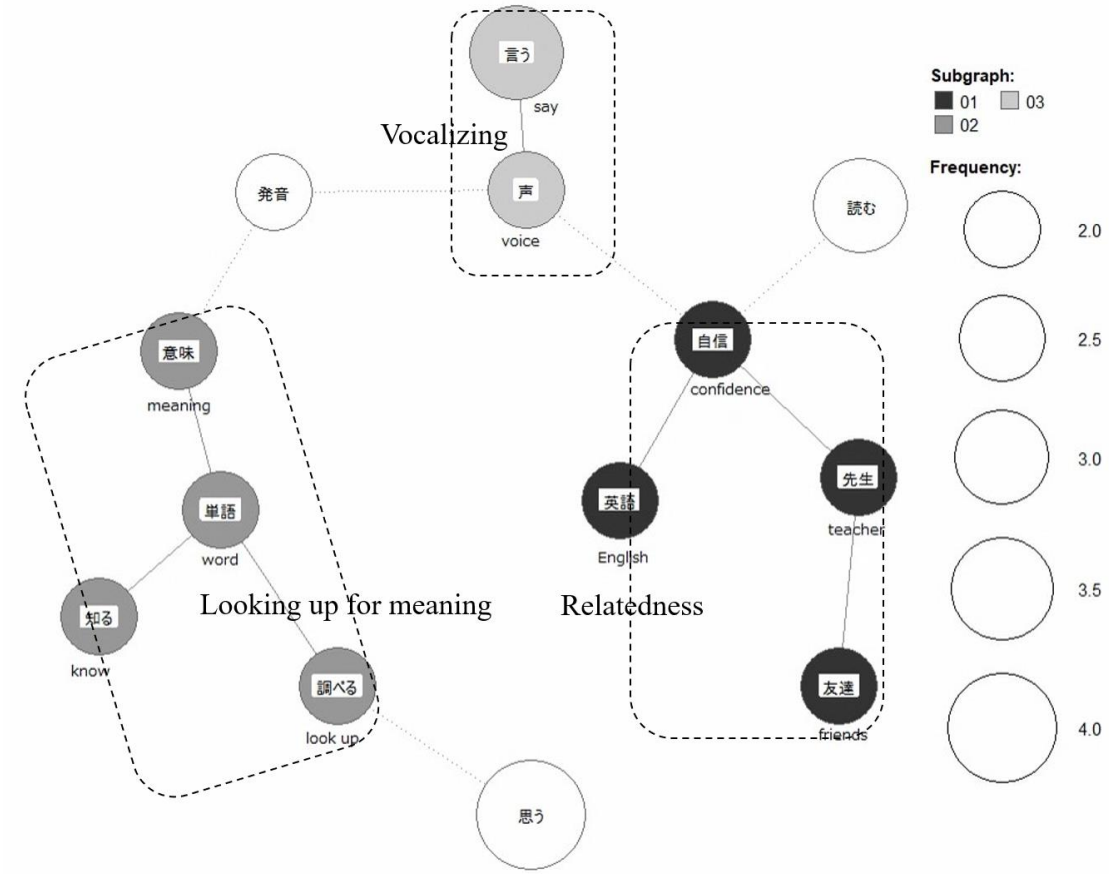
The other strategy observed among the LP students was ‘*looking up the meaning*’ of the words they could not read aloud. For example, Student 24 mentioned that he would memorize unknown words by heart. They believed that understanding the meaning of the word would help them determine its pronunciation. This approach contrasts with the phonological route. Furthermore, since the Japanese language includes many loanwords, students need to be cautious not to pronounce these words with a Japanese accent. In cases where students struggle with phonological word recoding, they might tend to rely on the word meanings or sight word reading. Nonetheless, Gatherole and Alloway (2018) emphasize that children with reading difficulties often exhibit poor working memory capacities, and their memory scores predict the severity of their learning problems. Therefore, even though they face difficulties in utilizing alphabetic principle, it is essential to dedicate time to help them acquire phonological word recoding skills before encouraging them to memorize by heart. A comprehensive and patient approach can ultimately support their progress in reading proficiency.

'*Relatedness*' emerged as another significant factor in the students' experiences. During class, students observed their peers closely. Student 22 mentioned, "When I realize that my pronunciation differs from everyone else's, I lose confidence. So, when the teacher

asks me to read aloud, I struggle to speak clearly due to my lack of confidence." Conversely, Student 33 observed and imitated her classmates when she encountered words she couldn't read. She expressed a desire to read words like her peers. Additionally, Student 24 shared, "I become anxious when I encounter unfamiliar words. However, learning alongside friends motivates me, and I feel more at ease when teachers offer their support." The sense of connection with classmates and the encouragement from teachers play pivotal roles in influencing the students' reading experiences and confidence levels.

Figure 10

Co-occurrence Network: the LP Students' Reaction When Failing Phonological Word Recoding



Motivation toward English reading

The analysis on their motivation did not utilize KH code. Instead, it focuses on differentiating between the HPHM and LPHM students, as well as the HPLM and LPLM students. This approach allowed for a more detailed and vivid understanding of their motivations.

The HM Learners' Voice. Approximately 30% of the HM students who took the interview exhibited a strong interest in the English language itself, which influenced their motivation for reading in English. Some students were intrinsically motivated. For example, Student 4 (HPHM) expressed, "I've always liked English and enjoy my English classes at school. English is fun for me. Unlike Japanese language classes, I have been enjoying English classes since first grade. I've been giving my best effort ever since. It feels great when I can read sentences, and I feel even happier when I can read them fluently."

Student 22 (LPHM) also exhibited a keen interest in foreign languages. She expressed, "Reading in English can be challenging, but it's enjoyable. I'm interested in other different languages. I also like Korean as well and I sometimes browse through Korean dictionaries. Even though I may not be able to read well, I still explore English dictionaries. It makes me happy when I come across words I recognize. I am interested in foreign languages, though learning them is sometimes challenging. I want to improve my reading and writing skills." Additionally, she mentioned the influence of her mother conversing with her friends in English and encouraging her to study not only English but also Korean.

The influence of their families, including parents and siblings, played a significant role in shaping students' interest in English and their motivation to read. Here are some examples of how students described the impact of their family members:

- I always like English and reading English because my mother speaks English at home. (Student 1)
- My parents made me learn English at first. I think this is why I like reading English. (Student 4)
- My older brother learns English before me and I saw him and my mother speaking English. I also want to speak English like my brother and I was always interested in English. This is why I like to read English, too. (Student 7)
- My sister is good at English, and when I saw her talking to foreigners online, I became interested in English too. (Student 23)

The family's influence played a crucial role in nurturing the students' passion for English and fostering their reading motivation.

The other HM students described how their motivation towards reading in English grew as they gradually acquired phonological word recoding ability. For example, student 8 (HPHM) expressed, "In the 5th grade, English class was OK at first, but I started to like English as I learned to read." Similarly, Student 5 (HPHM) mentioned, "Because I can read now, I enjoy reading and I am interested in reading. It is fascinating to understand the word's meaning." Despite facing some difficulties in phonological word recoding, LPHM students were also motivated by their successful experience of reading English, as demonstrated in the following statements:

- I like reading English because I'm happy when I read a word correctly by pronouncing each letter sound. (Student 15)
- I like reading English because it is pleasant and refreshing when I can read. When I can read difficult ones, I feel great. (Student 19)

These LPHM students focused on their progress and what they could achieve, demonstrating positive aspects of their learning journey. Additionally, some learners envisioned themselves becoming proficiency readers in English and appreciated the linguistic differences between English and Japanese. Student 13 shared, "I believe it would be amazing to be able to read and write in English someday." Student 23 remarked, "Unlike Japanese, English has many different ways to represent the same sounds. For example, we only have one way to pronounce 'あ' [a] in Japanese, while English sounds vary depending on different spellings." Regardless of the performance scores, the students' comments reflected their rich learning experiences.

The moment they enjoyed reading and the sense of competence they felt in their literacy learning enhanced their learning motivation toward reading. This literacy motivation obtained through their learning experience holds great value and will continue to support their English learning in junior high school.

The LM Learners' Voice. A significant question arises as to why the HPLM students did not enjoy reading English words. Student 9, who had an interest in math and science, explained, "I don't like English, so I don't like reading. Although I can read English, it doesn't become my favorite subject. I simply lack motivation."

Students 10 and 11 lacked confidence in comparing themselves to others. Student 11 expressed, “I don’t feel great because there are other people who are doing better than me.” Meanwhile, student 10 observed his returnee classmate reading a thick book in English and felt that he could never achieve such proficiency. He also mentioned that reading English, particularly more than three sentences felt burdensome. Despite acknowledging the usefulness of English, he found all school subjects monotonous. Interestingly, he discovered some English words while learning programming after school, indicating incidental language acquisition.

Conversely, the LPLM learners clearly emphasized their learning difficulties:

- Reading is hard because some letters in English are pronounced very similarly. Vowels are also challenging. I still haven’t become accustomed to them. (Student 24)
- Reading is difficult. I can read words like *dog* quickly, but there are words I struggle to read accurately and fluently. (Student 25)
- I am not good at reading sounds. (Student 32)
- I find it challenging to reading words with four or five letters (Student 31)

Despite their lack of confidence, it does not necessarily indicate a dislike for reading English. It highlights the need for continuous support in developing their phonological word recoding skills. Hence, English education in junior high school should provide a consistent and effective approach to enhance their fundamental early literacy abilities. The connection between elementary and junior high schools will assist in fostering their motivation and competence in reading English.

Discussion

Hearing the learners' voices has provided a more detailed understanding of their word recognition, including phonological word recoding ability. Students who acquired phonological recoding skills started recognizing familiar words by sight after encountering them multiple times. However, when faced with unknown or unfamiliar words, they still actively utilized their phonological word recoding skills, particularly when dealing with consonant digraphs/clusters and vowels. This finding demonstrates that Japanese young EFL learners follow a similar reading developmental process as ENL learners.

However, a notable difference between EFL and ENL learners lies in their oral vocabulary size. ENL learners, who have been exposed to a rich vocabulary through everyday language usage, can easily comprehend texts once they can read them aloud. On the other hand, for young EFL learners, being able to read aloud does not necessarily guarantee comprehension of the text. The interviews revealed that students who acquired phonological word recoding ability displayed curiosity about vocabulary learning. When they encountered words whose meanings they didn't know, they actively sought to learn their meanings by asking others or consulting a dictionary. This demonstrates that phonological word recoding empowers learners to study and make connections between pronounced words and their meanings.

The high performance in the PWR test and the advanced reflective capacity of explaining their phonological word recoding skills can be attributed to the systematic literacy program they received. Students expressed appreciation for the structured curriculum, which empowered them to read English words autonomously. Although some students still faced

challenges with phonological word recoding, many of them focused on their abilities rather than their limitations. During interviews with LPLM learners, some students did express anxiety about their phonological word recoding. To ensure that their efforts in acquiring phonological word recoding skills are not in vain, continuous instruction to develop their early literacy skills should be implemented in junior high school education. This approach will provide the necessary support for students to further improve their reading abilities.

CHAPTER 5

GENERAL DISCUSSION

With the revision of the new Course of Study, there is an increasing demand to enhance early literacy skills in elementary English education in Japan. In the context of ENL learning, the initial and fundamental task is to develop phonological word recoding skills, which are built upon oral language proficiency and phonological awareness (Chall, 1983). This dissertation has thoroughly examined the phonological word recoding ability of young Japanese EFL learners from various perspectives. This concluding chapter provides a summary of the author's two studies, addressing the research questions outlined in Chapter 2. Subsequently, it explores the pedagogical implications derived from these studies. Lastly, it discusses the limitations encountered in these studies and suggests potential avenues for future research.

Study 1, discussed in Chapter 3, aimed to comprehensively understand the phonological word recoding ability of the participants. This study had quantitative analysis and item/error analyses. The PWR test, comprising three tiers of varying levels of complexity, was administered to 121 sixth-grade students. The quantitative analysis yielded two significant findings. Firstly, the students' performance aligned with the complexity levels of the test. Notably, the presence of consonant digraphs/clusters posed greater difficulty in phonological word recoding, and words with long vowels were found to be more complex compared to those with short vowels.

Secondly, the results indicated that students comprehended word meanings through phonological word recoding. The finding was supported by conducting a multiple regression

analysis that examined the relationship between the PWR test scores and the WM test scores, thus validating the applicability of the theory of the phonological route to young Japanese EFL learners. Additionally, the statistical prediction of the WM test scores based on the PWR test scores for Tier 2 and 3 highlighted the influential role of knowledge in consonant digraphs/clusters and long vowels. Overall, these quantitative findings described the authentic phonological word recoding skills of young Japanese EFL learners and their status of word recognition, which encompasses the process of phonological word recoding.

To gain more comprehensive insights into their phonological word recoding ability, a detailed analysis of each item was conducted. The item analysis corroborated the first finding that the students demonstrated excellent performance in Tier 1, while the difficulty level of Tier 2 and 3 revealed variations in their proficiency and highlighted specific areas where they encounter difficulties in their phonological word recoding ability. To understand these challenges, an error analysis was conducted for each item, involving the classification and tallying of different error types observed. This analysis was supplemented by the inclusion of the recalling interview data collected from 33 students selected from the overall participants.

Building upon the initial error analysis, a further error analysis was conducted to address the third research question, with the objective of investigating the distinctive characteristics of errors in their phonological recoding. The findings provided three significant insights: (1) their stage of phonological word recoding development, (2) interlingual errors, and (3) intralingual errors.

Regarding their stage of reading development, the findings revealed that the students' phonological word recoding abilities showcased the process of skill acquisition. Some

students exhibited a disparity between their knowledge and production skills. Despite having a grasp of the alphabetic principle and the ability to produce individual sounds, they encountered challenges in accurately articulating certain difficult sounds (e.g., /v/ or /æ/) or blending sounds (e.g., combining with /æ/ or pronouncing consonant clusters). This observation illustrates their transitional phase from declarative to procedural knowledge.

While some students displayed the ability to decode words accurately, occasional errors surfaced when they weren't consciously attentive to each letter, or when they faced emotional pressure or time constraints. This indicates that despite having acquired procedural knowledge, they require more practice time to achieve automatization.

These findings exhibited by the participants can be elucidated through Ehri's reading development theory (1999). Ehri classified the progression of the ability to read individual words rapidly and automatically into four stages: pre-alphabetic, partial alphabetic, full alphabetic, and consolidated alphabetic phases. The comprehensive error analysis results indicated that the majority of participant students were in the partial alphabetic phase. During this phase, children acquire the ability to decode a substantial number of words, including unfamiliar ones, without relying solely on visual memory. However, their alphabetic knowledge remains partial, leading to occasional misreading of words as other words.

As hypothesized, numerous errors resulting from L1 interference were identified, encompassing various types of interlingual errors. The first type of interlingual error involved difficulties arising from confusion with sounds that do not exist in the Japanese language, primarily due to insufficient phoneme perception. Unique English sounds—such as /ð/, /f/, /s/, /v/, /ɹ/, /æ/, /ʌ/, /eɪ/, /oʊ/ —were often substituted with other sounds from the Japanese

language that were perceived as similar sounds. Insights from the recalling interview revealed that some students could not accurately perceive these distinct English sounds because they were relying on their Japanese phonological awareness.

The second type of interlingual error observed was the influence of Japanese orthography. Words with the short vowel *u* as the nucleus were frequently mispronounced due to Romanization. Unlike the other four short vowels, the Romanization of the letter *u* posed a significant threat to intelligibility. Additionally, Romanization had an impact on the mispronunciation of words with long vowels. Moreover, the diphthongs of /eɪ/ and /oʊ/ were prone to be mispronounced as [eR] or [oR] due to the presence of a specific orthographic symbol in the Japanese language (the extension bar written as 'ー') that elongates the preceding vowel. In terms of consonant digraphs, the results revealed that a few students still faced difficulties in recognizing the two letters as a single unit, as there is no convention in Japanese to read multiple letters as a single sound.

The third type of interlingual error involved the devoicing of voiced obstruent geminates. In original Japanese words, it is uncommon for voiced consonants to appear at the end of a word after obstruent geminates (Kawakita, 2012). This is represented by a small-sized letter 'っ' in Japanese orthography. As a result, the final voiced consonants in words such as *dog, pig, bed,* and *frog* were devoiced and mispronounced as [k] or [t] with aspiration.

The fourth error type identified was vowel additions. Vowel additions primarily occurred at the end of words or within a consonant cluster. The addition of a vowel at the end of a word is known as paragoge, while the insertion of a vowel within a consonant cluster is

referred to as vowel epenthesis. When the added vowel was stressed, it posed a risk to the intelligibility of the pronounced words.

The last two error types were identified as intralingual errors. A greater number of deletions within consonant clusters was observed compared to instances of vowel epenthesis. Although Jenkins (2000) described deletion as an interlingual error, it is also a common error observed in the regular acquisition of consonant clusters among ENL children.

The other type of intralingual error was the letter misidentification. Similar to novice ENL children, the participant students exhibited difficulties in distinguishing between the letters *b* and *d* or discerning lower-case *i* from upper-case *I*. Moreover, consonant digraphs consisting of identical letters (e.g., *th* and *ch*) as well as those occurring at the end of words (e.g., *ck* and *ng*) were also prone to being misidentified. These intralingual errors provide valuable insights into the common challenges encountered by learners in accurately recognizing and differentiating specific letters during their developmental phase.

The mixed method design integrating quantitative and qualitative data in Study 1 provided a comprehensive description of the phonological word recoding abilities of young Japanese EFL learners. Building upon these findings, Study 2, presented in Chapter 4, aimed to investigate aspects that could not be fully understood based solely on the test performance analyzed in the previous chapter. This involved conducting a qualitative analysis of the semi-structured interview data collected from the same group of students who participated in the previous recalling interview. The analysis focused on addressing the final two research questions: understanding the mechanism behind the learners' phonological word recoding

development and the environmental and motivational factors that support their literacy development.

The previous chapter did not provide a clear understanding of the mechanism of automatization of phonological word recoding, nor did it explain how word meaning is acquired through this process. However, insights into these aspects were gained through the interviews conducted in this study. The findings revealed that the participants utilized both phonological word recoding and sight word reading strategies. When encountering unfamiliar or challenging words, they actively engaged their phonological word recoding skills. Conversely, words they had encountered repeatedly were stored in their memory as sight words.

Moreover, the interview shed light on how students approached learning the meaning of words they could read aloud. Phonological word recoding served as a catalyst for their vocabulary acquisition process. The students sought assistance from teacher or friends, consulted dictionaries, conducted online searches, and employed strategies such as drawing from their mental lexicon or inferring meaning from the context. These findings highlight the role of phonological word recoding in fostering vocabulary learning and the diverse strategies employed by the students to comprehend word meaning, which supported the self-teaching theory (Share, 1995).

The students' development of phonological word recoding skills was facilitated by the curriculum, while their future growth in early literacy skills was supported by their motivation for reading. Therefore, it was crucial to examine how students responded to the curriculum and their levels of motivation. The reflections of the HP learners on factors that

enhanced their phonological word recoding skills aligned closely with the curriculum. They acknowledged that learning consonants in fifth grade and vowels in sixth grade significantly contributed to their acquisition of phonological word recoding skills.

Although a few students displayed low motivation towards reading despite their high proficiency in phonological word recoding, the majority of students enjoyed reading English words. Some students were intrinsically motivated or highly motivated due to the influence of their families. Others were motivated by their own experiences with phonological word recoding during their literacy learning journey within the curriculum. These findings underline the importance of curriculum alignment and the role of motivation in supporting students' engagement and progress in developing early literacy skills.

The error analysis provided insights into the specific difficulties faced by the low-progress LP learners during their literacy learning journey. They were able to articulate challenges related to certain pronunciations, including the confusion between the letters *b* and *d*, distinguishing between the sounds of /ɹ/ and /l/, pronunciation of consonant digraphs, the unique pronunciation of /æ/, and the Romanization of short vowel *u*. Additionally, they expressed difficulties in reading longer words and reading within time constraints. While their phonological word recoding skills are still developing, their ability to precisely describe their challenges in their own words represents great potential for their learning.

Similar to the HP learners, most LP learners were motivated by their own experiences with phonological word recoding. To support LP learners who lack confidence in their phonological word recoding, individualized support and ongoing instruction aligned with the developmental process of early literacy would be beneficial. A common characteristics

among low-motivated learners, despite their proficiency in phonological word recoding, is their lack of confidence when it comes to reading in English. More positive and successful reading experience both within and outside the classroom is important.

These findings above have significant pedagogical implications. Firstly, it is evident that a systematic approach to literacy instruction, which encompasses the inherent complexity, proves effective in enabling young Japanese EFL learners to acquire phonological word recoding skills. Typically, teachers tend to initiate instruction with simple and easily graspable concepts. Therefore, it is advisable to commence with the introduction of single consonants, as they represent the least complex component within the alphabetic principle. Secondly, the five short vowels should be introduced to enable students to decode CVC (consonant-vowel-consonant) words. Subsequently, the more intricate components of consonant digraphs/clusters can be introduced. Lastly, long vowels should be addressed. This instructional sequence is crucial to ensure that all students develop a comprehensive understanding of the alphabetic principle through phonics. Ehri et al. (2001) found that systematic phonics instruction demonstrated superior effectiveness compared to unsystematic or no-phonics instruction on learning to read, in facilitating children's reading abilities.

Next, it is crucial for teachers to familiarize themselves with common error patterns frequently observed among learners. Acquiring knowledge of these error types enables teachers to effectively monitor students' progress. This knowledge becomes especially valuable in supporting low-proficiency students in their phonological word recoding skills, as it equips teachers with the ability to identify stumbling blocks. Understanding the error types also empowers teachers to provide appropriate scaffolding. For instance, they can consider

the frequency of exposure to specific components that students often confuse. Additionally, they can make informed decisions regarding whether explicit or metalinguistic explanations are necessary when students encounter challenges in their phonological word recoding processes.

Thirdly, the abundance of interlingual errors provides valuable insights into how to effectively teach reading to Japanese EFL learners. The phonemic characteristics of English sounds pose challenges because multiple sounds do not exist in the Japanese language. Despite having knowledge of the correct pronunciation, some students struggle to produce these sounds accurately. To familiarize themselves with these English sounds, students require ample opportunities to listen and imitate model pronunciation. Additionally, the phonological features of English are also complex for Japanese EFL learners as they are more accustomed to open syllables. To prevent vowel addition errors and promote accurate pronunciation of consonant clusters accurately, consistent instruction based on the onset-rime unit is necessary. Furthermore, there are notable orthographic differences between English and Japanese. Particularly, it takes time for students to recognize consonant digraphs and vowel digraphs/silent-*e* accurately and fluently. Considering these interlinguistic disparities, employing Japanese *kana* notation in instruction carries the risk of hindering their precise phonological word recoding skills.

Lastly, it is crucial to provide ongoing instruction during junior high school. Despite receiving comprehensive literacy instruction throughout elementary school, the participants in this study still exhibited partial development in their phonological word recoding skills. Following the partial alphabetic phase, students progress into the "full alphabetic phase,"

where they rely less on phonological word recoding as words that have been decoded multiple times are stored in their memory as sight words (Ehri, 1999). To advance to the next stage of reading, students require continuous literacy instruction that builds upon what they learned in elementary school. For low-proficiency learners lacking confidence in their phonological word recoding abilities, the most effective support is continuous instruction aligned with systematic literacy instruction that spans across both elementary and secondary schools.

Both the latest elementary school and junior high school Course of Studies overlook the importance of fostering phonological word recoding. The MEXT (2017a) expresses concerns that teaching the letter-sound relationships might confuse children. However, a curriculum that prioritizes the development of phonological word recoding skills has proven to be beneficial for students, including those with low proficiency. Furthermore, students have demonstrated high analytic and metalinguistic abilities as a result of their literacy learning. Delaying or inhibiting explicit and systematic teaching methods is not a reasonable solution. Learning always takes place within the Zone of Proximal Development (ZPD), which represents the range between what students can accomplish independently and what they can achieve with guidance. It is the responsibility of teachers to help students reach what they cannot yet accomplish on their own in in English literacy learning. Cameron (2001) expressed “the teacher has to do what the child may not be able to do: to keep in sight the longer view, and move the child towards increasingly demanding challenges, so that no learning potential is wasted.”

In considering future studies, it is important to note three limitations of my research: (1) the limited number of items, (2) the data collection method using Zoom, and (3) the absence of a control group in the research design. The current study utilized half the number of items in Tier 3, thus future research should aim to include an equal number of items across all tiers. While data collection via Zoom was necessitated by the pandemic, the quality of recorded sound obtained through the Zoom recording function may not be optimal. Therefore, careful consideration should be given to the procedure for collecting performance data to ensure more reliable data analysis. In this dissertation, the participants had received systematic literacy instruction aimed at enhancing their phonological word recoding skills. While these studies effectively provided insightful descriptions of their phonological word recoding abilities, they did not include a control group to ascertain the effectiveness of the instruction. However, the effectiveness of the instruction has already been proved through a quasi-experimental study conducted by Allen- Tamai (2022), as discussed in Chapter 2. To further comprehend the performance of phonological word recoding, my future research endeavors to examine the abilities of students who do not receive any literacy instruction. This comparative analysis will allow for a more comprehensive understanding of the findings gleaned from these studies.

My future research aims to contribute to expanding the opportunities for young Japanese EFL learners to have a solid foundation in English literacy learning. The passion for my teaching career originated from my encounter with a professor who developed the curriculum implemented at the research site for this study. This study was conducted based on

her extensive research and curriculum development. Let us consider the following excerpt from her book:

> I realized the importance of literacy instruction in children's English education from my experience teaching English to infants through elementary school children at a university-affiliated research institute. Although I had been teaching mainly oracy focusing on listening, I felt that in order to improve the English skills of children who had already learned a certain amount of English, it was essential to teach skills in an integrated manner and to teach literacy in a small, systematic step-by-step manner suited to Japanese children. From my experience teaching returnee children, I also knew that regardless of the length of their stay in an English-speaking country, children who have the ability to read and understand the relationship between letters and sounds retain their English skills better. These experiences led me to believe that it is important for learners to acquire literacy based on sound because of the language environment in which English is not a part of daily life as it is in Japan. In English education from junior high school onward, many learners are unable to read their first English sentences smoothly, despite the fact that they read aloud many times in class. There are also many learners who understand the meaning but can only read and pronounce English in Japanese. This is probably because there is a disconnect between the letters and the sounds. (Allen-Tamai, 2019, p.3) [translated by the researcher]

Now that English education has started as an official subject in public elementary schools in Japan, there is now an urgent need to create an optimal educational environment

for students to thrive in their language learning journey. Children growing up in this century are confronted with a world full of volatility, uncertainty, complexity and ambiguity. In order to navigate this world successfully and effectively address global societal and environmental challenges through collaboration with others across the world, English literacy skills have become increasingly crucial. Therefore, developing their early literacy skills in English means empowering them.

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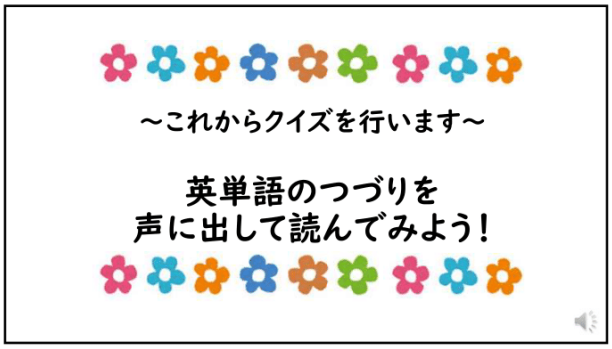
Appendices

Appendix A. Test Items of the PWR and WM tests

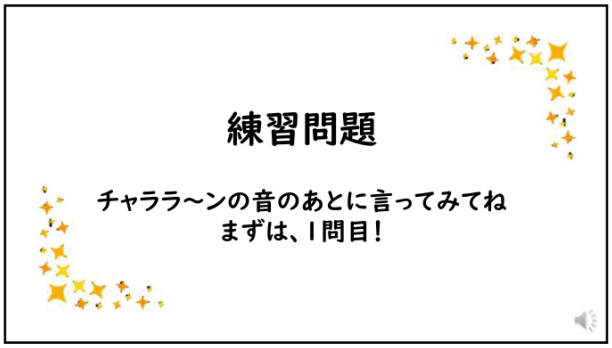
Tier 1	Tier 2	Tier 3
dog	ship	bake
vet	when	wine
jam	long	bean
pig	black	rope
sun	drum	cube
hot	frog	
bed	this	
fig	help	
bus	fast	
rat	lunch	

Appendix B. The PWR test (Tier 1, 2)

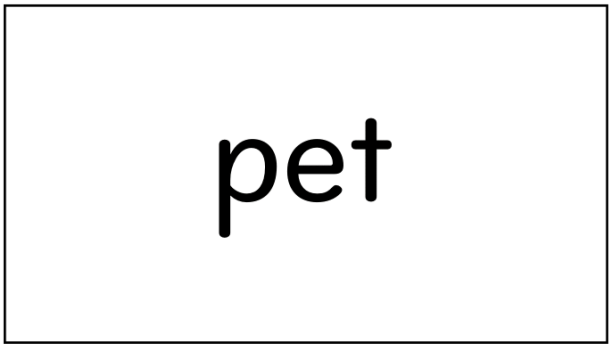


1

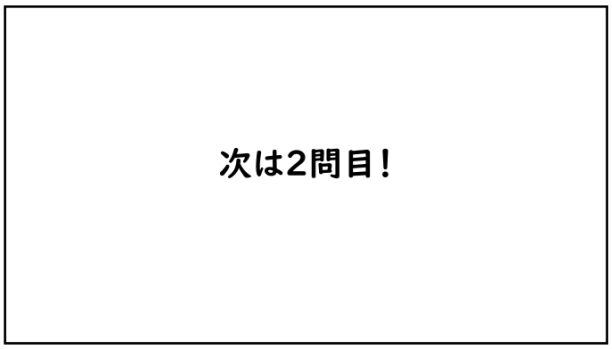
2



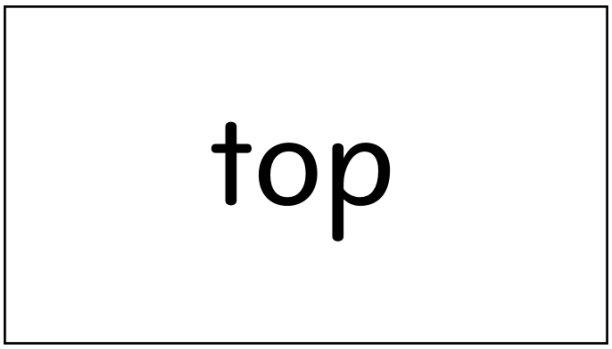
3



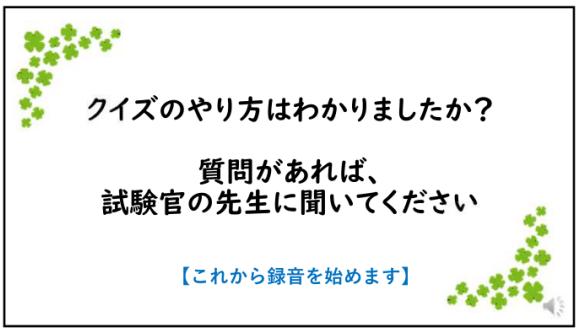
4



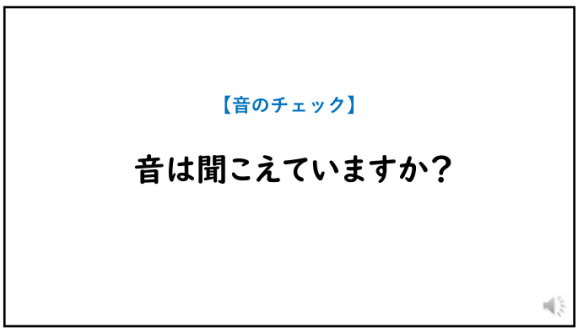
5



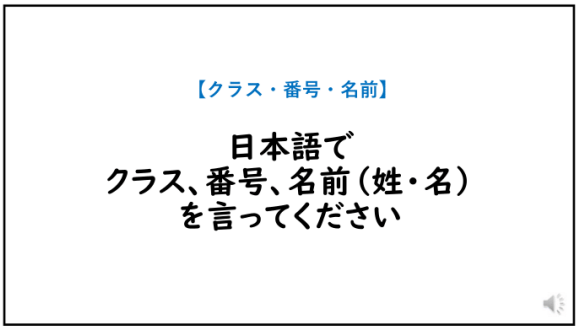
6


クイズのやり方はわかりましたか？
質問があれば、
試験官の先生に聞いてください
【これから録音を始めます】

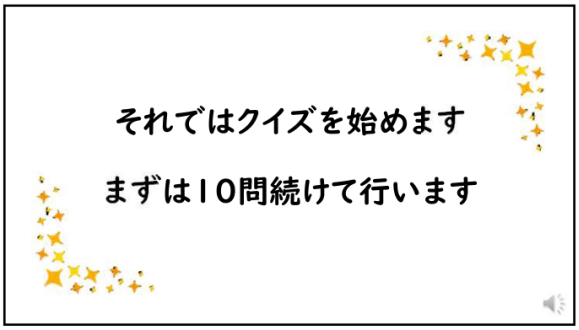
7


【音のチェック】
音は聞こえていますか？

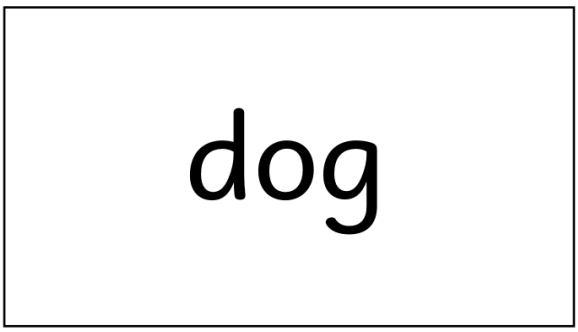
8


【クラス・番号・名前】
日本語で
クラス、番号、名前（姓・名）
を言ってください

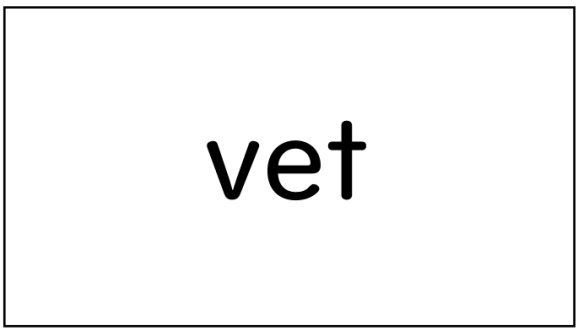
9


それではクイズを始めます
まずは10問続けて行います

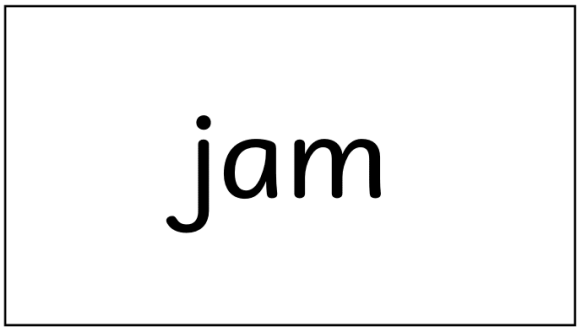
10


dog

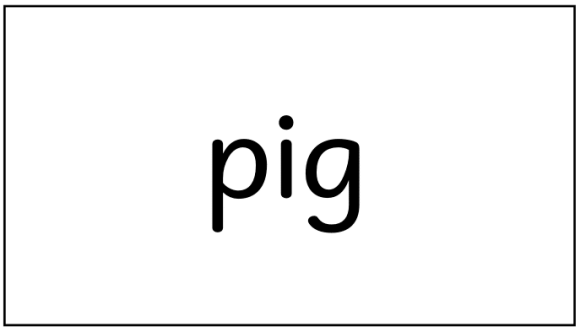
11


vet

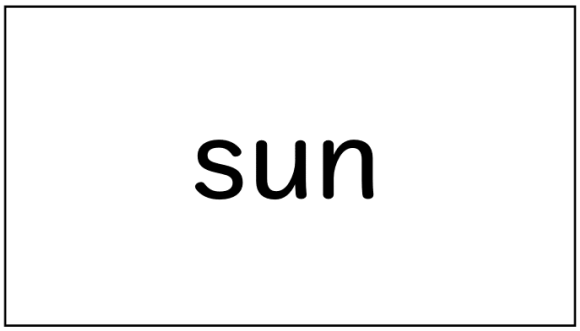
12



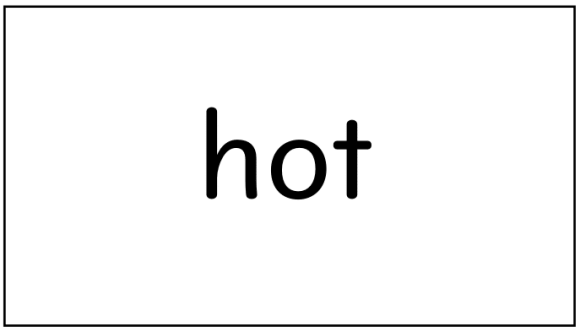
13



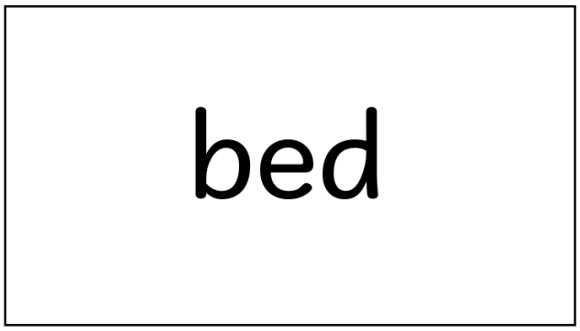
14



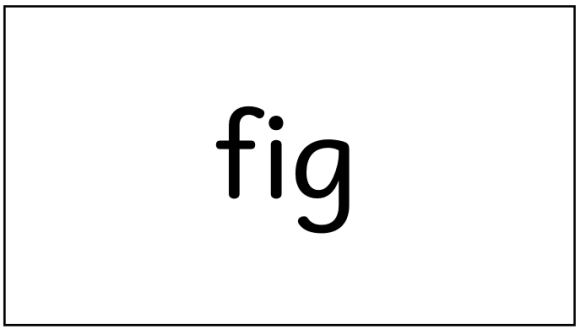
15



16



17



18

bus

19

rat

20

ここから少しレベルアップ！

同じように、
１０問続けてやってみましょう

21

ship

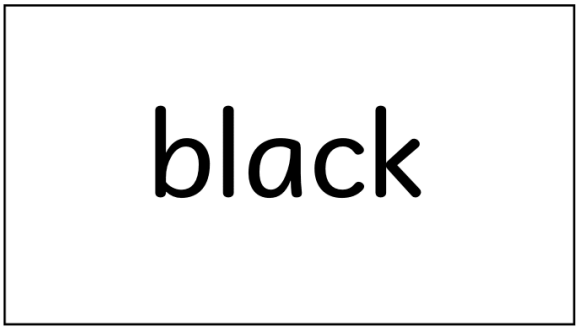
22

when

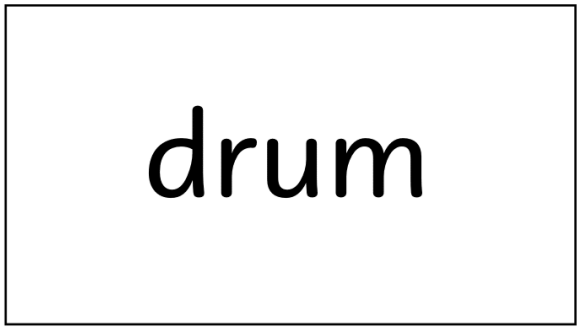
23

long

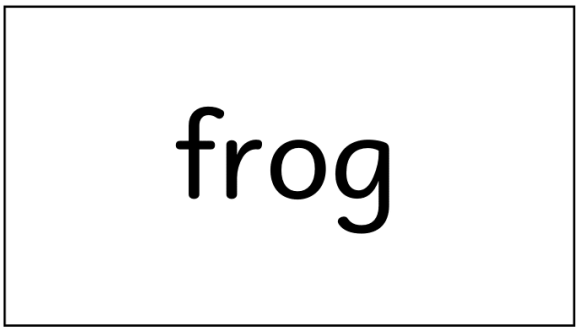
24



25



26



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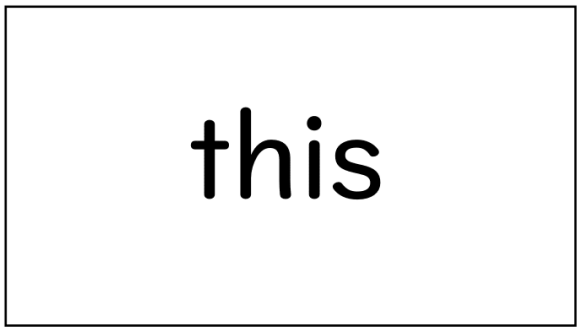

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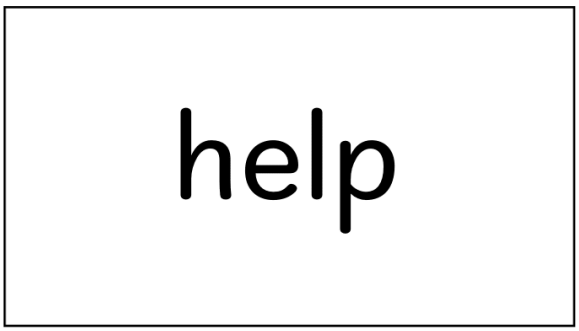

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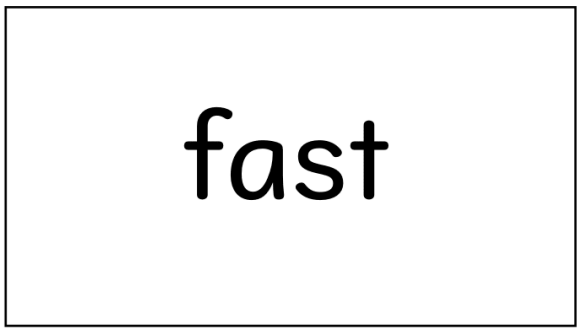

30

lunch

31

これで終わります

よくがんばりました！

32

Appendix C. Selected Students for the Recalling Interview

Appendix C1. Students Selected for the Recalling Interview (HP learners)

Category	School-Class	Student ID	Incorrect word	
HPHM	A-1	Student 1	bed, (dog)	wine, rope
	A-2	Student 2	drum, lunch, (long)	
		Student 3		—
	B-1	Student 4		cube
		Student 5		
	B-2	Student 6	vet, ship	(bake), (bean), (rope), (cube)
	B-3	Student 7		
		Student 8	rat	(bean), (rope)
HPLM	B-1	Student 9	rat, (frog), (this), fast	wine, rope, cube
	B-2	Student 10	lunch	
	B-3	Student 11	bed, drum, (frog)	bean, cube
		Student 12	(rat)	bake, cube

Note. The words in parentheses are those that could not be heard in the interview because of the limited time.

Appendix C2. Students Selected for the Recalling Interview (LP learners)

Category	School-Class	Student ID	Incorrect word	
LPHM	A-1	Student 13	dog, vet, sun, bed, bus, rat, ship, when, long, black, drum, frog, (this), (help), (fast), (lunch)	(bake), (wine), (bean), (rope), (cube)
		Student 14	rat, (ship), long, black, drum, this, fast, lunch	(bake), rope, cube
		Student 15	dog, bus, rat, ship, black, drum, this, fast, lunch	—
	A-2	Student 16	pig, sun, hot, bed, fig, bus, rat, ship, when, black	—
		Student 17	vet, when, long, drum, this, help, lunch	(bake), (wine), (bean)
	B-1	Student 18	(dog), jam, (pig), sun bus, ship, black, drum, help, fast, lunch	(bake), (bean), (rope), (cube)
		Student 19	(rat), black, drum, frog, this, lunch	(bake), (wine), (bean), (cube)
	B-2	Student 20	(dog), vet, jam, (pig), (bed), rat, (ship), (drum), frog	(wine), bean, cube
		Student 21	bed, bus, rat, ship, black, drum, this, fast	bake, wine, (bean), (cube)
	B-3	Student 22	dog, fig, (rat), (black), drum, (frog), this, lunch	bake, (wine), bean, cube
		Student 23	rat, ship, black, drum, fast	—

Category	School-Class	Student ID	Incorrect word	
LPLM	A-1	Student 24	fig, when, long, black, drum, help, lunch	bake, wine, bean, cube
		Student 25	(rat), black, drum, frog, this, help, (lunch)	bake, bean, rope
	A-2	Student 26	(dog), vet, (jam), pig, sun, hot, (bed), fig, bus, rat, ship, when, (long), (black), (drum), frog, this, (help)	(bake), (wine), (bean), (rope), (cube)
		Student 27	(vet), sun, bus, ship, when, long, black, drum, frog, this, lunch	(bake), (wine), (bean), (rope), (cube)
		Student 28	vet, rat, ship, when, black, drum, this, lunch	(bake), (bean), (cube)
	B-1	Student 29	dog, vet, (rat), ship, (black), (frog), help, fast, lunch	—
		Student 30	jam, sun, rat, (ship), black, drum, this, help, lunch	(bake), (wine), (bean), (cube)
	B-2	Student 31	vet, sun, bus, rat, ship, black, drum, frog, this, (help), (lunch)	bake, bean, rope, cube
	B-3	Student 32	dog, vet, jam, pig, sun, hot, (bed), (fig), (bus), rat, ship, (when), long, (clack), drum, frog, this, (help), fast, (lunch)	(bake), (wine), (bean), (rope), (cube)
		Student 33	(dog), pig, hot, ship, drum, frog, lunch	(bake), (wine), (bean), (rope), (cube)

Note. The words in parentheses are those that could not be heard in the interview because of the limited time.

Appendix D. Consent Form for the PWR test (For School)

研究参加の同意書

研究課題「小学生児童の単語・文ディコーティング力」

この研究に関する以下の説明をご一読の上、研究内容等をご理解くださり、研究にご協力いただける場合は、参加同意書に署名をお願い申し上げます。

研究者　　小林悠　　連絡先：[redacted]
研究指導官　青山学院大学文学部英米文学教授　アレン玉井光江
〒[redacted]

研究目的：本研究は、リタラシー指導を児童が獲得したリタラシーの基礎的なスキルをもとに、児童がどの程度の単語と文を読む（音声化）ことができるのかを調査することを目的としています。

手順：研究者は別教室をお借りし、複数台のパソコンを設置させていただきます。zoom を使ったリモート形式で児童に単語ないしは文を声に出して読ませる個別テストを実施します。1 人につき 10 分以内のテストとなります。データ分析のため、テストの様子を録音させていただきますが、児童の顔は一切映りません。テスト中教室で待機する児童には、アンケートに取り組んでいただきます。

時間：【　　月　　日　】に単語音読テスト、【　　月　　日　】に文音読テストを実施させていただきます。6 年生の英語授業時間内に実施させていただく予定です。

参加の利点：本研究にご参加下さる利点として

1．リタラシー指導を通して児童の獲得した力を理解することができます。

2．教室の一斉指導では見られない個別の能力を知ることができます。

辞退：参加者は、理由に関わらず、いつでもこの同意書を撤回し、参加を中止する権利があります。

秘密厳守：参加者からいただくデータに関しては、プライバシーを厳守します。調査結果は研究者と研究者の指導教官により分析されます。このデータを公表することにおいて、個人が特定されることはないことをお約束します。研究結果は学術的な目的以外で使用されることはありません。

質問：この研究に関してご質問があれば、同意書に署名する前に前述の研究者にお問合せ下さい。

承認：
私はこの研究に関しての説明を読み、口頭で説明を受けました。この研究に児童が参加するかどうかは各自の自主的な選択によることも理解しました。また、いつでも辞退できることも承知しています。児童がこの研究に参加することを許可します。尚、同意書に署名した日に、そのコピー一部を受け取りました。

参加者代表者名 _____印　　日付　年　　月　　日

Appendix E. Consent Form for the Interview (For Parents)

研究参加の同意書

研究課題「小学生児童の単語・文ディコーティング力の発達」

この研究に関する以下の説明をご一読の上、研究内容等をご理解くださり、研究にご協力いただける場合は、参加同意書に署名をお願い申し上げます。

研究者　　小林悠　　（連絡先：[redacted]小学校）
研究指導教官　青山学院大学文学部英米文学教授　アレン玉井光江
〒[redacted]

研究目的：本研究は、簡単な英単語や英文を自力で読めることを目標にしたリタラシーカリキュラム（文字指導）を受けた児童が、どのように読む力を獲得したのか、また当該カリキュラムを捉えているのかを理解することを目的としています。

手順：本調査では、英語の読み書きや授業内容に関してインタビューをさせていただきます。インタビュー内容は IC レコーダーで録音し、逐語録を作成して分析いたします。

時間：英語の授業のある月曜日か水曜日の休み時間ないしは放課後約 15 分間

参加の利点：本研究にご参加下さる利点として

１．子ども達の考えを知ることで日々の授業の改善に還元することができます。

２．インタビューで内省することで、子ども達自身の学習が深まります。

辞退：参加者は、理由に関わらず、いつでもこの同意書を撤回し、参加を中止する権利があります。

秘密厳守：参加者からいただくデータに関しては、プライバシーを厳守します。調査結果は研究者と研究者の指導教官により分析されます。このデータを公表することにおいて、個人が特定されることはないことをお約束します。研究結果は学術的な目的以外で使用されることはありません。

質問：この研究に関してご質問があれば、同意書に署名する前に前述の研究者にお問合せ下さい。

承認：
私はこの研究に関しての説明を読み、説明を受けました。この研究に子どもが参加するかどうかは自主的な選択によることも理解しました。また、いつでも辞退できることも承知しています。子どもがこの研究に参加することを許可します。

参加者保護者名 _____ 印　　日付 ____ 年 ____ 月 ____ 日

Appendix F. Japanese Sounds Symbol Used in this Dissertation.

Appendix F1. Japanese Mora Sound Chart (Matsumura, 2019)

パ	バ	ダ	ザ	ガ	ワ	ラ	ヤ	マ	ハ	ナ	タ	サ	カ	ア
pa	ba	da	dza	ga	ɯa	ɾa	ja	ma	ha	na	ta	sa	ka	a
pʲi	bʲi		dʒi	gʲi		ɾʲi		mʲi	çi	ɲi	tʃi	ʃi	kʲi	i
pɯ	bɯ		dzɯ	gɯ	ɯ	ɾɯ	jɯ	mɯ	Φɯ	nɯ	tsɯ	sɯ	kɯ	ɯ
pe	be	de	dze	ge		ɾe		me	he	ne	te	se	ke	e
po	bo	do	dzo	go		ɾo	jo	mo	ho	no	to	so	ko	o
pʲa	bʲa		dʒa	gʲa		ɾʲa		mʲa	ça	ɲa	tʃa	ʃa	kʲa	
pʲɯ	bʲɯ		dʒɯ	gʲɯ		ɾʲɯ		mʲɯ	çɯ	ɲɯ	tʃɯ	ʃɯ	kʲɯ	
pʲo	bʲo		dʒo	gʲo		ɾʲo		mʲo	ço	ɲo	tʃo	ʃo	kʲo	

Appendix F2. Special Mora/ Non-Syllabic Mora (Matsumura, 2019)

ン	/N/	moraic nasal
ッ	/Q/	moraic obstruent
ー	/R/	long vowel

Appendix H. Interview Data

Appendix H1. The Excerpts in Japanese Version (Sight Words)

ID	Comments
S01	テストに出てきたような単語は、もうすぐ見てわかる
S02	初めて見る単語だと音を考えながら読む
S03	知っている単語はパッ見て読める
S03	知らない単語だと、音の足し算をしながら読む。難しい子音の入っている単語や 長い単語を音を意識しながら読んだ。
S05	テストに出てきたような単語はパッ見て読めるが、母音は意識しながら読む 読み方がすぐ分からない時は、音を考えながら読む
S06	テストに出てきたような単語は、何回もやってるから、パッ見て読める
S07	Tier1 のような単語や ship はパッ見て読める。Tier2 のような単語は読むのに時間がかかる けど読める。2 字子音や連続子音を意識したり、母音の数を確認して読む
S08	見たことある単語はパッ見て読むが、あまり見たことのない単語だと音を考えながら読む
S09	母音の数を確認して、音を意識しながら読む
S10	ノリでパッ見て読む プログラミングによく出てくる単語はパッ見て読める
S11	お母さんがよく英語を使っている単語はパッ見て読める
S12	読み方がすぐ分からない時は、母音を意識して、音の足し算をする 一度頭の中で言ってから言うが、一度読んだことはある単語は感覚でパッと見て読める
S13	パッと見てわかるのもあるが、正確に読むために音を確認する
S14	短い単語はパッ見て読めるが、Tier2 のような単語だと、音に分解して読む
S15	１文字ずつ確認しながら読む
S16	１文字ずつ読む
S17	簡単な単語や短い単語はパッ見て読めるが、難しい単語や長い単語は音を考えながら読む

S18　知っている単語はパッ見て読めるが、help のように読めない場合は 1 文字ずつ音を考えながら読む。初めて見る単語は、音に分解してから音の足し算をしながら読む

S19　Tier1 のような単語はパッ見て読めるが、Tier2 のような単語は音を考えながら読む

S20　簡単な単語はパッ見て読める

S21　読み方が分からない時は、最初の子音や母音を意識しながら読む

S22　一文字ずつ読んで、思いついた単語を読む

S23　授業で見たことのある単語はパッ見て読める

S24　ゲームでよく出てくる単語はパッ見て読める

S25　パッと見て分かる単語は時々あるが、たいてい音を考えながら読む

S27　見慣れない単語だと、 1 音ずつ足し算しながら読む

S28　だいたいははパッ見て読めるが、長い単語は音を考えながら読む

S29　見たことある単語はパッ見て読めるが、初めて見る単語だと読み方を考えながら読む

S31　今のところ、たいてい音を考えながら読むが、わかっている単語だと全体的に見て言ってる

Appendix H2. The Excerpts in Japanese Version (Phonological Word Recoding to Word Recognition)

ID	Comments
S01	授業中、音声化できても意味がわからない時、知りたいなって思うことはある
S02	音声化できても意味が分からない時は、「これはどういう意味なんだ？」と知りたい気持ちになる
S03	音声化できても意味がわからない時、「もっとなんか単語をちゃんと学ぶ覚えていく必要あるな」と思う
S04	単語を音声化できても、意味がわからないことはたまにある。単語だけ読めても将来使えないから、意味を考えるようにする。先生に聞いたり、ipad で意味を調べることもある。
S05	なんか英語の文章があって、その中の単語がわからないとすると、その他の単語とかの意味を考えて、文脈から意味を推測する
S06	単語を音声化できても意味が分からない時は、今度英語の塾の先生に教えてもらおっかな〜ってなる
S07	「どっかで見たことないかな」「カタカナの言葉でないかな」とか考えるようにしています。bake みたいなのが読めるけど意味がわからなかった。wine も読んだ時は意味がわからなくて、あとでああ〜ってなりました。授業中にもこういうことはよくあって、すぐ[redacted]先生に聞きます。「どっかで見たことないかな」「カタカナの言葉でないかな」とか考えるようにしています。
S08	単語を音声化できても、意味が分からない時は、意味を調べたいと思う。実際に電子辞書で調べたりする。
S09	別に調べまではしないが、どう意味なんだろうなとは思う。
S10	音声化できても単語の意味わからないときはあって、気になったらあとで調べる
S11	店の名前とか自分で読もうとする読んでみて意味なんだろうみたいな。意味分からないと嫌な気持ちになっちゃう。だから、家に帰って辞書で調べる
S12	読み方がわかっても意味がわからないと、ちゃんと言えてる気持ちにならない。

もやもやする。

S13　単語の意味は、頑張ってこうなんだっけなと考えたりしてるんですけど、まあなかなか分からない時が多いです。

S14　音声化できても意味がわからない時、イライラしたり英語を嫌いになることはないけど、意味は気になる。 1 回だけ自分で調べてみたことがある。

S15　単語を音声化できても意味がわからない時、むずむずしてずっと考えたくなる

S16　ほとんど言えるやつはほとんど意味を知ってる

（しかし fig で確認してみると、読めるが意味は知らない）

S17　単語の意味はわからなくても、読めるならいいかなってかんじです

S18　読めるだけでなく、意味も知りたい。 単語の意味は先生が解説してくれるんでわかりやすいです。ipad で単語の意味を調べたりすることもある。

S19　意味は気になる。授業中のはだいたいわかるが、分からない時は友達に聞く。

S20　音声化できても意味がわからなかったら、先生に聞こうと思う。

S22　読めても意味わからない時は、どうしてるんだ。自分でもちょっとわからない。気になった言葉とか、使えそうな言葉は調べたりする。今は使わなそうな言葉は、 1 回でも聞いて、頭のはしに残っていればいいなって思う。バレエやってるから shoes とかは使う言葉。

S23　単語を読めても意味わからないと、わくわくする。

S24　読めても意味がわからないことはたまにある。そういう時は、読み方もこれでいいのかって迷っちゃう。

S25　読めても単語の意味がわからないと、いやだなってなる。意味を教えてほしいし、意味を知りたい気持ちになる。

S27　読めても意味がわからないと、不思議な気持ちになる。ちょっと悔しいみたいな気持ちになる。

S29　読み方がわかっても意味が分からなくても、これから勉強してければいいかな

先に音を考えてから、意味を次に考える。 文字を頼りにしてよみつつ、 6 年で同時に意味を

教えてくれる時に意味も覚えるようになった。

S31　単語の意味は、先生が教えてくれる時があるけど、普段の言葉で使わない言葉が出てくる時はわからなくて、「こんな単語あるんだ」って新しく 1 個増えた感じに思う。

S32　読めても意味わからなければ、ナニコレ？ってだいたい友達にきく。

S33　読めても意味が分からない時は、学校でわからないときは、教科書の Picture Dictionary をみたり、ペアでやるときは友達に聞く。

S33　英検を 2 回受けてて、単語は読めても意味がわかんないのが結構あって、その時は意味はとりあえず保留にしておいて、前後を見て、意味を考えるようにしていた。

Appendix H3. The Excerpts in Japanese Version (Curriculum/ HP learners)

ID	Comments
S01	４年では読めなかったけど、５年生くらいから読めるようになってきた。２字１音をやって、６年ですぐ読めるようになった
S02	僕が英検の勉強してた時（５年の最後）あの時と比べると、バカみたいに読めるようになったなって。家で英検５級のテキスト読んでみたら、めっちゃ簡単！って。前読んでたら、うーんってなってたのに。全然家で何もやってないんで。学校でできるようになりました。
S02	桃太郎の紙くれるの、まじうれしいです。先生から聞いた音だけで気合で言ってるみたいなかんじで、I can't believe this! とか、ぼくめっちゃ音違ってたんですよ、先生から聞いた時。で、見た時に、belive / this 、あ！believe this って、こういうことだったんだって。 正しく発音できるようになったりとかはそれはいいなって思いました
S03	５年生かなあ。忘れっぽいから、いつ英単語を読めるようになってきたかはあまり覚えてない。ABCD 覚えるのと、音覚えるのがわかりやすかった。
S04	５年の終わりから６年で読めるようになった。My Literacy Book が勉強になる。先生のいった言葉を書いたり、その長母音が入る単語に丸をしたりとか、楽しい。
S05	６年のはじめらへんで読めるようになってきた。私が行く中学がなんか英語がすごい進んでるからなんかなんでおきたいなって思ったら、６年のはじめらへんに英語に興味が出てきて、自然にできるようになった。
S06	授業は役には立ってます。長文読むときに、子音とか母音習って読みやすくなった。読めない単語もあるので。 ４， ５歳くらいで読めるようになってきた。 でも３歳の時には０～１００まで英語でいえたから。
S07	５年でなんとなく読めるようになってきた。学校で、ずっと子音とか英語の授業で習ってきたから、パッと見でできるようになった。塾では単語の意味とかを習った。 ５年の終わりから６年くらいで母音を習い始めた時に読めるようになってきました。読める範囲が広がって嬉しかったし、使った文とかないかなって探したりするようになった。昔はなんとなく読めたかもしれないけど、A はこうやって読むとか知らなかったので、自信もっ

て読めるようになった。

S08　英単語が読めるようになってきたタイミングは、この前英検五級に向けて勉強してた時、これならったってたなって思った（in on under by とか）

毎回授業で音やってると、最初は覚えてなくても、何回もやってるから覚えられるようになる。赤ずきんも最初全然わかんないけど、やってくうちに分かってくる

S09　５年後半くらいで英単語が読めるようになってきた。母音の練習をして。

S10　読めるようになったのは、やっぱ５年だね。４，５年。１年いってつまらなくて辞めたけど、まあ、塾のおかげで読めるようになったかな。学校の授業は役立たない。あ、やっぱね、子音は役だった。母音はノリ。

S11　５年くらい。英検の勉強とか始めて、だんだん教科書に書いてある単語とかは読めるようになった。

Appendix H4. The Excerpts in Japanese Version (Curriculum/ LP learners)

ID	Comments
S13	短い単語ならできるけど、長いと難しい
S14	4 文字とか 5 文字だと、どう繋げていいのかかわかんない。少し読んでたら忘れちゃう。
S14	TH とか 2 文字なのに 1 音で読む読み方が難しい
S15	長母音 u の音が難しい。「ウー」「ユー」で変わるのが難しい。
S16	短母音 ieaou の発音
S16	長母音の母音が 2 個ある読み方
S17	l と r の違いが難しい。 2 つの文字で 1 つの音を読む時にすごい難しい。e と a（短母音）の違いが難しい。長母音 a /ei/ を /e:/ と読んでしまう。
S18	街とかでも英語使われてるの見るけど、あんま覚えてないな、読みづらいなってなって思う。
S19	Tier1 はつなげるのがないからできる。このインタビューで自分ができないところがわかった。 2 文字で 1 つの音のが忘れちゃうだけ。時間かければわかる。ルールは覚えちゃえばできるけど、わすれっぽいから。
S21	b と d の違いがむずかしい。drum みたいに m と n のちがい がむずかしい。 書くのは得意だけど、読むのは苦手。v の発音とかがふつうと違うから。
S22	b と d のちがいがむずかしい 短母音の u の読み方がむずかしい 母音が 2 個あるのがむずかしい
S23	u の音は習ったけど、じゃあ「ウ」の発音はどう出すのか気になる。 母音 2 つのルールがどうしてそうなるんだろうって不思議。
S24	英語っぽく発音するのが難しくて、日本語っぽくなっちゃう。そうならないように意識はしている。 2 個同じ発音とか、母音とかあるから、読むのが難しい。慣れない。
S25	wh とか最初につくやつ（what, when, where, who) がむずかしい

L が単語の途中に入ってる単語がむずかしい。２字１音がむずかしい。

S27　ローマ字読みしちゃう。r と l のちがいが難しい。２文字のやつが難しい

u をローマ字読みしちゃう

S28　長い単語を読むのが難しい。２文字で１つの音のが難しいかなって。

S31　ルールを覚えたほうがいいから、覚えるしかない。単語をいちいち覚えるよりも、ルールを覚えるほうがすぐに言えるようになると思う。単語を１つ１つ覚えるのもいいけど、単語全部は知らないから、知らない単語も読めるようになりたい。

S32　名前読みは時々忘れるけどできて、音が難しい。先生の説明が分かりにくいとかない。音さえ分かれば書けるんだけど、授業で音が分からないからついていけない。覚えやすいのは覚えやすいけど。自分でもなんで覚えられないか分からない。音さえわかえれば音くっつけて読めるけど、音自体が難しい。

S33　単語が長いと、「ん？」ってなっちゃう。今みたいに１文字ずつ考える時間があれば読めるかもしれないんですが、すぐ読んでみようって言われるとできなくなっちゃう。

単語が長いと、「ん？」ってなっちゃう。今みたいに１文字ずつ考える時間があれば読めるかもしれないんですが、すぐ読んでみようって言われるとできなくなっちゃう。

n. m. u がたまに混じっちゃって、それが分かんない。

Appendix H5. The Excerpts in Japanese Version (Motivation/ HM learners)

ID	comments
S01	もともと英語が好きで、お母さんが英語を言ったり話したりしてたから、英語を読むのも好き
S02	読めるようになって英語を読むことが好きになりました 名前のスペルとか、誕生日聞くやつとかで、単語と単語をつなげると文になるじゃないですか。単語単語の途中の意味知って、「あ、これがこういう意味なのか」って。例えば、How do you spell your name? だったら、HOW ってなんだろう？意味が分かると「これがこういう意味か！」って。
S03	読めるようになったら英語を読むことが好きになった。
S04	もともと英語が好きで、学校の授業が楽しくて。英語自体が楽しい。国語と違って英語は楽しみながらできる。１年生の時からからずっとそう。最初から結構がんばりたいなって思ってた。やっぱり文とか読めたら結構気持ちも良いし、だいぶ嬉しさも出てきました。
S05	読めるようになったから、読むことが好きになって、興味が出てきた。意味が理解できると楽しいからです。
S06	最初は親にやらされてた。読めることと好きは関係してるとは思う。
S07	お兄ちゃんが先に英語習ってたし、お兄ちゃんとお母さんが英語で話してる姿をみて、憧れてて、もともと興味はあった。だから、英語で読むのが好き。
S08	５年生の時はふつうだったが、読めるようになってきて好きになった。
S13	英語なら読んだり書くのが好き。いつかできるようになったらすごいなって思う。
S14	英語読めると、もし海外に行ってもなんかわかんないけど、すぐ読めるようになる。 英語の発表で読めたりすると嬉しいから 好き。
S15	読めるようになってってから楽しくなってきた。６年の途中で母音がわかってから。 一文字一文字読んであってたら嬉しいから、英語読むのは好き。
S17	読めると快感、すっきりするから、英語読むのは好き。

難しいのも読める急に読めたら、もう気分上昇して楽しくなる。塾でも心の中で読むようにしている。今塾にも行きはじめて、勉強量が増えて、分かり始めた。

S18　英語読むのは、嫌にならない。好きなんで。英語でスピーチしたのが楽しかったから。

S19　読めたら面白い。意味知らないのが出てくると面白い。こういう勉強やったことないから、楽しい。新しいこと学のはだいたい楽しいから。

S20　塾で読めたり、書けたりすると楽しい。まあ読めたりしたら嬉しいときもあるっちゃある

S22　難しいけど好き。日本語以外の言葉に興味がわく。韓国語も好きで、たまに辞書もみる。英語は読めなくても、英語の英語もよくみるんですけど、知ってる言葉があったら楽しい。楽しいこともあれば難しいこともあるけど、海外の言葉に興味がある。読めるようにもなりたいし、書けるようにもなりたい。小さい頃からディズニーみてて、お母さんの友達に外国人もいて、お母さんが「韓国語やってみたら？」とか言ってくる。

S23　お姉ちゃんが英語が得意で、お姉ちゃんが外国人とオンラインで話してるのをみて、自分も興味が出た。日本語と違って、英語では、１つの文字にも色々な読み方がある。日本語は「あ」なのに、英語では、文字の組み合わせで読み方が変わるのが面白い。５年生くらいでそう思うようになった。

Appendix H6. The Excerpts in Japanese Version (Motivation/ LM learners)

ID	Comments
S09	英語っていう科目自体が嫌い（算数と理科は好き）英語自体が嫌いだから読むのも嫌い。でも、しゃべるより読むほうが好き。読めるようになっても好きにならない。単にやる気が出ない。
S10	英語役立たないことはないけど、授業全般面倒くさい。[redacted]さんが読んでた本とか絶対読めないから好きじゃない。英語読むのはめんどくさいから諦める。３文以上の長い文になると面倒くさい。
S11	好きっていうわけではない。わかっても、他にもっとすごい人がいるから、自分がすごい気になれない。
S12	英語自体は、少し難しいっていう感じはあるけど、英語読むのは好きっちゃ好き。
S24	読むのが難しい。２個同じ発音とか、母音とかあるから、読むのが難しい。慣れない。
S24	海外行くとき英語できないとやばいからできるようにはなりたい
S25	やっぱ難しいっていうのがある。dog とかすぐ読めるけど、すぐ読めない、わかりずらいのがあるから。
S26	楽しくもない。嫌ではない。辛くもない。
S27	先生のサポートがあるとがんばれるけど、ないとやる気そんなに出ない。読めないから。先生のサポートがあって、ship みたいなのが分かるとうれしい。
S28	嫌いでもないし、読めなかった時が悔しいし、読めるときは嬉しいし、

プラスの面もマイナスの面もある

S29　めっちゃ大好きってほどではないし、最悪ってほどでもない。若干好きより。他の教科と比べると中間くらい。理科や国語とか他の教科のが好き。

S31　４文字とか５文字とか難しいのがあるのが、そこはあまり好きじゃない。短いのならわかるし、普通にした。

S32　苦手。音とか読むことができない。

S32　ふつうにみれば読めるようになれば。そんな感じができれば別にそれ以上英語できなくてもいいかなって。書けなくてもこう見ればわかるとかも一緒にできるようになれば、ある程度会話とかもできるじゃないかなって。

S33　どうだろう〜ってなる。選択肢でいうと、「どちらかというと好き」。なんか、ぱっと単語が出て、ぱっと読めたら気持ちいし、もしそれがわからかかった単語で、その時にそのまたその単語がでたとき、やめたら、今度読めたなとか、いい気持ちになるときもあるし、まあちょっと読めなかったらなんかあとあとなんかあれなんて読むんだったんだろうみたいなのがあってうん。」まあそれ、そういうときはなんか。好きでも嫌いでもない。