Using Digital Flashcards to Improve English Word Reading Skills in Thai Primary School Learners
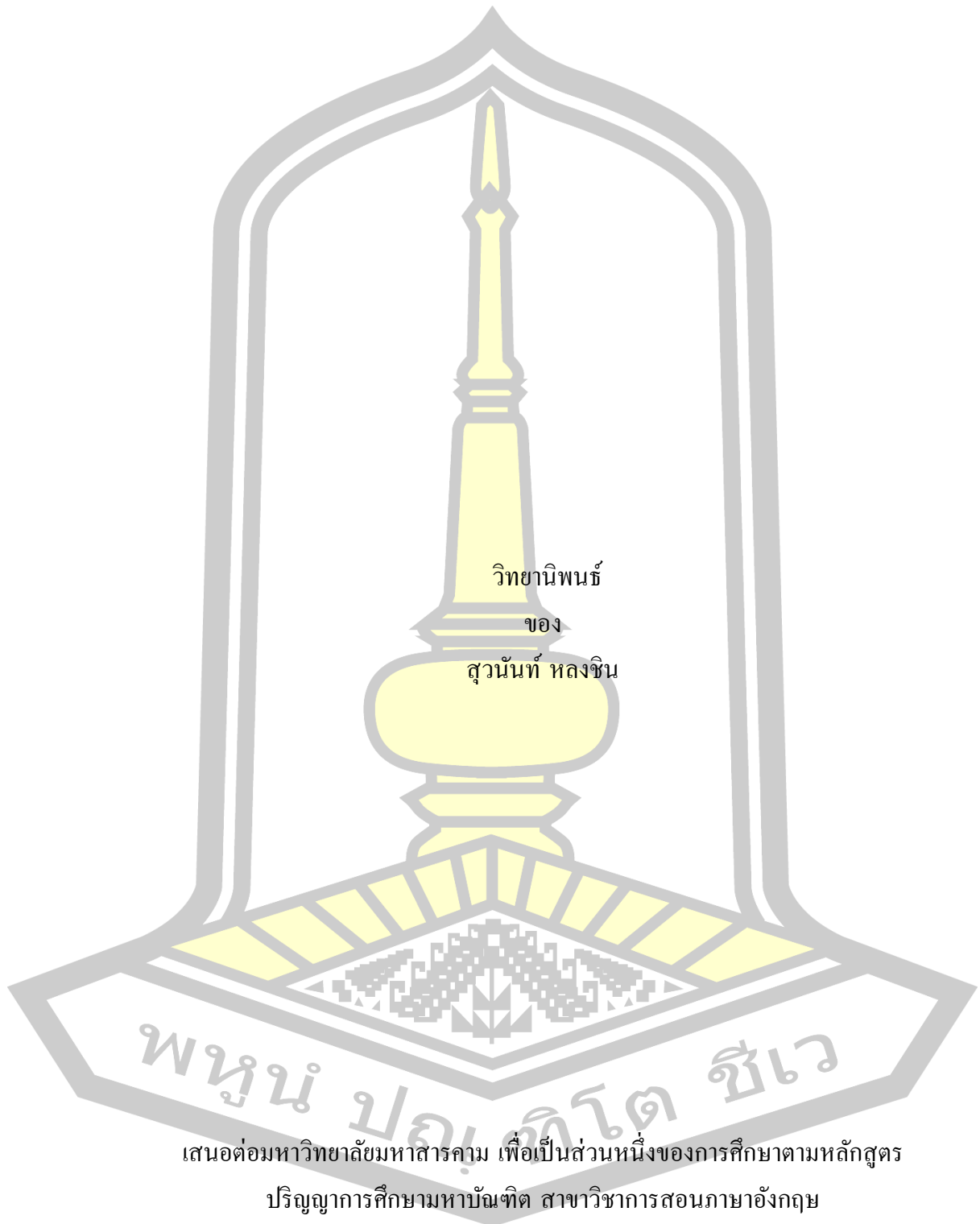
Suwanan Longchin

A Thesis Submitted in Partial Fulfillment of Requirements for

degree of Master of Education in English Language Teaching

April 2024

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for Master of Education (English Language Teaching)

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TITLE   Using Digital Flashcards to Improve English Word Reading Skills in Thai Primary School Learners

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ABSTRACT

Numerous studies have investigated the effectiveness of digital flashcards for teaching word reading. Digital flashcards, among various educational tools, have gained popularity for enhancing word reading skills. This study investigated the effect of digital flashcards on English word reading skills among Thai primary students. Moreover, the study explored their perceptions towards the implementation of digital flashcards for word reading development. The study involved nineteen students aged 11 to 12. The research tools included a pre-test and post-test assessment of word reading skills and a perception questionnaire. A semi-structured interview was also conducted to gather deeper insights into the participants' perception of digital flashcards. A pre-test was administered before the implementation of an eight-week instructional period with digital flashcards, followed by a post-test. Next, a perception questionnaire and a semi-structured interview were conducted. The findings suggested that digital flashcards effectively enhanced word reading skills among Thai primary school students. The perception questionnaire revealed that the participants held highly positive views on using digital flashcards. Qualitative data further supported the advantages of digital flashcards in word reading skills, offering insights for educators and recommendations for future research.

Keyword : A digital flashcard teaching approach, Thai EFL primary learners, word reading skills

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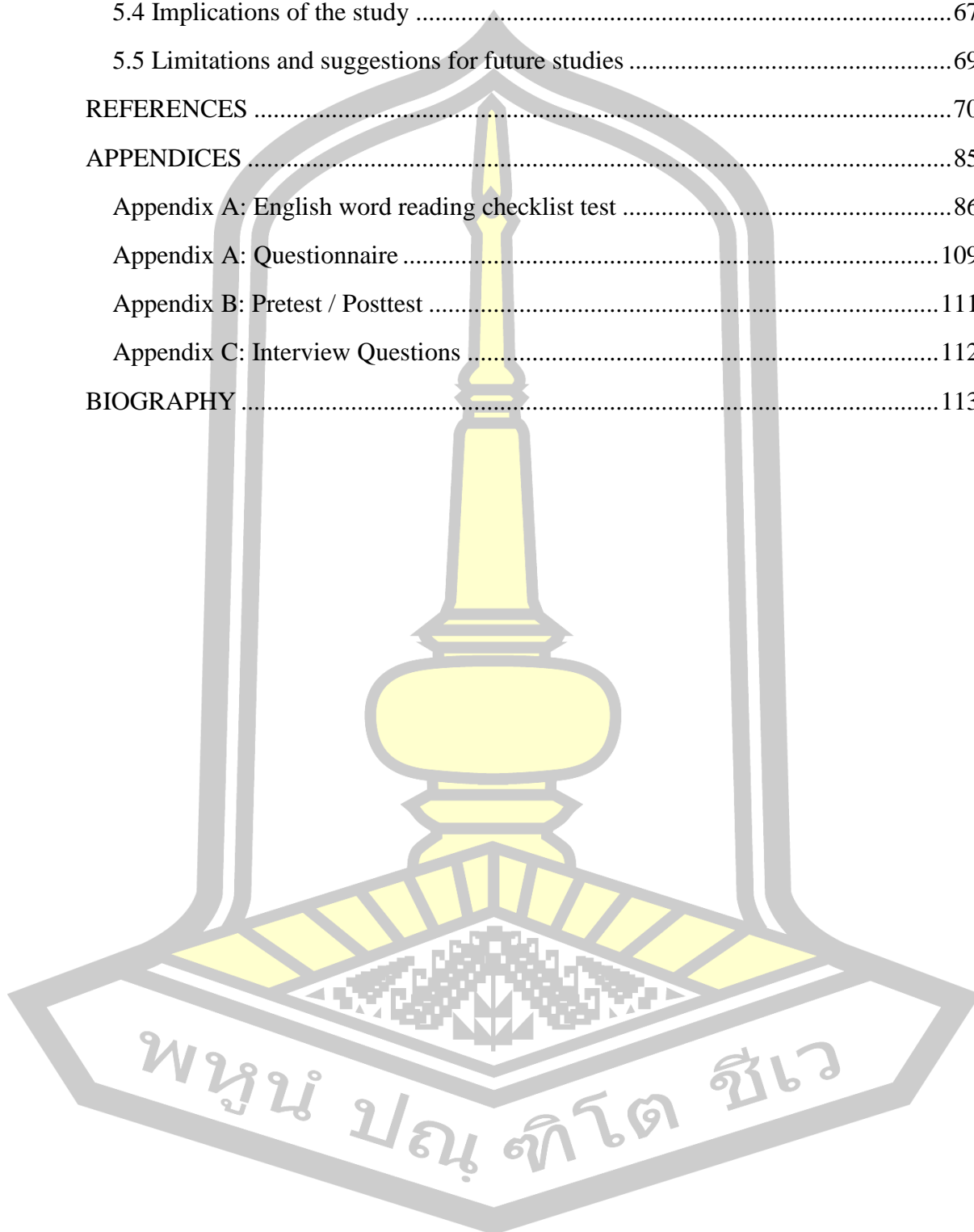Additionally, I sincerely thank everyone who helped me, directly or indirectly, complete the research work.

Suwanan Longchin

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CHAPTER I

INTRODUCTION

This chapter is an introduction of the present study. It starts by discussing a background of the study, followed by purposes of the study, scope of the study, significance of the study, and operationalized definition of terms.

1.1 Background of the Study

Reading is one of the essential language skills which learners are required to learn. It is instructed in all language courses in schools. It serves a significant role in providing students access to knowledge in various fields (Salikin et al., 2017). Additionally, it contributes to their lives as it paves the way for attaining work-related success (Castles et al., 2018) and academic achievements (Loong & Aziz, 2019). Due to its contributions, reading alone is insufficient; simply speaking, reading without comprehension does not fulfill the goal of reading (Loong & Aziz, 2019), which entails constructing meanings or messages of the text (Alwi & Aulia, 2023). This lies in the fact that without comprehension, the authors' intended meanings or messages may be misunderstood or missed. To achieve such a goal, students should be capable of identifying ideas embedded in the text (Akhondi et al., 2011). With this in mind, reading instruction is aimed at enabling students to read and understand English text.

Considering the goal of reading, reading comprehension is regarded as one of the language skills which students need to develop. With the ability to comprehend the English text, they are equipped with access to new knowledge (Gultiano, 2022). This reading skill is, hence, taught since primary education. Particularly in primary education, students acquire the reading skills through reading activities, enabling them to recognize written forms and to articulate the symbols representing language sounds (Lucas et al., 2021). In general, reading instruction in primary education focuses on comprehension and pronunciation of written language with the aim of developing a foundational skill for advanced reading in higher educational levels, as pointed out by Alwi and Aulia (2023). At this level of instruction, learners are expected to recognize sounds in utterances, letters, syllables, words, and sentence types.

Despite instruction in primary education, reading skills pose a challenging task for students since a combination of different skills is required to attain effective reading

comprehension (Montgomery, 2022). Several components contributing to efficient reading comprehension encompass word reading, word and word knowledge, and fluency (Kaushik & Lipton, 2018; Zhang et al., 2021). Among these, word reading, together with its elements including orthographic, phonological, and morphological knowledge, plays a crucial role in reading comprehension at the early stage of reading development (Kim, 2020). In fact, it serves as a predictor of reading comprehension for learners at this level. Despite such significance, this particular component of reading comprehension seems to pose as a challenge for primary school students. Some still cannot read or pronounce the words correctly, regardless of their knowledge of the words (Tasawang, 2022). Early reading difficulties also cover the inability to identify similar consonant sounds, similarities in vocal and schwa sounds, similar sounds in sentences, and inverted sounds (Alwi & Aulia, 2023). This is particularly influenced by irregular correspondence between letters and their associated sounds in English (Gangl et al., 2018). Specifically, this may be attributable to complex phonemic rules of the language; as an example, the consonant digraph 'gh' of the world 'laugh' is pronounced as 'f', yet its pronunciation is different in case of the world 'ghost' of which digraph is pronounced as 'g' (Wang, 2019). This complexity may hinder students' development of fluent word reading skills.

Although the Basic Education Core Curriculum established by the Ministry of Education (The Ministry of Education, 2008) stipulates that six graders must be able to read aloud the given paragraphs, tales and short poems, the difficulty in word reading skills has still emerged among Thai students, especially in the school where the researcher is currently teaching. Based on the researcher's observation, the majority of the students do not possess word reading skills. Specifically, they struggle to read and recognize English words. Most student are unable to pronounce or mispronounce the words although they have already known them. In addition, when encountering new words, they tend to struggle with reading those words or being unable to decode them, thereby resulting in misreading.

In delving into the potential causes, it appears that the limited word reading skills among the students at the research site may be caused by different aspects. Basically,

this issue may stem from ineffective teaching methods, such as rote learning. The low level of word reading skills among this group of learners may be attributable to inadequate alphabet knowledge as well. In fact, this form of knowledge is regarded as a predictor of learners' word reading skills (Schatschneider et al., 2004). As pointed out by Gallagher et al. (2000), young learners struggling with development of reading skills may possess limited alphabet knowledge. As a result, their skills may be hampered or developed at a relatively lower rate, compared to their peers with strong alphabet knowledge. In particular, it is likely that the students have inadequate letter-sound knowledge, a component of alphabet knowledge. This lies in the fact that although reading instruction at this level may emphasize recognition of sounds, the teacher may not pay sufficient attention to sound components, particularly ending sounds such as -s, -es, -ch, and –sh. This aspect is deemed crucial, considering its link with the development of word reading skills (Khosa, 2021). Learners equipped with strong letter-sound knowledge will be enabled to link letters with their sounds (Carson et al., 2013) and, in turn, to decode and written forms correctly (Khosa, 2021). Consequently, limited letter-sound knowledge can lead to the inability to read or decode both familiar and new words, potentially hindering attainment of word reading skills. This also indicates that the limited word reading skills among these students may result from a deficit in phonological awareness. It has been found that the emergent readers struggling with word reading tend to attain a poor level of this linguistic awareness (Phillips et al., 2008). To elaborate, insufficient phonological awareness can pose challenges in various aspects, such as word identification, word blending, and word segmentation (Musa & Balami, 2016). As a consequence, a lack of phonological awareness can hinder advancement of word reading and the ability to read words accurately and fluently. Thus, all of these aspects may compound a difficulty in word reading and impede the students' development of word reading skills, which would in turn pose hindrances to successful reading comprehension.

This word reading problem facing the grade 6 students at the research site should be tackled rapidly. This can be explained by the fact that good word reading skills can have a tremendous effect on students' reading comprehension and vocabulary knowledge (Bree et al., 2022). Improved word reading skills can contribute to an increasing amount of reading or text exposure, which would then foster their verbal

skills or lexical knowledge (Florit & Cain, 2011). Hence, if the inadequate word reading ability still persists, it will hamper their comprehension (Conrad & Levy, 2007) and vocabulary learning. The low early reading ability of primary school learners may be largely attributable to the utilization of conventional, teacher-centered teaching methods, which may not promote engaging learning and stimulate students' learning (Alwi & Aulia, 2023). To address this issue, more engaging instructional materials or resources should be incorporated in classroom teaching to facilitate young students' development of word reading skills. Considering that young students tend to acquire skills or knowledge through auditory, visual and kinesthetic means (Leasa et al., 2017), media should be used as learning or instructional materials since they can spark learners' motivation and attract their attention (Jonassen et al., 1994).

Among many forms of media, a flashcard has been increasingly used to promote reading skills, specifically word reading (Iqbal, 2016; Warti, 2021). In fact, flashcards are recognized as an instrument employed in language learning for learning letter shapes, sounds, and words (Wen et al., 2020). As stated by Volpe et al. (2021), they can contribute to automatic word recognition. Additionally, they typically feature appealing colors and illustrations of animals, fruits, alphabets, and professions (Kusumawardani, 2019). With vividness featured in those colors and images, the students may be able to form visual associations, potentially contributing to better word recognition and reading. These visual cues in conjunction with captions may enable them to recognize or remember concepts or contents presented with greater ease as well (Ulum et al., 2021). Moreover, repetition naturally inherent in the use of flashcards increases their exposure to the words, allowing them to memorize the words or pronunciation effortlessly (Warti, 2021). Considering these, flashcards can serve as a form of learning media to foster students' word reading skills.

The arrival of sophisticated and modern technology has contributed to the improvement of flashcards over the years. In fact, flashcards have been created through applications or software, leading to the rise of digital flashcards. With the increasing access to technological devices such as computers and smartphones, language learners can gain access to digital flashcards with ease (Dizon & Tang, 2017). Consequently, this has resulted in the growing popularity and preferences for

digital flashcards over paper flashcards in recent years (Zung et al., 2022). Regarding design, this form of flashcards is slightly different from its counterpart. While conventional paper flashcards primarily comprise information as in a word or a concept on the front and a picture on the back, digital flashcards can incorporate more elements. Particularly, animations, audio input, games, videos, and other interactive elements can be added to digital flashcards (Cobran et al., 2014; Nakata, 2020). Besides, digital flashcards provide greater advantages, compared to traditional paper flashcards. As they can incorporate more elements mentioned earlier, they can draw on those to clarify the prompt or concept in question. Incorporating the interactive elements can contribute to creating an engaging learning atmosphere for learners and allowing for interactivity (Predani et al., 2022; Wright, 2016). Additionally, the addition of audio input can enable learners to be aware of how each word is read or articulated (Ho & Kawaguchi, 2021). This particular feature would aid in fostering word reading skills accuracy among young learners. Moreover, digital flashcards allow learners to use and share flashcards with their peers easily since they can be accessed via devices such as smartphones, tablets or computers (Lubis et al., 2022). In addition, previous research has discovered that the incorporation of digital flashcards can contribute to favorable learning outcomes (e.g., Ashcroft et al., 2016; Eichstaedt, 2023; Kerdmuenwai, 2018; Miyakoshi, 2009; Turnbull, 2017). Specifically, digital flashcards can contribute to expanding vocabulary knowledge, enhancing reading comprehension, and fostering word reading skills, particularly development of sight word reading skills. Hence, it can be stated that digital flashcards provide functionality unavailable in conventional paper flashcards and can be employed to promote learners' language skills, especially word reading skills.

There has been a growing body of studies exploring the use of flashcards in teaching reading skills, particularly word reading skills (e.g., Al-Kandari, 2023; Eichstaedt, 2023; Hatiningsih & Adriyati, 2018; Othman & Tahar, 2017; Turnbull, 2017; Warti, 2021). These studies in global context explored the effectiveness of flashcards, namely traditional paper flashcards and digital flashcards, in developing reading skills among young learners, especially primary school learners. The results of this study indicate that the implementation of flashcard interventions could contribute to enhancing students' reading skills, spanning reading comprehension, early reading

skills, and word reading skills. In particular, Eichstaedt's (2023) and Turnbull's 2017 studies have exhibited the positive outcome of using digital flashcards; specifically, digital flashcards could outperform traditional paper flashcards in terms of improving word reading skills. Similarly, in Thai context, there have been growing interests in investigating the effect of instructional interventions on students' word reading skills (e.g., Bhumibhong, 2018; Tasawang, 2022; Wichayut, 2019). However, many of these studies incorporated the use of flashcards in combination with their interventions, yet they did not investigate the effect of using flashcards on students' word reading skills directly. Several studies (e.g., Jaisiri, 2013; Junma & Sanboonvej, 2019; Maneechot, 2020; Petchnuy, 2013; Wiriya et al., 2022) explored the effect of such media on pronunciation and reading skills. They have displayed the same trend in the use of flashcards, just as previous studies in global context found. Particularly, they have found that the incorporation of flashcards could lead to improvement in pronunciation skills, reading skills, and word reading skills. Despite that, these studies tended to focus on reading skills in general but did not place an emphasis on word reading skills. As a result, insights into the utilization of flashcards to enhance word reading skills are still lacking. Additionally, the prior studies have not touched upon the effect of digital flashcards on such skills yet, despite the growing popularity of such instructional media in this digital age; they focused on the effectiveness of conventional paper flashcards. As much of attention among these studies was paid to the effect of flashcards on reading skills in a broad manner and considerable focus was given to conventional paper flashcards over their counterpart, the use of digital flashcards to enhance word reading skills was under-researched. It can be stated that this has led to a paucity of studies on the use of digital flashcards to improve students' word reading skills.

Hence, the present study was intended to bridge the gap by examining whether the use of digital flashcards could contribute to enhancing primary school students' word reading skills. In addition, it was aimed at delving into the students' perceptions of using digital flashcards to improve their word reading skills.

1.2 Purposes of the Study

The present study investigated the effect of digital flashcards on improvement of Thai primary school students' word reading skills. It also explored their perceptions of using digital flashcards to develop word reading skills. Based on these two purposes, two following research questions were formulated to guide this study.

1. To do what extent do the digital flashcards affect Thai primary school students' word reading skills?
2. What are Thai primary school students' perceptions about digital flashcards to enhance word reading skills?

1.3 Scope of the Study

This study adopted a mixed methods research design to examine the effect of using digital flashcards on English word reading skills among Thai primary school students, along with their perceptions about the use of digital flashcards in developing word reading skills. There was one experimental group comprising 19 Thai EFL sixth graders from a single intact class at an extended opportunity school located in the Northeast of Thailand during the academic year 2022. The research instruments included a word reading pre-test and post-test, a perception questionnaire, and a focus group interview. Specifically, the Word Reading Test (WRT) with 30 items of target words was developed to assess the primary school students' word reading skills. Additionally, a perception questionnaire was administered to investigate their perceptions about digital flashcards. A semi-structured interview was used to obtain their perspectives on digital flashcards and their word reading skills. The collected data were subsequently analyzed using descriptive statistics and content analysis to shed light on the effect of using digital flashcards on enhancing students' word reading skills and their perceptions of utilizing such media to develop their word reading skills.

1.4 Significance of the Study

This study was carried out in the hope of providing insights into the effectiveness of digital flashcards in enhancing the primary school students' word reading skills, along with their perception of the instructional approach. Initially, the results of the study could underscore how the use of digital flashcards in reading lessons could contribute

to development of primary school students' word reading skills. Specifically, they could illustrate the effectiveness of digital flashcards in increasing EFL grade 6 students' word reading, potentially promoting automaticity and fluent reading. Building on these results, the ESL/EFL teachers may be inspired to incorporate digital flashcards in their instructional practices to foster their students' word reading. In addition, the study would show how the students perceive the incorporation of digital flashcards in learning; this finding can be drawn to improve the utilization of such materials in classroom practices, potentially leading to the development of more engaging instructional materials for reading improvement. Lastly, the results of the study may provide a practice guideline for future researchers to further examine how effective digital flashcards were in enhancing students' word reading skills in other contexts.

1.5 Definition of Key Terms

A digital flashcard teaching approach refers to a method of using electronic flashcards to aid in learning and memorization. This approach involves creating digital flashcards, which can be accessed through a computer or mobile device, and using them to quiz oneself on various topics. Digital flashcards in this study include text, images, and auditory or visual components to help students understand the rules of reading words with -s and es ending.

Thai EFL primary learners refers to 19 sixth graders who are learning English as their foreign language at an opportunity extended school located in Sisaket province.

Word reading skills refers to the process of recognizing and interpreting written words by deciphering the letters and symbols that make them up. It is an essential skill for literacy and communication, as it enables individuals to understand written language and access information. Students' ability to accurately pronounce English regular verbs in the past in *es* with three different sounds, namely /s/, /es/.

1.6 Organization of the Thesis

Chapter 1 provides the overall picture of the study. It gives the readers the rationales to carry out the present research, including the study's background, purposes of the study and research questions, significance of the study, scope of the study, and definition of key terms.

Chapter 2 reviews the theoretical framework for the present study. First, it describes the construct of word reading skills. Then the chapter critically reviews digital flashcards with phonological awareness and the relevant studies on of word reading skills in various contexts.

Chapter 3 outlines the research methodology. The chapter describes in detail the instrumentation, intervention, data collection procedures, and data analysis.

Chapter 4 presents the study results and interpretations of those findings to answer the research questions.

Chapter 5 presents the conclusion and discussions of the study, implications of the current study, limitations, and recommendations for future research.
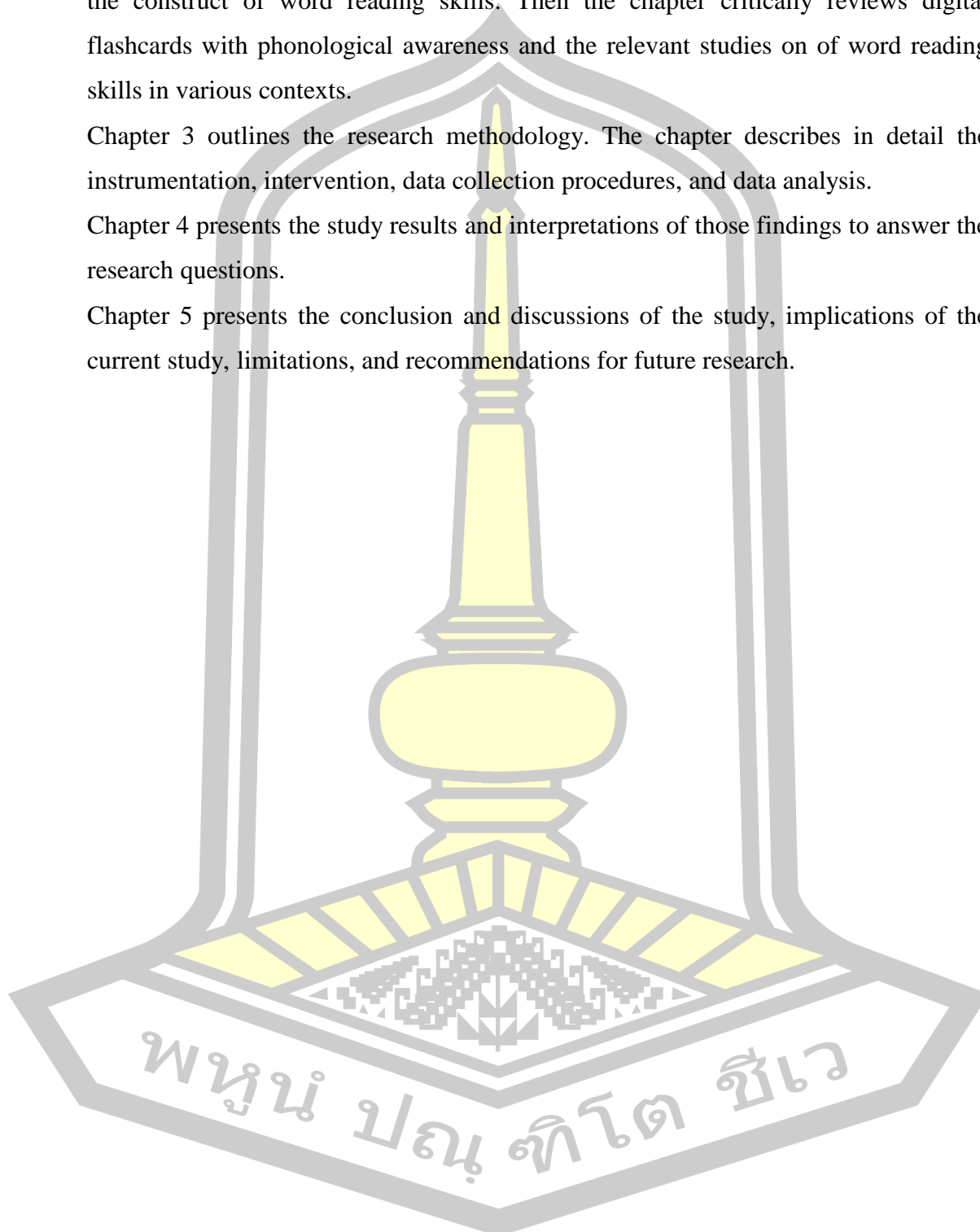
CHAPTER II
LITERATURE REVIEW

This chapter provides an overview of word reading skills, discusses the application of digital flashcards, and examines relevant research about using flashcards to improve word reading skills. The chapter commences with a theoretical framework related to multimedia learning theory, reading skills, definition of word reading skills, importance of word reading skills, significance of word reading skills and teaching word reading skills for primary learners. Next, the concept of phonological awareness training is reviewed, followed by information regarding digital flashcards, including their design, benefits, and drawbacks. A chapter summary and a review of relevant studies conclude the chapter.

2.1 Multimedia Learning Theory

The use of spoken and visual components in the delivery of instructional content is known as multimedia learning, according to Mayer (2002). The integration of graphical visuals and aural story underlines how the cognitive theory of multimedia learning improves the construction of verbal and visual mental representations, as Moreno (2002) goes on to emphasize. Next, by combining these mental images with past information, new knowledge is created. By constructing meaningful connections between spoken and visual elements, students participating in multimedia learning are able to comprehend concepts at a deeper level than they would when verbal or visual stimuli are used separately (Mayer, 2002). Mayer (2010) asserts in his Cognitive Theory of Multimedia Learning that the goal of multimedia instruction is to improve students' ability to create coherent mental models based on the information they are exposed to. With the intention of enhancing students' learning efficiency, the theory attempts to demonstrate how multimedia teaching practices can be effectively organized and integrated with cognitive processes. (Sorden, 2012).
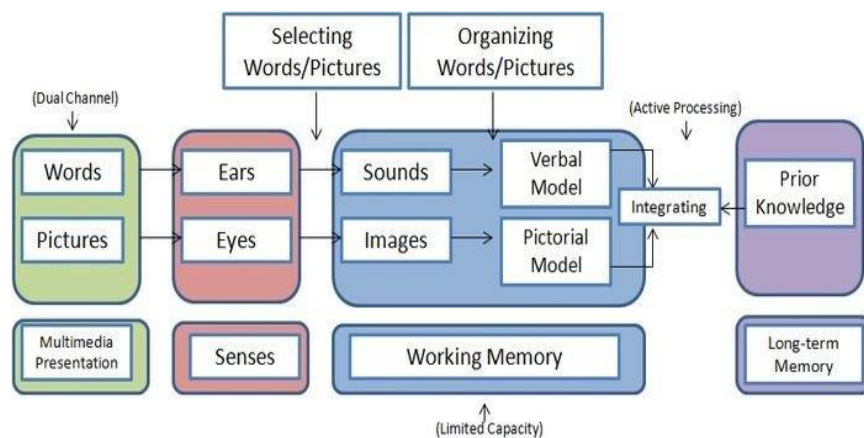
Figure 1 Mayer's Cognitive Theory of Multimedia Learning (Mayer, 2002)

There are three memory stores: working memory, long-term memory, and sensory memory. These are highlighted by the cognitive theory of multimodal learning. According to Sweller (2005a), sensory memory improves the perception of new information. Visual sensory memory preserves visual elements like written texts and pictures as visual images, according to Mayer (2005), whereas auditory sensory memory preserves auditory elements like spoken words and sounds as auditory images.

Working memory is a cognitive construct that is associated with the conscious information processing (Sweller, 2005a). The cognitive process is concerned with the attentional mechanism that involves the selection and retrieval of data from the sensory memory, enhancing its subsequent processing and integration. Another cognitive structure that exists is long-term memory, which serves as a repository for our knowledge base involves the complete repository of information for an indeterminate duration. The recognition of information in long-term memory is contingent upon its transfer to working memory, as posited by Sorden (2012). Mayer's (2010) findings suggest that the capacity of working memory is limited to processing a limited number of stimuli simultaneously. Furthermore, the active processing assumption claims that students engage in the construction of knowledge by actively attending to pertinent information, organizing them into a coherent conceptual framework, and integrating them with their own knowledge.

In conclusion, by reducing the cognitive load on working memory, the integration of auditory and visual components in multimedia learning has the potential to provide meaningful benefits. Learning results can be improved, according to Sorden's (2005) argument, when nonverbal visual pictures are combined with verbal and auditory audio for narrative. By activating both the aural and visual sensory channels in a balanced way and avoiding overload on either channel, the use of voice narration and visual visuals efficiently offers support for verbal and nonverbal working memory. There are two distinct routes through which information can be processed when narration or audio is presented alongside visual stimuli. Information processing in working memory can be enhanced by using a variety of media, according to Kalyuga (2000). Since spoken language is more effective than written language when it is paired with visual visuals, learners demonstrate their better learning outcomes.

2.2 Reading Skills

For language learners, reading is considered one of the most essential skills. This is reflected in the rationale for the correlation between reading and academic achievement. This facilitates the expansion of learners' lexical vocabulary while also allowing them to obtain a comprehensive understanding of various domains that are accessible in both their L2 and native language (Short et al., 2018). This would subsequently enhance their scholastic and vocational accomplishments (Eloranta et al., 2019). This particular ability necessitates comprehension; as Loong and Aziz (2019) note, reading deviates from its intended purpose—extracting messages from textual or printed materials—when comprehension is absent (Alwi & Aulia, 2023). This requires deciphering or comprehending the message, interpreting it, and incorporating the complete concept into the reading material (Karademir & Ulucinar, 2017). As a result, reading comprehension is an essential achievement for both language learners and readers, as it empowers them to grasp the writers' intended meanings.

Reading comprehension, in particular, is not a simple skill for language learners to acquire. This is because the activity at hand is intricate in nature, necessitating the concurrent coordination of numerous skills (Dujaradin et al., 2023). Different components or talents are identified by scholars as essential for attaining reading

comprehension (e.g., Gough & Turnmer, 1986; Kaushik & Lipton, 2018; Zhang et al., 2021). As postulated in the Simple View of Reading (SVR) by Gough and Turnmer (1986), reading comprehension comprises two fundamental components: vocabulary comprehension and fluency in spoken language. Conversely, the following elements comprise successful reading comprehension, according to Kaushik and Lipton (2018) and Zhang et al. (2021): word reading proficiency, word and word knowledge, and fluency. Word reading is the component of reading comprehension that these scholars all possess in common. This is consistent with the findings of other researchers who emphasize the impact of word reading on text comprehension (e.g., Rochman, 2018; Stahl & Nagy, 2006). Thus, it is possible to conclude that proficient reading comprehension is facilitated by word reading.

2.2.1 Definitions of Word Reading Skills

Word reading skills have been defined among many scholars (e.g., Department for Education, 2023; Tonne & Pihl, 2013; Fraser et al., 2014; Hoover & Gough, 1990; Perfetti, 1985). As stated by Tonne and Pihl (2013), word reading entails the ability to decode and understand a word. It can be seen that this description relates comprehension as part of word reading skills. In the meantime, Hoover and Gough (1990) describe this term as the capacity to read words in a given text. This may imply that with word reading, learners should be able to read aloud or pronounce words in a reading material. Unlike Engen's description, their definition emphasizes decoding since they view that comprehending a word is part of the other component, namely language comprehension, which is characterized by Hoover and Gough (1990) as being able to establish connections between meanings and speech sounds.

Similarly, based on Perfetti's view (1985), word reading involves deciphering written letters and words and converting them into corresponding phonetic representations. Additionally, Fraser et al. (2014) relate word reading to the ability to decode, just as Hoover Gough and Perfetti did; specifically, this reading component is labelled as being able to read words with automaticity and possessing decoding strategies to read unfamiliar words. The same view is also seen in the Department for Education's definition of word reading (2023) in that it is associated with decoding abilities; it mainly involves reading new words by articulating the sounds associated with the

letters and merging these sounds, whether silently or aloud. It is also extended to pronounce familiar words correctly and silently with 'at a glance'.

Based on the definitions given by those scholars, word reading skills are primarily associated with decoding words, whether familiar or unfamiliar and the capacity to translate letters and words into phonetic representations. Additionally, these skills entail being able to read words with automaticity. Thus, it can be concluded that word reading skills involve the ability to read, decode or pronounce familiar and unfamiliar words by automatically establishing associations between the sounds and the letters of those lexical items.

2.2.2 Importance of Word Reading Skills

Word reading skills play an essential part in reading activities and the attainment of reading comprehension. These skills influence learners' reading quantity (van Bergen et al., 2020). That is, fluent word reading will enable them to read better, promoting their exposure to reading materials. It will foster their word recognition and understanding, increasing opportunities to immerse themselves in texts, broaden their knowledge of the world and vocabulary, and comprehend more sophisticated texts (Relyea, 2015). With increasing exposure to those texts, their repertoire of lexical resources and verbal skills are likely to expand (Florit & Cain, 2011), together with knowledge in various areas.

As has been emphasized, word reading can also contribute to learners' effective reading comprehension. It is clear that without precise word reading, learners will be unable to grasp the intended message, and incorrect word reading may result in text misunderstandings (Rochman, 2018) or hamper their comprehension. This may be attributable to two reasons. Specifically, as Hoover and Tunmer (2018) pointed out, incorrect recognition of words can result in an inadequate understanding of the text. Additionally, low automatic word reading or slow and effortful progress through the text will strain their capacity to develop an understanding of the text (Rochman, 2018). This can be explained by Perfetti's (1985) verbal efficiency theory, which states that slow and laborious word reading demands tremendous cognitive resources, leading to a small portion of cognitive resources at learners' disposal for text

interpretation. It hinders the use of sophisticated or high-level processes (Hoover & Gough, 1990).

Conversely, implementing efficient or automated word scanning can aid in mitigating cognitive load or resource allocation towards comprehension (Fuchs et al., 2001). This inequitable distribution of cognitive resources resulting from arduous word reading negatively impacts text comprehension (Daniel et al., 2022). Conversely, automatic word reading does not necessitate the application of fundamental processing abilities, such as word recognition (Relyea, 2015). Learners will have access to a wealth of cognitive resources when they can read words accurately and automatically. These resources help interpret texts and derive meaning (Perfetti, 1985). In essence, this will empower individuals to focus on integrating novel information with preexisting knowledge, as well as evaluating textual content or information (Cain et al., 2000).

As discussed, word reading skills may improve students' reading and understanding. Therefore, it is imperative to develop these abilities in the students to read words independently or in conjunction with other texts more precisely and efficiently. By using automatic and precise word reading, students can allocate cognitive resources towards developing or comprehending the intended meaning or message, increasing their exposure to reading materials.

2.2.3 Teaching Word Reading Skills for Primary Learners

Numerous academics have attempted to identify critical components of word reading skills. It is worth noting that recognising and establishing connections between the spelling, pronunciation, and meaning of a given word can improve the execution of word reading. As a result, phonology, orthography, semantics (Ouellette, 2006; Seidenberg, 2005), and morphology comprise the majority of its subject matter (Wolter et al., 2009). Existing literature has demonstrated that the reading proficiency of young learners has been enhanced by their linguistic awareness in these domains (Moats, 2000). In particular, awareness of letter patterns (orthographic awareness), word meaning (vocabulary), word structures (morphological awareness), and phonemes (phonological awareness) generally contribute to the development of word reading skills (Wolter et al., 2009). It is possible that a deficiency in one facet of

linguistic awareness could impede the ability of learners to successfully utilize other facets, resulting in challenges with word reading and text comprehension.

To aid in developing a solid foundation in word reading, primary students should nurture four areas of awareness, which are influenced by word reading skills. A link has been established among primary learners between phonological awareness and word reading across all four dimensions, as supported by data (e.g., Manis et al., 2004; Nagy et al., 2003). This feature of linguistic awareness may, therefore, lead to proficient word reading. Consequently, it can be concluded that these students should develop their phonological awareness since it serves as a basis for their word reading skills.

2.2.3.1 Phonological awareness

Phonological awareness has been the subject of numerous scholarly definitions (e.g., Anthony & Francis, 2005; Wagner & Torgesen, 1987). Phonological awareness, as defined by Wagner and Torgesen (1987), is a combination of linguistic and metalinguistic abilities pertaining to the recognition or sensitivity to the sound structure of words. Similarly, Trehearne and Healy (2003) equate phonological awareness to the capacity to comprehend the phonemes included within a word, as opposed to emphasizing its semantic substance. Both definitions emphasise the recognition or identification of the sound structures or components of a given word. Furthermore, Anthony and Francis (2005) define this concept as the ability to recognize, distinguish, and manipulate the phonemes of a language independently of the specific dimensions of the given word component. According to their description, phonological awareness is characterised by the capacity to modify sound components. On the basis of these concepts, phonological awareness might be defined as the capacity to discern and change the phonetic constituents of words, as opposed to being concerned with their semantic implications.

Phonological awareness can be defined more precisely as the ability to identify speech sounds on three distinct levels: phonemes, onsets and rimes, and syllables (Anthony & Francis, 2005; Torgesen & Hudson, 2006). This specific notion aligns with the research conducted by the J.P. Das Centre on Developmental and Learning Disabilities (2011). It argues that it is crucial to recognize that sentences are

composed of words, which are fundamentally composed of syllables, which comprise distinct phonemes such as onsets, rimes, and initial consonants or clusters of consonants (vowel sounds and final consonants or consonant clusters). Phonemes, the smallest unit of sound, compose onsets and rimes. Similarly, Hu (2019) defines this concept as the ability to identify and control speech sounds, which encompasses three dimensions: onset-rhythm awareness, phoneme awareness, and syllable awareness.

Phonological awareness, as defined by the provided sources, pertains to the capacity to recognize, discriminate, and manipulate sound components, which are speech units. Furthermore, this consciousness entails the understanding or recognition that words or sounds are composed of three subunits: phonemes, onsets and rimes, and syllables. Phonological awareness enables individuals to discern the configuration of word constituents inside phrases or speeches and to modify said constituents.

2.2.3.2 Phonological awareness training

Phonological awareness is a factor that influences the development of word reading skills. Indeed, it is an essential component of proficient word reading. Individuals who have limited phonological awareness are more prone to encountering challenges in the process of reading acquisition (e.g., Jenkins & O'Connor, 2002; Phillips et al., 2008) and exhibit inadequate proficiency in word reading (Adams, 1994). Musa and Balami (2016) propose that challenges in word recognition, word blending or segmentation, and automatic letter and word naming can arise from a deficiency in phonological awareness. They contend that a lack of phonological awareness may hinder children's ability to differentiate syllables, initial, middle, and final sounds, onsets, and rimes. As a result, individuals will experience challenges with reading, such as reading slowly and laboriously or being unable to comprehend words.

Furthermore, a lack of phonemic awareness, characterized by a restricted capacity to categorize phonemes, can impede the inductive learning process. This process is critical for acquiring new letter names and creating words using those phonemes (Verhoeven et al., 2022). In addition, a lack of phonological awareness may worsen the challenges of comprehending written texts. In other words, it has the potential to hinder learners' ability to engage in higher-order cognitive processes, thereby negatively impacting their reading comprehension (Wang, 2019). Difficult or slow

reading requires significant cognitive resources, leaving comparatively fewer cognitive resources available for text processing. Therefore, inadequate phonological awareness might hinder or create obstacles to developing reading comprehension and word reading skills.

Therefore, before introducing these students to written texts, it is evident that they should be rigorously instructed on phonological awareness. They ought to establish a correlation between the letters' symbols and the sounds they represent. Despite this, it is common for elementary students to lack sufficient early development of this linguistic insight. Primary students should, therefore, be encouraged to develop this aspect of linguistic awareness. For alphabetic instruction or reading acquisition, the absence of phonological awareness integration results in unfavorable consequences, according to Foorman et al. (2003).

Additionally, without explicit instruction, their phonological knowledge tends to remain static (Cirino et al., 2009). On the contrary, learning can potentially be enhanced by integrating phonological awareness into the curriculum. As it cannot develop organically, this is consistent with the recommendation of experts that it be explicitly instructed to students beginning to read (Mohammed, 2014). Research has demonstrated that providing direct instruction or training in this domain can positively impact various academic skills, including reading comprehension, manipulating words and syllables, phonological working memory, and detection of rhymes (Thompson & Matt, 2005). Consequently, specific phonological awareness skills should be emphasized in classroom activities. Literal awareness comprises a number of metalinguistic abilities, including phonemic awareness, onset-rime awareness, syllable awareness, and word awareness, according to Lane (2007) and Lane et al. (2002). Unambiguous instruction should, therefore, be provided in each of these domains.

Word Awareness

According to Lane et al. (2007), word awareness can be characterized as the ability to recognize that individual words form speech or sentences. This can be showcased through learners' ability to produce a single lexical item or word which he has encountered within longer phrases, for example, the word "rainbow", which is formed

by two words ", rain" and "bow". This skill can be assessed or trained using activities such as word combining or deletion (Phillips et al., 2008). To illustrate, the word "hotdog" is joined by 'hot' and 'dog', while deleting 'ball' from the word "baseball" will produce the word "base". In addition, using chants in combination with word deletion and substitution (Jump & Johnson, 2022) can be used as a classroom activity; for instance, in the chant *Five Little Ducks*, learners can be taught to delete the word "ducks" and substitute it with "chicks". This should help cultivate this word-level awareness, allowing them to grasp that words construct a sentence. Additionally, as recommended by Lane et al. (2007) and Trehearne and Healy (2003), other activities can be implemented to foster word awareness among learners.

1. **Tapping words**: Young learners can be trained to tap a rhythm stick or use their fingers for each word within a sentence or phrase. Most tend to develop this skill through minimal instruction. Moreover, teacher modelling and guiding can benefit those facing difficulty in this task. Given that those struggling with this activity tend to confuse words and syllables, it is crucial to clarify the difference between both components (Lane et al., 2007).

2. **Word segmentation**: In this activity, learners can be taught to draw blocks or specific items to represent each word within a sentence of approximately four words, such as "I have a dog" (Trehearne & Healy, 2003), which should contain four blocks. This should foster learners' ability to segment words.

Syllable awareness

This syllable-level awareness can be described as the capacity to perceive parts of phonemes that constitute a word (Mohammed, 2014). Put simply, it concerns the ability to recognize, segment, and count syllables (Lane et al., 2007). As pointed out by Gillon (2004), an assessment test for this metalinguistic skill can serve to identify learners' understanding of the concept that every syllable contains a vowel unit and that syllables are distinguished to ensure that certain consonants that cannot be clustered are not placed as the initial or final syllable. In the case of the word "only", two consonants, as in 'nl', cannot be regarded as a "legal cluster", considering that this lexical item can solely be distinguished as "on-ly". Additionally, syllables are typically distinguished based on the stress pattern of a given word, and the stress

syllable can contain many consonants. To illustrate, "patrol" can only be segmented as "pa-trol" (Gillon, 2004).

Despite not explicitly understanding a syllable, many learners can identify the number of syllables in a word (Gillon, 2004). She mentions that a one-syllable word does not seem to pose a problem for learners, but they struggle with those containing up to four or five syllables. Modelling and practice through segmenting and blending should enable them to segment words with many syllables.

The tasks that can be implemented to foster this skill are syllable segmentation, syllable blending, syllable deletion, and syllable deletion (Gillon, 2004; Mohammed, 2014).

1. Syllable segmentation: This task can be carried out through specific activities, such as jumping or clapping, to identify the number of syllables in a word (Gillon, 2004; Jump & Johnson, 2022; Lane et al., 2002). To illustrate, the teacher's name, "Strawbridge", comprises two syllables, so the students must clap or jump twice.

2. Syllable blending: This task involves prompting learners to complete the missing part of a word, as Gillon (2004) stated. Initially, teachers can present an image representing the word "rabbit" and articulate the first segment "rab-", encouraging the learners to complete the other part "-bit" to construct the complete word "rabbit".

3. Syllable deletion: According to Gillon (2004), this entails asking learners to remove a syllable from a given word. Any syllable, e.g., initial, middle, or final, can be drawn (Mohammed, 2014). To illustrate, the teacher will first read a particular word, such as "homework", and instruct the students to read the word without the other syllable, i.e. "homework". The teacher may increase the difficulty of the task by using words with more than two syllables. This may foster their syllable awareness effectively.

Onset-rime awareness

Onset-rime awareness can be referred to as the intra-syllabic level of phonological awareness (Lane et al., 2002; Ng & Ng, 2014). The onset is the initial consonants or

consonant clusters preceding a vowel, while the rime is the vowel and the remaining phonemes following it. (Phillips et al., 2008). For example, in the word 'bird', the onset is "b", while the rime is "ird".

Providing instruction focusing on onset-rime awareness is crucial for numerous young learners (Treiman, 1992). Tasks involving the analysis of onsets and rimes are more intricate than tasks at the syllable level, considering that they involve segmenting syllables. However, these tasks are less challenging than those at a phoneme level, for they do not discriminate or distinguish between each phoneme (Lane et al., 2002). Hence, onset-rime tasks may be regarded as an intermediate or transitional stage in the progression of phonological awareness. Some learners may still encounter challenges in rhyming multisyllabic words and might generate only a singular set of rhyming words; moreover, notwithstanding their ability to produce rhymes fluently, they may face difficulties in consciously segmenting at the onset/rime level (Trehearne & Healy, 2003). This challenge arising during children's transition from syllabic to phonemic awareness might be attributable to the omission of this intermediate stage – the intrasyllabic unit – in early reading instruction (Lane et al., 2002). Thus, explicit instruction on onset rimes and practices may help ease this challenge.

Some activities have been proposed to strengthen children's onset-rime awareness: rhyme recognition, rhyme generation, rhyme oddity detection, and rhyme matching (Lane, 2007; Mohammed, 2014; Gillon, 2004).

1. Rhyme recognition: Young learners can learn to discern rhyming between two one-syllable lexical items (Lane et al., 2002). This activity entails identifying whether a given pair of spoken words rhymes. Rather than using phrases to foster this ability, the teacher might pose a question such as "Cat and sat both have an *at*. Does the word hat have an *at?*" (Lane et al., 2002) or "Do shell and bell rhyme?" (Ng & Ng, 2014).

2. Rhyme generation: Generating a word or a list of words rhyming with the given word can be demanding due to the increasing use of cognitive and verbal resources (Lane et al., 2002). Still, engaging in rhyming activities, such as rhyming word games, can be a practical method to foster this skill;

nonsense words can be incorporated into those games, as Lane et al. (2002) recommended. Alternatively, the teacher may pose a question such as "Tell me the words that rhyme with bell." (Ng & Ng, 2014). This would help enhance the learners' concentration on sounds.

3. Rhyme oddity detection: This activity involves selecting the word from a list that does not rhyme with others. The teacher may use songs from television shows, such as Sesama Street, to implement this activity and ask students to identify the word differently from the others – not rhyming with other words (Lane et al., 2002).

4. Rhyme matching: As the name of the task suggests, this involves matching words that rhyme with a particular word. In particular, the learners are assigned a pair of words or list of words, which may comprise approximately three or four words and are required to select the word from the list rhyming with the given word, as in "Do these two words rhyme? beat/bean" (Lane et al., 2002).

Phonemic awareness

Phonemic awareness can be characterized as breaking down a spoken word into the smallest unit of sound, called phonemes, and manipulating those sound elements (Lane et al., 2002; Lane, 2007; Phillips et al., 2008). This smallest unit of sound is unique; put simply, it can affect the word's meaning (Mohammed, 2014). To illustrate, the distinction between a pair of words, such as "kill" and "pill", and "pay" and "say", can portray how the use of differing consonants can alter the meaning of the word. In a similar manner, the comparisons between "day" and "die" and "pan" and "pin" can show how words differ in their meanings due to the use of different vowels (Mohammed, 2014).

This last level of awareness seems to pose the greatest challenge for young learners. This lies in the fact that it entails breaking down and blending each sound within words (Snow et al., 1998). Additionally, the learners might break down words at the onset-rime level instead of segmenting them sound by sound, as Trehearne and Healy (2003) pointed out. This is rather typical in the progression of phonological

awareness, though. Moreover, EFL learners may struggle with words with inflectional morphemes -s and -es added to verbs or nouns and omit these endings when communicating in English (Hayashi, 2008). For instance, they may assume that the verb "goes" in the sentence "He goes to the market every morning" contains two phonemes, including /g/ and /o/, but it consists of three phonemes, as in /g/, /o/, and /s/. Consequently, this lack of phonemic awareness can lead them to read verbs with inflectional endings incorrectly or omit the sounds of those endings during reading or speaking. As such, explicit instruction or training is needed to nurture this aspect of phonological awareness since the learners will be provided more opportunities to recognize and reproduce each sound within a word. With phonemic awareness instruction, the learners engage in segmenting and manipulating initial consonants, medial vowels, and ending phonemes, as well as counting phonemes (Gurjar, 2023), so this may enable them to be aware of those inflectional morphemes and to read words correctly and clearly.

To instill phonemic awareness in learners, several classroom activities are at teachers' disposal, including phoneme segmentation, phoneme deletion, and phoneme blending, as recommended by Lane et al. (2002), Lane (2007), and Educator Preparation Institute (2020).

1. Phoneme segmentation: This task involves counting phonemes in a spoken word (Lane et al., 2002). Picture cards with boxes, such as Elkoin boxes, can be incorporated into this task; boxes are placed under each picture and indicate the number of phonemes in the given word. As the learners articulate the given word sound by sound, they are required to place in each box to indicate every sound in the word; alternatively, the teacher can implement this activity verbally by using fingers to count phonemes, with each finger representing each phoneme (Lane et al., 2002). For instance, the teacher may read the verb with inflectional endings of the present tense, such as 'works', and ask the learners to count its phonemes.

2. Phoneme deletion: This can be simply described as the omission of a sound from a given word (Educator Preparation Institute, 2020). It involves identifying and manipulating sounds within a spoken word and omitting a

particular sound from that word (Lane et al., 2002). To illustrate, the teacher may initially read the word "speak" and repeat the word by omitting the final phoneme /k/. This should start with initial sounds and gradually advance to final sounds.

3. Phoneme blending: This task starts with segmenting a target word into phonemes and blending those sound elements to produce a word (Lane et al., 2002). The teacher may segment the verb "run" by saying /r/, /u/, and /n/, and ask the learners to the entire word by blending those phonemes.

In brief, phonological awareness can be described as the ability to identify and manipulate sound units of words. It features four aspects ranging from the largest component to the small unit of sounds: word awareness, syllable awareness, onset-rime awareness, and phonemic awareness. Providing explicit training or instruction on each of these aspects may help foster the learners' phonological awareness and enable them to read words correctly with greater ease.

2.2.4 Letter-name and letter-sound knowledge

In addition to phonological awareness, alphabet knowledge should be fostered in children's learning. It serves as a foundation for reading acquisition among young learners who are emergent readers (Adams, 1994). A lack of this knowledge would pose obstacles and hinder their learning during the initial phase of literacy (Manfili, 2013). Prior research has demonstrated that alphabet knowledge is one of the most effective indicators of reading proficiency (Smith et al., 2008) and word reading skills (Schatschneider et al., 2004). More importantly, it contributes to their acquisition of reading abilities in languages with alphabetic orthographies (Kim, 2009), such as English. It indicates that learners without alphabet knowledge would face reading and word reading difficulties. Hence, it is necessary to instill alphabet knowledge into these young learners to facilitate language acquisition and reading development.

Alphabet knowledge can be characterized as learners' recognition of the shapes of letters, their names, and the associated sounds (Piasta & Wagner, 2010). It consists of two aspects: letter-name knowledge and letter-sound knowledge (Kim et al., 2010). These components would enable children to acquire reading skills and indicate their reading proficiency. Inadequacy of letter-name and letter-sound knowledge can result

in these young learners facing challenges in developing reading skills (Gallagher et al., 2000). As a result, they are inclined to progress more slowly compared to those equipped with such knowledge, potentially causing deficiencies in spelling, vocabulary, comprehension, and reading competency (Torgesen, 2002). Considering this, both aspects of alphabet knowledge should be cultivated among learners to pave the way and lay a strong foundation for reading development, contributing to reading success.

Letter-name knowledge

Letter-name knowledge can be learners' capacity to recognize a letter based on its name (Evans et al., 2006). This aspect of alphabet knowledge can provide learners cues of letter sounds embedded in each letter name. Numerous letter names have a phoneme related to the particular letter, whether appearing in the initial or final position (Evans et al., 2006). For example, the letter "F" contains the phoneme /f/, which would equip learners with background knowledge. This, in turn, would enable them to learn letter sounds with ease (Phillips & Piasta, 2013).

On the contrary, young learners with insufficient letter-name knowledge have been found to struggle with learning letter sounds (Ehri & Wilce, 1979), whereas those able to identify the specific letter by its name can learn them with greater ease (Treiman et al., 1998); furthermore, those taught letter-name knowledge in parallel with letter-sound knowledge have been seen to outperform those taught letter-sound knowledge alone in terms of letter-sound learning (Piasta & Wager, 2010). This may be because letter-name knowledge allows them to identify letters, capturing their attention to the sounds of spoken language or letters (Barron, 1994). It strengthens their understanding and provides access to sounds embedded in letter names. As a result, the ready access to sounds may serve as a referent and enable them to form associations between sounds and letters vividly and effortlessly, facilitating the process of acquiring letter-sound knowledge.

In addition, letter-name knowledge contributes to developing other skills, such as word reading and phonological awareness. Specifically, given that each letter contains sounds in its name, it provides crucial information regarding letter sounds (Treiman & Kessler, 2003). This knowledge of letter names is associated with word reading as it

establishes a connection between letters and printed words, which enables young learners to realize that spellings are not random combinations of letters (Treiman & Kessler, 2003). With this knowledge, they could decode or read familiar or unfamiliar words more efficiently. Consequently, they are inclined to identify letters accurately and, in turn, read words more correctly (Stanovich et al., 1984), improving their word reading skills due to letter-name knowledge. Besides word reading skills, this type of alphabet knowledge can contribute to fostering the young learners' development of phonological awareness (Levin et al., 2004). This is because the letters in printed words enable the learners to recognize that spoken words can be segmented into different sound units, with the letter names indicating corresponding sounds. This may serve as a stepping-stone towards word segmentation. As a result, it can promote their access to phonological awareness, especially phonemic awareness.

Essentially, letter-name knowledge should not be overlooked. Instead, it should be taught to children at the initial stage of learning because it plays a contributory role in facilitating letter-sound learning, promoting word reading skills, and enhancing their development of phonological awareness. Without this knowledge, the learners may face challenges developing reading skills and progress more slowly than their peers.

Letter-sound knowledge

Letter-sound knowledge can be the ability to associate each letter with its sounds (Adams, 1994). This form of alphabet knowledge contributes to developing young learners' reading. Letter-sound knowledge can promote young learners' understanding of the alphabetic principle (Dodd & Carr, 2003). They would recognize that language consists of distinct sounds, each letter produces those sounds systematically (Huang et al., 2014), and certain sounds in language are not represented by a specific letter (O'Leary et al., 2010). Otherwise, they may confuse words that have similar letters but different sounds, resulting in misreading. As a result, letter-sound knowledge would serve as a milestone in their reading development, enabling them to bridge from emergent literacy to conventional reading (Liberman et al., 1990); they could perform various tasks, including decoding and making sense of a written form. Learning letter sounds can also promote the learners' word reading skills (Huang et al., 2014; Khosa, 2021). This is because this knowledge

allows them to establish associations between the letters and their corresponding sounds (Carson et al., 2013). They will be able to read words more correctly and fluently. This would, in turn, lead to improved word reading and attainment of word reading fluency.

Moreover, letter-sound knowledge can facilitate children's decoding of new words and the development of sight words. In particular, it can help them read words with which they are not familiar (Ehri, 1994). When learning to read, novice readers are likely to draw on visual and contextual cues. However, having learned letter sounds, they can utilize them as clues to identify words (O'Carroll, 2011). Specifically, they can draw on letter-sound knowledge to convert the written forms of those unknown words into spoken language, approaching them letter by letter (Kozloff, 2004). For example, English contains several irregular words whose letters may deviate from their usual sounds. Despite that, considering it is an alphabetic language, as mentioned earlier, most words can be read through letter-sound knowledge; an irregular case, such as the word "yacht", is still embedded with certain letters that correspond to the sounds in spoken words (O'Carroll, 2011). Those possessing adequate letter-sound knowledge will outperform those primarily using contextual cues in terms of decoding unknown words (Tunmer & Chapman, 2006). Finally, knowing letter sounds can promote children's recognition of words as sight words (Blaiklock, 2008). Those words are words they can instantly identify without needing to decode each letter. Ehri (2005) found that young learners can draw upon knowledge of letter sounds to store high-frequency words in their mental repertoire.

Hence, it is necessary to foster letter-sound knowledge among children in the early learning phase to promote the development of their reading skills. Specifically, it can cultivate an understanding of the alphabetic principle and strengthen their word reading skills, the ability to decode unknown words and establish sight words. A lack of this alphabet knowledge may result in poor performance in reading, such as confusing words with the same letters and misreading words, and hinder their development of reading fluency.

2.2.5 Assessment of Word Reading Skills

Word reading assessment can assist in determining the amount of proficiency that young learners possess in word reading. This, in turn, can yield significant information regarding the areas that require improvement to enhance their skill development. In general, two metrics can be utilized to assess word reading proficiency: accuracy in word reading and efficiency in word reading (e.g., J.P.Das Centre on Developmental and Learning Disabilities, 2011; Torgesen et al., 1999). One perspective posits that the former is commonly defined as the aptitude to identify every lexical item in its written manifestation (Pasquarella et al., 2015). Following the definition provided by the J.P. Das Centre for Developmental and Learning Disabilities (2011), it is the ability to accurately express the objects provided. It involves the ability of an individual to recognize and decode sight words, which are lexical elements they are either familiar with or have learned, as well as to identify familiar or known lexical items as a unit.

In essence, word reading accuracy pertains to the precise articulation of a phonological representation of a word that is presented in written material (Cain et al., 2015). It has been noted that learners may have challenges in achieving accurate word reading in English when confronted with words that have unexpected correlations between their spelling and sounds, as is the case with a number of terms such "colonel" and "yacht." As a result, such atypical associations may present challenges, sometimes resulting in inaccurate pronunciation. Conversely, word reading efficiency pertains to the ability to articulate textively with both swiftness and precision (Fuchs et al., 2001). Precious to the efficient and precise execution of word reading assignments is word identification in particular (Torgesen et al., 1999). In essence, word reading pertains to the ability to promptly and accurately identify items from the lexicon (Caravolas, 2017; J.P. Das Centre on Developmental and Learning Disabilities, 2011). It relates to the correctness of word reading; according to Caravolas, it derives from the decoding abilities of early learners, which require them to build associations between letters and sounds and mix them in order to correctly pronounce supplied words. Based on the correlation between difficulties with word reading accuracy and reading efficiency, arduous or sluggish reading would result. In brief, the evaluation of word reading skills encompasses two facets: efficiency, which

pertains to the swift and correct reading or pronunciation of words, and accuracy, which emphasizes precise decoding and pronunciation.

Reading-aloud activities are recommended to evaluate word reading skills, as their outcomes are more readily interpretable than silent reading tasks (Sprenger-Charolles, 2003). Their word reading skills are specifically assessed using a set of isolated words (Carter et al., 2015). Nevertheless, in light of their distinct areas of emphasis, word reading efficiency and accuracy are evaluated in various ways. To further elaborate, young learners must read lexical items of increasing difficulty, unfamiliarity, and larger syllables throughout the test to determine their word reading accuracy (Fuchs et al., 2001; J.P. Das Centre on Developmental and Learning Disabilities, 2011). In contrast to previous assessments that prioritized reading time or meaning (Coltheart, 1978), this evaluation method emphasizes the number of words read precisely, ensuring proper pronunciation and stress (Constantinidou & Rhona Stainthorp, 2009). As a result, scores are determined by the proportion of correctly pronounced words.

Nevertheless, word reading efficiency is evaluated before both speed and duration. Significantly, the students are instructed to rapidly and accurately read aloud a specified number of words from a given list within a restricted time frame. The words in the list will progressively grow in difficulty and syllabic length, encompassing both monosyllable and multi-syllable options (J.P. Das Centre on Developmental and Learning Disabilities, 2011; Ricketts et al., 2016). In contrast to its alternative, this mode of evaluation assigns points based on the number of words read accurately within a designated time frame, such as thirty to forty-five seconds (e.g., Ricketts et al., 2016) and one minute (e.g., Huettig & Brouwer, 2015). A concise summary reveals that the scoring and emphasis for measuring word reading accuracy and efficiency are distinct. The former focuses on accuracy and assigns points based on the number of words read correctly. In contrast, the latter prioritizes rapidity and determines scores by counting the number of words learners can read correctly within designated time periods.

Although the focus feature and scoring criteria may vary, the evaluation of word reading proficiency encompasses both accuracy and efficiency. This is achieved by utilizing a list of unrelated words. Word lists generally consist of two distinct

categories: non-words and actual words (Wood et al., 2023). Actual terms in the target language, including is, up, and cat, are included in the former (Zoski, 2015). This list has both a graded and a high-frequency wordlist (Chiappe, 2006). The graded wordlist organizes lexical elements according to their difficulty and syllabic length. Several tests, like the Word Identification test and the Single Word Efficiency test (Torgesen et al., 1999), have utilized this type of actual wordlist (Woodcock, 2011). It often commences with simple ones, characterized by short syllables and prevalence, and culminates with challenging ones, which possess longer syllables and are less frequent (Fuchs et al., 2001).

Conversely, the high-frequency word list comprises lexical elements with a significantly high-frequency rate (Seymour et al., 2003). These terms are extracted from the textbook the students in Grade 1 used. Therefore, the students are expected to be able to identify these words due to their potential familiarity with the wordlist. By evaluating the learners' familiarity with the given words, the correctness of the assessment may be determined using the genuine wordlist. Additionally, the high-frequency wordlist can be utilized to measure the learners' comprehension or acquisition of the words in their textbook (Chiappe, 2006).

A list of non-words, also known as pseudowords, comprises fictitious or nonsensical terms devoid of definitions, such as ip, ga, and ko, in addition to the actual wordlist (Zoski, 2015). These non-target language terms, such as "meeb," which conform to the syllable structure and phonotactic and orthotactic principles, are absent (Wood et al., 2023). They are produced artificially and thus can be considered a more advantageous option. The words in this list, akin to the actual word list, can be organized based on their escalating syllable count and level of complexity (Chiappe, 2006). The Phonemic Decoding Efficiency test is one example of an evaluation tool that has implemented this wordlist format (Wagner et al., 1999).

Given that the words comprising the list are inherently foreign, the ability to decode them is essential for recognizing the printed words (Hoover & Tunmer, 1993). The evaluation of word reading through the non-word list is predicated not on recognition or familiarity but on decoding abilities, as opposed to the actual word list. One can

ascertain word reading proficiencies, including phonetic decoding abilities and sound-letter correspondences, by employing non-word lists.

Thus, it can be concluded that the assessment of word reading skills consists of accuracy and efficiency. Both types of evaluation are usually implemented through a reading-aloud task. Specifically, a real wordlist and a non-word list are employed in both assessment forms. Hence, the selection of assessment methods should be based on the aim of the assessment, i.e. accuracy or speed, so that it can measure the young learners' word reading skills effectively and point out further what can be achieved to strengthen their skills.

2.3 Digital Flashcards

Regarding language acquisition, media is crucial in instructing youngsters in English. Indeed, they have the potential to facilitate the teaching process, enhance information transmission, and captivate learners' attention (Muhyiddin, 2019). Consequently, they can facilitate knowledge acquisition and skills development within this cohort of learners. Moreover, integrating these materials into pedagogy may foster a more stimulating learning environment (Astuti & Chandra, 2023), bolstering students' drive. An extensive array of media can be included in pedagogy, including visual media such as flashcards, graphics, and flipcharts. Flashcards are commonly used in English instruction, among numerous other visual media. Flashcards, first proposed by brain surgeon Glenn Doman, consist of cards that contain words or sentences, often accompanied by graphics (Kusumawardhani, 2019). Typically, they are produced using visually pleasing hues and an assortment of depictions, including fruits, animals, and other occupations. Typically, young learners are introduced to the cards as each word or sentence is spoken aloud. Due to their aesthetically pleasing form and straightforward application, flashcards have emerged as a prevalent visual medium utilized in educational settings (Sinurat, 2022).

Digital flashcards are closely linked to the multimedia learning approach as they leverage various forms of media to enhance the learning process. According to the cognitive theory of multimedia learning by Mayer (2009), the integration of text and visuals can lead to better comprehension and retention of information. Digital flashcards often incorporate images, videos, and audio clips alongside text, providing

a multi-sensory learning experience that caters to different learning styles. This multimedia approach not only makes the learning material more engaging but also increases the likelihood of information being encoded into long-term memory. By offering interactive features and personalized content creation, digital flashcards align with the principles of active learning and cognitive engagement emphasized in the multimedia learning theory. The visual and interactive nature of digital flashcards allows learners to engage with the material in a more dynamic way, leading to improved learning outcomes (Mayer, R. E. (2009). Multimedia Learning (2nd ed.). Cambridge University Press).

Flashcards have changed and become more adaptable with the introduction of technology and innovation (Gardner, 2013). The progression of technology has specifically resulted in the digitization of conventional flashcards, giving rise to an innovative variant known as digital flashcards, computer flashcards, or electronic flashcards (e-flashcards). Research has demonstrated that these flashcards are more effective than their traditional counterparts (Nakata, 2008). Digital flashcards, which have animations intended to convey information and sounds to aid comprehension, are a technology-based learning resource (Lubis et al., 2022). Quizlet and Anki are among the digital flashcards that students may now more easily access due to the increasing affordability and availability of the Internet, laptops, and cellphones (Dizon & Tang, 2017).

Digital flashcards are increasingly being utilized as an alternative to traditional or paper flashcards (Zung et al., 2022). Digital flashcards have been designed to replicate the functionality of traditional paper flashcards (Green & Bailey, 2010). Whether in paper or digital format, flashcards are widely regarded as an effective method for individuals to retain or commit to memory a wide range of topics. These subjects encompass mathematical principles, biological or economic mechanisms, musical patterns, historical events, lexical items, and medical or legal terminology (Colbran et al., 2015). They have been demonstrated to enhance four English language skills—reading, listening, speaking, and writing—during instruction (Muhyiddin, 2019). In particular, they can foster many abilities, including spelling, vocabulary, and pronunciation (Muhyiddin, 2019).

Moreover, they can aid young learners in the acquisition of letter shapes and sounds (Wen et al., 2020). Furthermore, they facilitate the improvement of numerous learning facets for students, including the growth of memory, recall, and the expansion of lexical storage (Colbran et al., 2014; Predani et al., 2022). Consequently, in a nutshell, digital flashcards are flashcards that incorporate animated visuals and sounds and are based on technology. Their capabilities are almost identical to those of traditional paper flashcards; that is, they can aid in developing language skills, including recall, memory, vocabulary, and spelling.

Regarding design, regular paper and digital flashcards are comparable in some ways. Following the findings of Colbran et al. (2014), the conventional configuration of flashcards has a front and back. The front of the document contains information, including a question, exercise, specific word, or idea. The reverse side of the document has the response, definition, translation, or explanation of the given concept (Zung et al., 2022). Additionally, the flashcards may include an image or graphic that communicates information about several facets, like subjects, behaviors, or individuals (Astuti & Chandra, 2023).

In addition, the flashcard's content or material may be modified in accordance with the skill level of the learners, which may be categorized as basic, intermediate, or advanced (Erviana & Andriani, 2019). They exhibit physical or concrete attributes, which may facilitate the elucidation of the subject matter or notion under consideration. This design encourages learners to assess their comprehension or memory by having them recollect the material on the back after reading the offered prompt, enabling them to obtain immediate feedback (Cobran et al., 2014). Hence, akin to conventional paper flashcards, digital flashcards are constructed in a two-sided fashion wherein the response or clarification to the question appears on the reverse side of carrying a prompt presented in diverse formats.

Digital flashcards are distinct from their analogous counterparts in specific ways, although they have the same construction attributes. Conventional paper flashcards are constructed by hand using an image and a sheet of paper. Unlike traditional flashcards, they are produced in an electronic version to facilitate use on electronic devices. They are created, stored, and employed using computer software, mobile applications, or websites while in this format (Zung et al., 2022). To illustrate, Quizlet, a program that

facilitates the development of digital flashcards, permits them modification, access, and creation from any location or time via the application or website and online accessible on any connected device (Ashcroft et al., 2018; Lubis et al., 2022). Lubis et al. further argue that the availability of many digital flashcard platforms enables students to customise the use of flashcards they generate or import.

Additionally, it should be noted that traditional paper flashcards predominantly comprise a word and an image as their constituent parts. In contrast, the latter are augmented in scope. Digital flashcards provide animated pictures, visuals, audio pronunciation, game-based activities, and many interactive features in addition to the components mentioned earlier (Cobran et al., 2014; Ho & Kawaguchi, 2021; Serfaty, 2019). Learners will be able to interact with the audiovisual material in a more engaging setting facilitated by including these components. This would enhance the ambience of the learning environment.

As previously mentioned, it can be inferred that the format and incorporation of components distinguish conventional paper flashcards from digital flashcards in design. Digital flashcards are generated, stored, and accessible via websites or applications on connected devices, as opposed to traditional paper flashcards. Indeed, they are not limited to conventional components such as text and images; instead, they are expanded to include interactive aspects such as those found in video games, animation, and audio. In light of these distinctions, they can be considered an advanced variant of flashcards.

2.3.1 Advantages of Digital Flashcards

Regardless of the type (traditional paper or digital flashcards), flashcards are considered a learning tool. Notably, digital flashcards provide some benefits that are also present in their analog version. Flashcards can assist students in broadening their lexical resources and learning or revising grammatical structure, as Haycraft (1978) noted. Moreover, due to their compact dimensions, they can be employed in any setting, both within and outside the educational institution, to review or study unknown terminology. Additionally, the incorporation of colors and drawings into the flashcards has the potential to engage the learners. In addition to aiding in the development of memorization and active recall, they enable students to assess their

comprehension of any subject matter, which may result in self-correction due to the promptness of the feedback (Colbran et al., 2014). However, upon further examination of the potential advantages, it becomes apparent that digital flashcards offer many benefits that may surpass traditional paper flashcards. Utilizing digital flashcards, such as Quizlet, can initially promote participation (Wright, 2016).

Animations, games, audio, and video can be added to digital flashcards (Nakata, 2020). These aspects are explained through audiovisual input and allow self-testing through gamification. Interactive multimedia can enhance learning (Predani et al., 2022). Pronunciation is another benefit of digital flashcards. Text-to-speech technology lets students hear word pronunciations (Ho & Kawaguchi, 2021). They can recognize the correct pronunciation and read the word. Digital flashcards like Quizlet or Anki have more features than their counterparts. They allow data analytics, flashcard customization, card deletion or retention, games and practice questions, and learning progress tracking (Colbran et al., 2015; Nakata, 2020; Zung et al., 2022). Thus, this allows for capabilities and engagement with linguistic input that standard paper flashcards cannot (Martinez & Schmitt, 2010), giving learners more flexibility to build learning experiences to suit their tastes and maximize this learning resource.

For easier access and sharing, digital flashcards are available. They can be accessible via smartphones, tablets, or laptops for revision or learning at any time and place (Lubis et al., 2022) and shared with other learners easily (Colbran et al., 2015). Learners can record new words while travelling and learn them later (Serfaty, 2019). Digital flashcards also worked in previous trials. In particular, Miyakoshi (2009) examined how Quizlet and paper flashcards affected reading comprehension. A study indicated that digital flashcards improved results. Digital flashcards improved reading comprehension more than paper ones. In addition, Kerdmuenwai (2018) contrasted digital and traditional flashcards for vocabulary learning. Digital flashcards showed better vocabulary improvement than interactive technology. Ashcroft et al. (2016) compared digital and paper flashcards for vocabulary learning. It revealed that digital flashcards improved vocabulary. This sound effect may be due to the digital flashcard platform's activities and learning progress control.

Based on those mentioned earlier, it can be inferred that digital flashcards offer a substantial array of advantages that might be absent in their analogous format, paper flashcards. To summarize, this type of flashcard facilitates enhanced interactivity by incorporating diverse multimedia elements, offers pronunciation capabilities via audio input generated by the technology, provides a range of functionalities, including performance tracking and spaced repetition systems, and is conveniently accessible. In conclusion, earlier research has demonstrated the benefits of digital flashcards for language acquisition, including vocabulary and reading comprehension.

2.3.2 Disadvantages of Digital Flashcards

Despite offering several benefits, digital flashcards possess a few intrinsic drawbacks. Specifically, they necessitate technology apparatus such as laptops, smartphones, or tablets (Murray et al., 2018). Notwithstanding the capability of specific digital flashcards to function offline, learners or users must possess such gadgets to utilize them. Consequently, this could lead to disparities in chances for learners and impede their ability to effectively utilize this type of media to advance their learning. Moreover, certain digital flashcard platforms could necessitate an online connection (Lubis et al., 2022). To demonstrate, to utilize the digital flashcard tool Quizlet, students must have internet access. It functions on Android and iOS-powered cellphones and is accessible over the Internet. Therefore, it is impossible to access this program without an internet connection.

Furthermore, it should be noted that not all digital flashcard apps or platforms are offered at no cost. Lubis et al. (2022) indicated that the program Quizlet charges additional subscription fees for premium features, although providing some of them for free. Therefore, to fully utilize the capabilities of digital flashcards, students may be required to make a membership or buy payment to obtain access to all functions. Lastly, removing available functionality from specific programs may impede learning (Zung et al., 2022). Thus, particular learners could prematurely engage in these functionalities, notwithstanding their lack of mastery of the specific subject matter or topic at hand. This could hinder their ability to fully engage in an immersive educational experience. In conclusion, the utilization of digital flashcards is not without its drawbacks, which comprise the need for internet connectivity,

technological equipment, and payment for access to premium services; utilizing these features might adversely impact learning experiences.

2.4 Related Studies

Prior studies have demonstrated that flashcards can be utilized to instruct reading skills, precisely word reading (e.g., Al-Kandari, 2023; Eichstaedt, 2023; Hatiningsih & Adriyati, 2018; Othman & Tahar, 2017; Turnbull, 2017; Warti, 2021). Indeed, research has demonstrated that flashcards have the potential to enhance early reading skills, sight word recognition, and reading comprehension across students of varying proficiency levels, with a particular emphasis on young learners.

Othman and Tahar (2017) found that flashcards improved sight word reading in learning-disabled pupils. Their study examined learning-disabled students' sight word reading competency after using a reading racetrack and flashcards. Both six-year-old preschoolers in the sample exhibited learning disabilities. The intervention included reading tracks and flashcards simultaneously. In one minute, participants were told to read aloud. The number of sight words that read correctly determined performance. Participants read sight words more accurately after the intervention. Sight word reading errors decreased after the intervention. This suggests that flashcards and racetracks may improve young kids' sight word reading.

The study by Turnbull (2017) demonstrates that using digital flashcards to improve word reading skills, specifically sight word reading, yields positive effects. The study aimed to investigate the impact of digital flashcards on students' acquisition of sight words. Three college students who had been diagnosed with intellectual impairment comprised the participants. An evaluation was carried out at various stages—baseline, intervention, maintenance, and generalization—to determine the impact of digital flashcards on the students' sight word reading performance. Word reading accuracy, as measured by the number of words read accurately, comprised the criterion for scoring. The findings demonstrated that the participants' word reading ability improved. However, they demonstrated varying rates of word acquisition per minute. Among all the participants, one individual demonstrated the most significant rate of word acquisition. However, the result showed that children with intellectual handicaps might benefit from using digital flashcards to improve their word-reading abilities.

A study conducted by Hatiningsih and Adriyati demonstrates that the application of flashcards has a similar impact on the early reading abilities of students who struggle with reading (2018). This research endeavour aimed to assess the efficacy of flashcards in improving the early reading abilities of students with reading challenges. Precisely one seventh-grade student meeting the criteria above was intentionally chosen to participate. Akin to two prior investigations, flashcards were utilized as a pedagogical tool in this study, and a comparative assessment of the participant's performance was accomplished via pre-test and post-test. The acquired data were subjected to analysis using both graphical and descriptive approaches. The findings indicated that the individual in question attained a superior post-test score compared to their pre-test score. This finding suggested that using flashcards in learning improved the participant's early reading abilities.

Like the studies above, Warti (2021) discovered that integrating flashcards into sight word training to enhance reading fluency yielded positive results. The primary objective of this study was to investigate the efficacy of flashcards as a tool for improving reading fluency among young learners, with a specific focus on kindergarten children. The sample consisted of four kindergarten pupils, ranging in age from five to six years, with subpar English proficiency. Various methods were utilized to gather the data, including document analysis, pre-test, post-test, observation, and interviews. The data were studied using a qualitative technique, namely constant comparative analysis. All subjects demonstrated superior reading fluency, according to the study. Their reading fluency was comparatively poor before the intervention, which was deemed inadequate. The implementation of flashcards to instruct sight words led to an observed enhancement in the reading proficiency of the participants, specifically in the area of reading fluency.

In the study by Eichstaedt (2023), a similar upward trend is noted in using flashcards to enhance sight word recognition among young learners. The primary objective of this research endeavour was to assess the comparative efficacy of digital flashcards and conventional paper flashcards in facilitating sight word acquisition among second graders. The instruction of ten words via flashcards was chosen. In this context, pupils were instructed to utilize paper and digital flashcards. Regarding the rate of

development, a comparison was made between two varieties of flashcards. An unexpected finding was that both improved the participant's sight word recognition ability. However, the digital flashcards had a marginally greater contribution to improving those skills compared to their counterparts. There is a possibility that the use of digital flashcards could function as a viable tool for enhancing the ability to recognize sight words.

In a similar vein, the impact of flashcards on sight word recognition among young learners, specifically primary school students, was the subject of Al-(2023) Kandari's research. Specifically, fifty primary school pupils participated, twenty-five in the second and third grades. A total of seventeen Dolch sight words were instructed to the second graders, while the third graders were exposed to thirty-seven words via flashcards. The growth of the participants' sight word recognition skills was evaluated by administering a pre-test and post-test. Statistical methods, such as the paired sample t-test, Cohen's d, and Eta Squared equation, were employed to examine the gathered data. According to the findings, significant disparities in sight word recognition were observed among students in grades two and three before and after the introduction of flashcards. More precisely, the implementation of flashcards resulted in a rise in the level of sight word recognition exhibited by these youthful students.

Based on a synthesis of the results obtained from all relevant studies, it is possible to deduce that flashcards have the potential to function as a potent tool in instructing reading proficiencies, specifically early reading and word reading. Moreover, this may serve to reinforce the skills above.

In the Thai setting, extensive research has been conducted about word reading skills (Bhumibhong, 2018; Tasawang, 2022; Wichayut, 2019). However, these studies exclusively examined the impact of instructional methods, such as phonics, on students' word-reading abilities. Although flashcards were utilized as instructional materials, no insights were provided regarding how flashcards contributed to improving word reading skills. The impact of flashcard usage on reading abilities, particularly word recognition, has been the subject of very little research (e.g., Jaisiri,

2013; Junma & Sanboonvej, 2019; Maneechot, 2020; Petchnuy, 2013; Wiriya et al., 2022).

Jaisiri (2013) conducted a study to improve kindergarten kids' English pronunciation abilities with a multimedia learning package that integrated flashcards. The study's sample comprised 18 kindergarten children. The students utilized a multimedia learning package containing alphabet VCDs, phonics-based pronunciation VCDs, flashcards, and the like to improve their pronunciation skills. The efficacy of the multimedia learning package in enhancing the students' pronunciation skills was assessed using a pre-test and post-test. Utilizing descriptive statistics means explicitly and percentages, the data were evaluated. Through the implementation of the created learning package, it was observed that the post-test scores of the participants exceeded their pre-test scores. In addition, the E1/E2 scores achieved by the multimedia learning package surpassed the predetermined standards. This finding suggests that using flashcards and other educational resources might be productive and aid in developing pronunciation abilities among young learners.

Petchnuy (2013) found that young students' English reading improved. This study used sight words and Pictured Me Reading flashcards to assess the word reading skills of grade 3 students with learning difficulties. The study sampled seven grade 3 students with learning impairments using purposive sampling. The pre-test and post-test were used to evaluate students' English word reading skills after sight word and Picture Me Reading instruction. Basic statistics like median, Wilcoxon Matched-pairs signed ranks test, and one-sample median sign test were then applied to the data. The educational strategy improved participants' word reading skills. For instance, their post-test results were much higher than their pre-test scores. This suggests that flashcards can enhance word reading skills and complement the instructional technique.

In the same vein, the research conducted by Junma and Sanboonvej (2019) demonstrated that the implementation of flashcards improved the word-reading skills of elementary school students. The study specifically examined the impact of flashcards on the development of fourth-grade students' reading proficiency in English. PURPOSIVE sampling was utilized to choose the seventeenth-grade

participants. A test, a questionnaire, and flashcards constituted the instruments used in this research. The evaluation of their performance before and following the implementation of flashcard learning was conducted via a test, whilst their contentment with the use of flashcards was ascertained through the administration of a questionnaire. Variance, standard deviation, fundamental statistics, and the t-test were employed to assess the gathered data. Students achieved higher post-test scores than pre-test scores at a statistically significant level of 0.05, indicating improved English word reading skills. Furthermore, this approach to learning was received with the greatest degree of student satisfaction.

The same result was noted in the research conducted by Maneechot (2020), which demonstrated that flashcards improved the word-reading abilities of students. The study investigated the impact of flashcards on the development of word-reading abilities. The sample consisted of eight second-grade pupils, and the research tool comprised a pre-test and post-test. The participants had received phonics education for 12 weeks via flashcards. Before receiving the intervention, the participants demonstrated a comparatively deficient level of word reading proficiency, as indicated by the results. However, after the intervention, there was a substantial improvement in their word reading skills and their capacity to retain the definitions of the words. More precisely, the research demonstrated that a single male student achieved an average score of 93.33 percent on the posttest, in contrast to his pre-test score of 23.33 percent. Analogously, a female student's performance improved upon the posttest; she attained an average score of 86.66 percent, as opposed to her pre-test score of 51.66 percent. This finding demonstrated that their proficiency in word reading increased exponentially due to the implementation of flashcards.

In addition, Wiriya et al. (2022) found that flashcards improved grade 3 studens' reading and writing. Flashcard-based education and student achievement were the study's goals. Purposive sampling selected 20 students. After the session, students took a multiple-choice test to assess both skills. Data analysis included percentage, means, standard deviation, and dependent sample t-test. Participants consistently scored well on class tasks when flashcards were used. They scored higher on the

posttest than the pretest at a.01 significance level. It proved that flashcards helped improve reading and writing.

Research shows that flashcards can improve EFL learners' word-reading skills. Additionally, those studies show that students have positive perceptions toward digital flashcards in improving word reading skills. However, few studies examined how flashcards affected EFL primary school students' word reading skills. There have been few studies on using flashcards to improve word reading. Therefore, the present study aimed to investigate the effectiveness of flashcards in increasing primary school students' word reading skills and their perceptions about their use.

2.5 Chapter Summary

This chapter reviews the articles or documents about word reading skills and flashcards, precisely word reading skills and digital flashcards. The details regarding the research methodology, covering the sample, research instruments, data collection, and data analysis, are discussed in the upcoming chapter.
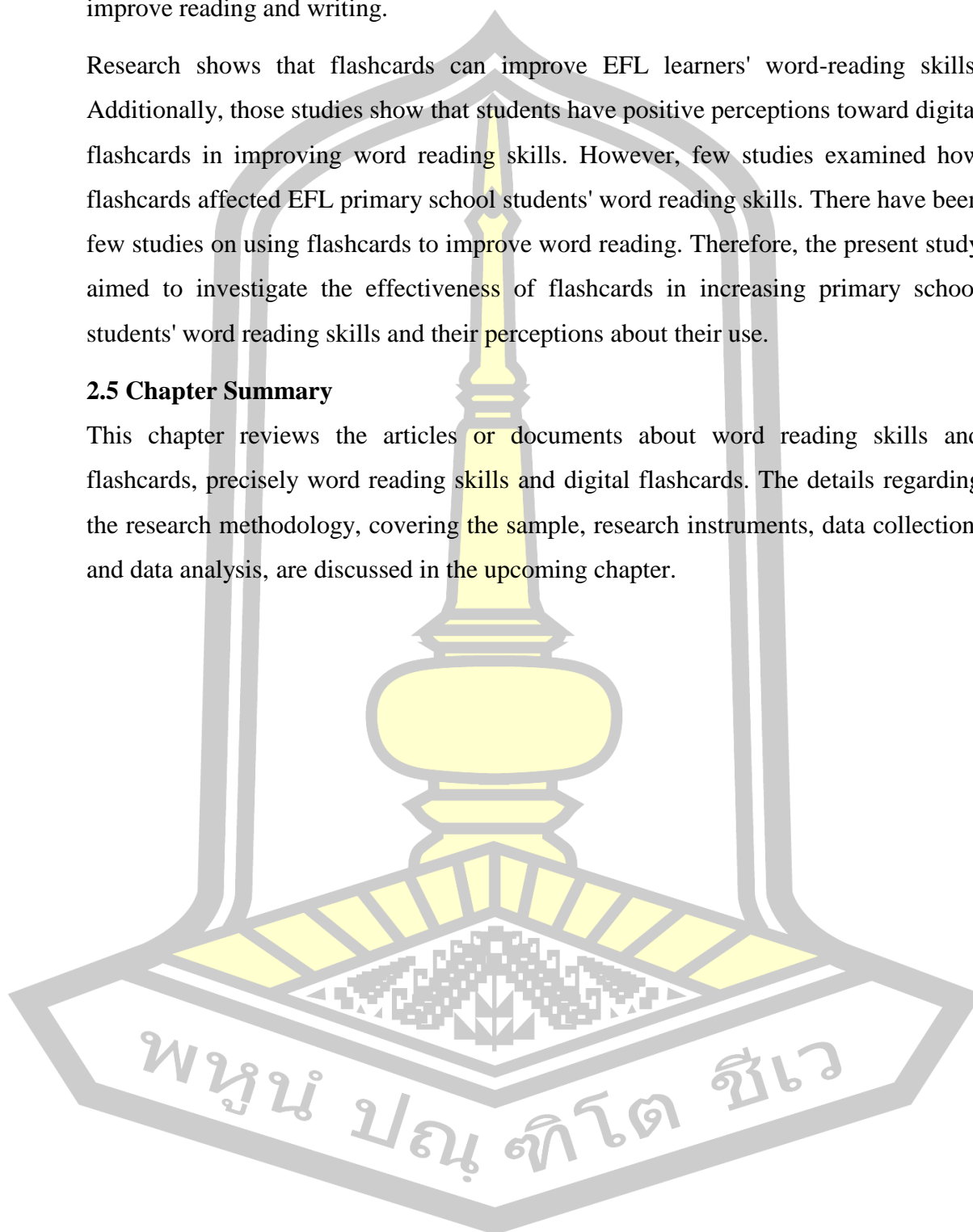
CHAPTER III

RESEARCH METHODS

In this chapter, the technique employed in the study is delineated. It next provides a summary of the study participants and the rationale for their selection, then proceeds to an analysis of the research design. Subsequently, the investigation details the analytical approaches, research instruments, and data collection processes that were utilized. In conclusion, a synopsis of the chapter's material is provided.

3.1 Research Design/Paradigm

The research was conducted through a mixed methods research design to explore the impact of digital flashcards on primary school students' word reading skills. As proposed by Creswell (2014), a mixed-method approach entails using both quantitative and qualitative research methods to obtain and analyze the data. The selection of this approach lies in the fact that it could yield comprehensive insights into any matter since this approach encompasses both the breadth and depth of data (Ivankova & Creswell, 2009). Moreover, considering different approaches have their own shortcomings, the use of various research tools available in each approach could address any potential limitation arising from each tool and, therefore, provide comprehensive data, as pointed out by Creswell (2014).

In the present study, the quantitative approach was drawn on to assess the effectiveness of digital flashcards in improving EFL primary school students' word reading skills. A one-group pretest and posttest and a five-point Likert scale were employed to collect the quantitative data. Their perceptions about the use of digital flashcards for enhancement of word reading skills were explored, followed by a semi-structured interview to obtain the qualitative data to shed light on this issue.

3.2 Participants and Setting

The participants of this study were 19 Thai primary school students, seven female participants and twelve male participants, who were enrolled in an opportunity-extended school in the northeastern region of Thailand and were learning English as a foreign language. Specifically, the participants were grade 6 students. The selection of the participants, whose ages ranged from 11 to 12, was accomplished through the use of an intact class. It had been at least two years since they began learning English as a

foreign language, and they received four hours of English study each week. On the other hand, their English skills were less than satisfactory, particularly in terms of their ability to read words, which was an essential component of reading comprehension. To elaborate, these students were unable to read many English words accurately. In particular, they struggled with reading words with -s/-es endings, so they often found themselves misreading them. Therefore, this underscored that this sample was suitable since their issues with reading words having -s/-es endings, covering /s/, /z/ and /iz/, aligned with the focus of the study.

3.3 Research Instruments

This study used three research instruments to collect the quantitative and qualitative data, namely a word reading pretest and posttest, a perception questionnaire, and a semi-structured interview. The detailed descriptions of individual instruments are provided below:

3.3.1 Word Reading Test (WRT)

The word reading test (WRT) was developed to measure the improvement in participants' word reading before and after the intervention. The test was presented as a wordlist, allowing the participants to read aloud isolated words. Considering that the present study placed emphasis on word reading accuracy, a real wordlist, namely a high-frequency wordlist, was used. The utilization of the high-frequency wordlist would allow for assessing the participants' ability to sound out the target words in their textbook.

Words ending with 's' or 'es' in Chapters 1-8, totaling 558 words, was taught at a pace of 30 words per hour. Additionally, 30 words were selected from the English word reading checklist test in Appendix A. English words were selected from units 1 to 8 of the textbook for Thai grade 6 students, specified in accordance with the Basic Education Core Curriculum B.E. 2008. Initially, words, whether nouns or verbs, with –s/-es endings (/s/, /z/, and /iz/ final sounds) available in the textbook were extracted. Subsequently, the list of these words was piloted with the participants in different groups who stayed in the same context. They were asked to determine whether they had known the particular words in the list or were able to read them. This was achieved by filtering words; simply put, words identified as known or being able to read were removed from the list. Hence, it enabled the researcher to develop the WRT

containing real words with which the participants were unfamiliar and struggled to read.

The reliability and validity of the WRT were determined by three ELT experts. Afterwards, the WRT was revised based on their suggestions. The finalized WRT contained 30 words with -s/-es endings, arranged based on syllabic length and difficulty. The participants were instructed to read aloud each word presented in the list. It should be noted that given the focus of the study on word reading accuracy, time was not the essence of the test; the speed was not focused here. Therefore, scoring was solely based on their reading accuracy.

After developing the two comparable tests, three experts in ELT were asked to determine reliability and validity of the tests. Then, the tests were used with other thirty students whose characteristics were similar to the participants in the main stage. Next, the tests were revised for the actual use in the main stage. Test 1 was used as a word reading pretest whereas Test 2 was used as a word reading posttest.

The total scores were 30 points. As shown in Table 3.2, when the participants were able to read the given item accurately, they were awarded 1 point. Otherwise, they were given 0 (zero) point for any error of word reading.

Table 1 Word reading assessment criteria

Point	Description
1	The ending sound is read correctly.
0	The ending sound is read incorrectly.

The range of scores below was used to determine the levels of the participants' achievement as high, mid and low:

Scores	Levels
21-30	high
11-20	mid
0-10	low

3.3.2 Perception Questionnaire

The five-point Likert scale questionnaire was utilized to delve into the primary school participants' perceptions of using digital flashcards to enhance word reading skills. The questionnaire consisted of fifteen items. Similar to the WRT, the reliability and

validity of the questionnaire were assessed by ELT experts. Subsequently, the research instrument was revised before its implementation.

The objective of the questionnaire was to examine the perceptions of the participants regarding the utilization of digital flashcards as a means to enhance word reading skills. It was written in Thai to ensure the participants' understanding, considering their English proficiency. The questionnaire comprised two main parts; the first part with five items aimed to elicit the participants' demographic data while the other comprising fifteen items was intended to explore how they perceived the usefulness of digital flashcards for improving word reading. Considering that there was only one group of the participants as the experimental group, the questionnaire was exclusively implemented with this sample. It was distributed to these participants once the post-test had been completed. The participants were asked to answer each item through rating scales, ranging from (5) Strongly Agree to (1) Strongly Disagree, as shown below.

Strongly agree	**5**	**points**
Agree	4	points
Disagree	2	points
Neutral	3	points
Strongly disagree	1	point

3.3.3. Semi-Structured Interview

Qualitative information concerning students' opinions on utilizing digital flashcards to enhance their word reading skills was collected via semi-structured interviews involving six students—two from intermediate, two from high, and two from low reading proficiency levels. Open-ended questions were employed in alignment with the research inquiry. The interview was conducted one week after the post-test was completed. Below are sample interview questions that were utilized to assess their perspectives:

- What are your feelings about learning through digital flashcards?
- How do you like learning English words by reading through digital flashcards?

- Do you think digital flashcards could help you read words better? How do they help you read words better?

3.4 Data Collection Procedure

The data collection process occurred at two-month intervals. Initially, participants were given a word reading checklist to complete, where they marked a tick (✓) next to items they knew or could read. Words classified as unknown or unreadable totaled 30 per hour and were subsequently included in both the Word Reading Test (WRT) and the wordlist was used throughout the intervention. Following this, the WRT was administered to participants before the intervention. During the test, each participant was required to read aloud every word presented on the list.

After the pre-test, the intervention was implemented using digital flashcards to enhance word reading skills. Upon completion of the intervention, a post-test was conducted to measure their improvement of word reading skills. Additionally, participants were given a perception questionnaire to gather insights into the effectiveness of digital flashcards in improving word reading. Finally, a semi-structured interview was conducted to delve deeper into the participants. The research methods employed in this study are outlined in Figure 2.

Word reading checklist → Pre-test (WRT) → Digital flashcards → Post-test (WRT) → Survey → Interview
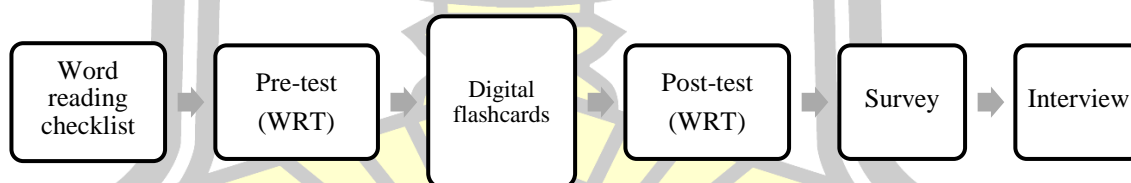
Figure 2 Research procedures

3.5 The Treatment: Digital Flashcards
3.5.1 Choosing Targeted Words

In determining words to be included in the wordlist, words, including nouns and verbs, with -s/-es endings were extracted from the textbook utilized for the sixth-grade English fundamentals course, which was grounded in the Thai basic education core curriculum. To recapitulate, the initial wordlist was piloted with a group of grade 6 students, i.e. non-participants of the study, to remove known words or the words

which the potential participants were able to read. Subsequent to this phase was the assessment of the wordlist by a panel of ELT experts to verify the suitability of the wordlist. Lastly, the wordlist was adjusted based on their recommendations and was further implemented.

3.5.2 Creating digital flashcards

Microsoft PowerPoint was utilized to generate digital flashcards to present every word in the flashcard technique. Two slides were used to illustrate each word. There was an image on the initial slide. The utilization of images has been proposed as a means to enhance learning, specifically for young learners, according to Webber (1978) and other researchers, including Chen (1990), Lotto and De Groot (1998), and Tonzar et al. (2009). The meaning of the English word and its phonetic emphasis were presented on the opposite side of the second slide in Thai. Efforts were made to incorporate animation and sound elements into the flashcards while maintaining their simplicity and appeal. These interactive elements may enable the students to be aware of how each word is accurately read. As proposed by Baddeley, the words were arranged in ascending difficulty to aid students' focus (1990: 52).

Phonological awareness was incorporated into the creation of the flashcards, beginning with the most straightforward unit called phonemic awareness. The digital flashcards, which included phonemic awareness, were one-sided and showed a single image. The pronunciation of the word that corresponded with the image was printed on the backside. Furthermore, a distinct segment of the alphabet was incorporated to serve as an example of phonemic blending, emphasizing how every individual letter unit syntactically formed the phoneme of the word. Additionally, the cards had the corresponding term in the primary language (L1). It was noted that the vocabulary at this juncture was regarded as the most basic due to its monosyllabic structure. The principal objective was to emphasize every alphabet letter and illustrate how they merged. The example of the constructed digital flashcard incorporating phonemic awareness is depicted in Figure 3.
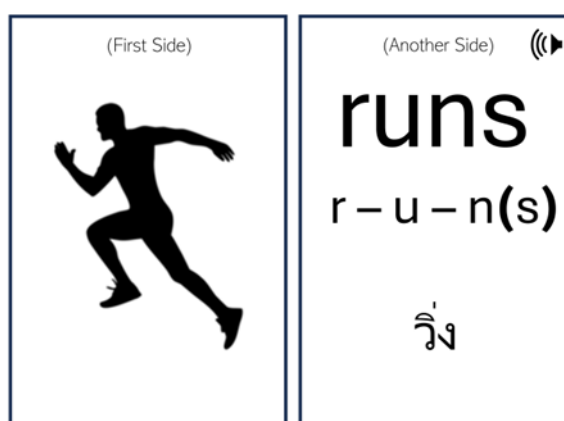
Figure 3 Example of designed digital flashcards integrated with phonemic awareness

An image portraying the word was presented on the first side of the digital flashcards to introduce them to promote onset-rime awareness. The English term, its corresponding phonetic sound, and its corresponding equivalent in the indigenous tongue were presented on the back side of the card (L1). Furthermore, the starting consonant or consonant blend, the vowel, and any ending consonants were graphically represented on the card to distinguish it from the rhyme. The selection of single-syllable words for this phase was to motivate students to memorize the consonant and rhyming group (consonant vowels and final consonants) automatically and accurately pronounce the word within a suitable time span. Incorporated onset-rime awareness is illustrated in Figure 4 as an example of the developed flashcard.
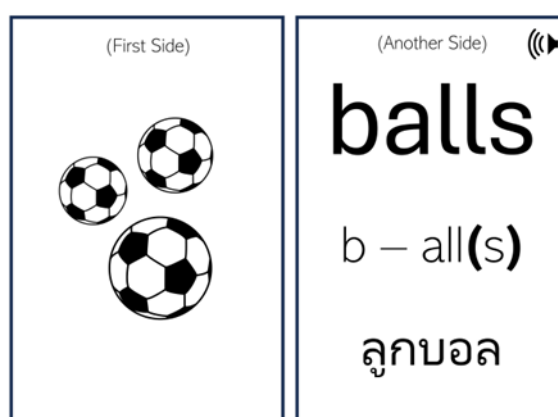
Figure 4 Example of designed digital flashcards integrated with onset-rime awareness

The digital flashcards were modified to incorporate syllable awareness in the following phase. The corresponding term was visually depicted on the front side of the card. Additionally, the digital flashcard featured the deconstructed syllable of the word to identify its number of syllables, the written word, its phonetic sound, and its

meaning in the first language (L1). Vocabulary units with a range of two to four syllables were chosen for this phase. This methodology promoted student engagement in the process of vocalizing vowels of a given word accurately and efficiently to determine its syllable count directly. The suggested flash card incorporating syllable awareness in seen in Figure 5

Figure 5 Example of designed digital flashcards integrated with syllable awareness

The ultimate version of digital flashcards, which is focused on phonological awareness, also incorporates word awareness. As described by Lane et al. (2007), word awareness is the understanding that speech or phrases are composed of individual words functioning as a unit. At this stage, students were especially instructed to read individual words that comprised a sentence. Consistent with prior iterations, the initial facet of the flashcard showcased a graphic depiction. However, the reverse side furnished a four-word sentence with the corresponding phoneme and a rendered statement in the primary language (L1). This methodology aimed to foster the student's capacity to identify and decipher specific vocabulary items in the framework of a complete phrase. Figure 6 functions as a demonstrative instance, exhibiting how word awareness has been integrated into the design of the flashcards. This ultimate phase strengthens phonological cognisance and cultivates the critical ability to discern and comprehend specific words in the broader scheme of spoken language.

Figure 6 Example of designed digital flashcards integrated with word awareness

3.5.3 Utilizing digital flashcards

Digital flashcards constituted the last component of the flashcard approach. This objective was accomplished by using flashcards in which the second language word was displayed on one side, alongside an opportunity for students to recall the word's meaning and sound from memory. One exposure is inadequate for L2 learners to recognize the pronunciation of the words; therefore, the flashcards must be utilized repeatedly. To enhance students' word reading through digital flashcards, they were instructed on several practices: spacing repetitions, emphasizing specific consonants and vowels following their phonological awareness, metalinguistic ability, and employing cards of an appropriate size. Furthermore, learners can attain and maintain the meanings of challenging or unfamiliar words by diverting their attention from familiar words to those that are challenging (Arktison, 1972). In addition, learners were assisted in developing their ability to decode words by emphasizing the correct pronunciation of specific words.

The use of digital flashcards in the classroom environment was carried out over five weeks, with the primary objective of systematically illustrating and underscoring different degrees of intricacy in word reading. The instructional path commenced with a fundamental comprehension of individual letter sounds and advanced towards sets of rhymes, syllables, and word clusters included inside sentences or phrases. The digital flashcards were developed utilizing Microsoft PowerPoint, and the instructional configuration comprised a computer, monitor, LCD projector, and

speakers. The instructor utilized these resources to exhibit visual aids and their associated English vocabulary on the computer screen, thereby enabling the transmission of precise word pronunciations via digital audio. Furthermore, the instructor furnished the definitions of every Thai word. An essential component of the pedagogical strategy entailed a deliberate emphasis on the phonological components illustrated on the flashcards. The students were motivated to participate actively in the activity by examining and verbally expressing the phonological subtleties of the provided words on each flashcard. The educational sessions were conducted twice per week. Ten unfamiliar or non-word words were introduced during each session, followed by a group of ten targeted words. This framework's objective was to give pupils sufficient opportunities for practice by utilizing digital flashcards, thereby strengthening their phonological awareness and word reading skills. Table 2 provides a comprehensive summary of the instructional procedures.

Table 2 Examples of an English word reading checklist test

Stage	Activities	Materials
Warm-up **(2 min)**	The teacher greets students and tells them the topic. The teacher may develop some other interesting materials to grab students' attention based on different topics.	
Presentation **(15 min)**	- The teacher presents the picture with colors on the screen and tells the students to look at it and guess the pronunciation. - The other side of the flashcard is shown afterwards. - The teacher has the students look at the word shown, turn on the pronunciation sound, and then lets them repeat after that. - The teacher emphasizes the phonological awareness feature shown on the card. - The students repeat reading the word(s) aloud so the teacher can check the accuracy. (30 words per hour.)	- Digital flashcards - Speaker - Projector monitor - Computer
Practice **(20 min)**	- The teacher comes up with another set of digital flashcards comprising the unfamiliar words with some similarity in consonants and vowels. - The students must practice reading aloud the words shown in the flashcards and tell the meaning in L1.	- Digital flashcards - Speaker - Projector monitor

	- The teacher guides the students when needed.	- Computer
Production **(10)**	- The students complete the different worksheets based on each topic.	-Worksheets
Wrap-up **(3)**	- The students are asked to write the words they have learned and prepare reading aloud for the teacher in the additional time outside the class.	

After the instruction period of five weeks, every participant completed the word reading assessment as a post-test. By administering direct word instruction using digital flashcards, this study aimed to assess whether or not this intervention significantly improved the overall word reading achievement of the participants. The test was conducted subsequent to the conclusion of the treatment. The participants were awarded one point for each accurate response; wrong answers and similar occurrences did not result in the deduction of any points. Thirty was the maximum possible score.

3.6 Data Analysis

Considering that both quantitative and qualitative data were collected, different analytical methods were used. Descriptive statistics, such as the mean, standard deviation (S.D.) and percentage, were employed to analyze the quantitative data derived from the WRT and the perception questionnaire. Then, t-test analysis and inferential statistics were utilized to determine whether test scores were statistically significant. On the other hand, content analysis was drawn on to analyze the qualitative data obtained from the interview regarding their perception of the efficacy of digital flashcards in improving word reading skills. The interview was transcribed. Using content analysis, the presence of particular words, themes, or concepts in qualitative data (i.e. text) was identified. The themes were created from the data's content. Ultimately, the data were evaluated, and a report was composed to present a persuasive narrative founded on the data analysis. The methodology for the analysis is illustrated in Figure7.
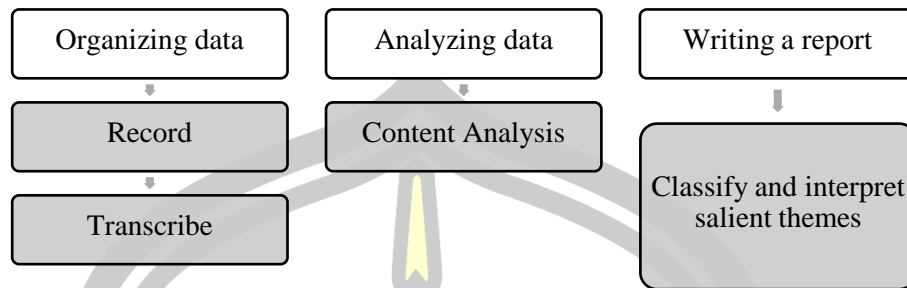
Figure 7 The procedure of the focus group's data analysis

3.7 Summary of the chapter

This chapter provides details of the research methodology adopted in this present study. In particular, it starts from addressing the research design and the participants of the study. Subsequently, research instruments, including the WRT, the perception questionnaire and semi-structured interviews, are described; specifically, this section elaborates on how each instrument is developed. The chapter moves onto providing descriptions on how the data were collected using the research instruments. Finally, the methods of data analysis utilized in this study, namely descriptive statistics and content analysis, are presented.
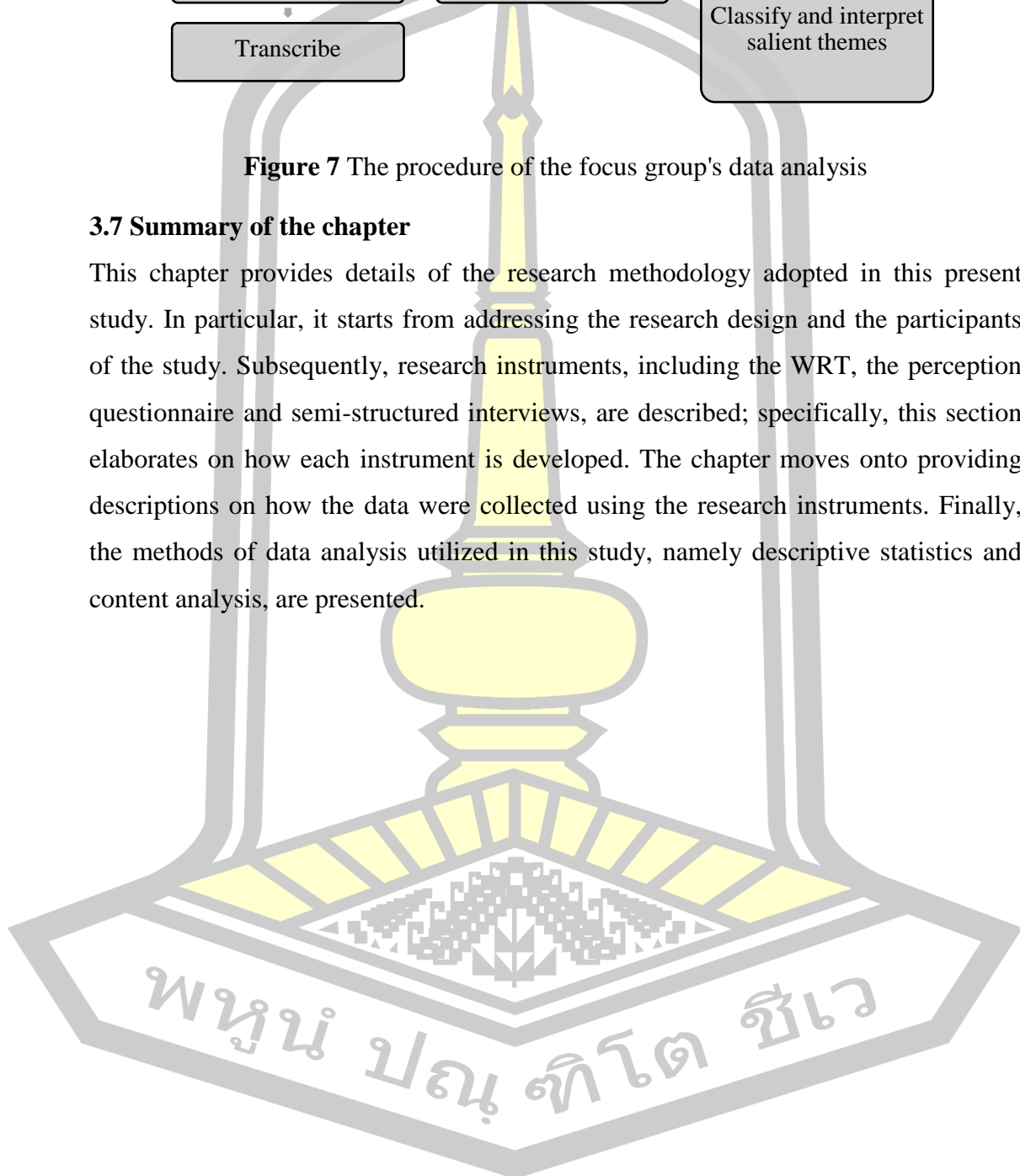
CHAPTER IV
RESULTS

This chapter presents the research results of the study. The first section presents the analyses related to the participants' performance on the Word Reading Test (WRT). The second section presents the students' perceptions of digital flashcards in word reading enhancement. Finally, this section reports the participants' perceptions regarding the implementation of digital flashcards to improve their word reading skills.

4.1 Digital flashcards and word reading ability test in Thai EFL primary students

This section describes how Thai EFL primary students benefit from using digital flashcards. A word reading ability test was conducted to evaluate the elementary students' vocabulary proficiency. The examinations were administered to the students before and after six weeks of digital flashcard-based instruction. Descriptive and inferential statistics were applied to the quantitative data using the Statistical Package for the Social Sciences (SPSS) 26 software. The descriptive statistics comprised skewness, kurtosis, the mean, and standard deviation. For comparative purposes, the raw scores were transformed into percentages. The percentages were utilized in order to compare word reading ability test scores.

Table 1 illustrates the summary of descriptive statistics for the word reading ability tests. The results showed that EFL primary participants' post-test scores were higher than the pretest. Specifically, the primary participants achieved a mean performance of 25.44% on the pretest (SD=2.91) before the learning using digital flashcards, whereas the post-test participants scored a mean performance of 74.04% (SD=2.90). Other relevant information is presented in Table 1. These findings indicate that using digital flashcard training positively affects word reading ability in Thai EFL primary learners.

Table 3 illustrates the summary of descriptive statistics for the word reading ability tests. The results showed that EFL primary participants' post-test scores were higher than the pretest. Specifically, the primary participants achieved a mean performance of 25.44% on the pretest (SD=2.91) before the learning using digital flashcards,

whereas the post-test participants scored a mean performance of 74.04% (SD=2.90). Other relevant information is presented in Table 3.

Table 3 A summary of descriptive statistics of word reading skills test

Time	Min	Max	Mean	(%)	SD	Skewness	Kurtos
Pretest	4	13	7.63	25.44	2.91	0.621	-0.757
Posttest	14	26	22.21	74.04	2.90	-1.367	2.382

Note: N=19

The distribution of scores was also examined for normality. Skewness and kurtosis were found to be normal across two times of tests. As illustrated in Table 3, approximately 95% of case values lie within two standard deviations from the mean. Therefore, there appears to be no violation of the statistical assumption of normal distribution (Larson-Hall, 2016).

Additionally, a paired t-test was conducted to ascertain whether a statistically significant difference was evident between the two-time points for the group. The study results indicate a significant difference between the pair of pretest and posttest scores among Thai EFL primary learners, as presented in Table 2. In other words, the statistical analysis of the performance on the word reading test revealed that the scores obtained from the posttest scores were significantly higher than those obtained from the pretest. The findings indicate that the use of digital flashcards has an impact on the improvement and acquisition of word reading skills among primary school students.

Table 4 Comparisons between pretest and posttest

	Test			t-test	Sig
Word reading ability	Pretest	VS	Post-test	13.572	.000*

*Note: N=19; *Significant at the 0.05 level (p<0.05)*

4.2 Thai primary school students' perception of using digital flashcards to enhance word reading ability

4.2.1 Quantitative results of students' perceptions of digital flashcards in word reading enhancement

In order to gather data about Thai primary school students' perceptions concerning the efficacy of digital flashcards in improving word reading skills, a five-point Likert scale questionnaire was employed to address Research Question 2 (RQ2). The fifteen-item Likert scale survey aimed to determine how the participants viewed the usage of digital flashcards for word reading instruction in the classroom. Descriptive statistics such as means, percentages, and standard deviations were utilized to present the results.

Students' perspectives on the use of digital flashcards to improve word reading are presented in Table 3. The findings revealed that the participants received the highest ranking possible, between 79.38 percent and 4.39 with a standard deviation of 0.43. A significant degree of consensus was expressed by the participants regarding the efficacy of digital flashcards in improving their word reading skills. These findings support the notion that digital flashcards are beneficial for teaching and learning English, as demonstrated by prior research (Yowaboot & Sukying, 2022).

According to the analysis of the results, Item 7 received the highest score from the participants, suggesting that the use of digital flashcards could enhance the enjoyment of the reading class (97.2 percent). Subsequently, Items 2 and 9 of the five-point Likert scale questionnaire revealed that 94.8 percent of respondents agreed. the participants specifically remarked that word reading activities facilitated by digital flashcards were beneficial (Item 2). The participants who actively participated reported that they also found word reading activities with digital flashcards to be enjoyable (see Item 9). Item 10 was another remark that garnered a significantly high percentage of agreement (88.57 percent). Thus, the participants delighted in the process of reading unfamiliar words through the designated electronic device activity (digital flashcards).

Table 5 The descriptive statistics of students' perceptions towards using digital flashcards to enhance word reading ability

Items	Statements	x̄	S.D.	%	Meaning
1	Word reading classes in which digital flashcards were practical.	4.05	0.23	81.00	high
2	Using digital flashcards in word reading classes was useful.	4.74	0.37	94.80	very high
3	Using digital flashcards helps me improve word reading.	4.34	0.37	86.80	high
4	Digital flashcards assist me in remembering to read the words.	4.26	0.37	85.20	high
5	Using digital flashcards does not help me understand word reading better.	1.63	0.60	32.60	low
6	The pictures in digital flashcards help me read a word better.	4.09	0.42	81.80	high
7	Using digital flashcards in word reading classes was fun.	4.86	0.50	97.20	very high
8	I feel motivated to use digital flashcards to learn to read the words.	4.32	0.48	86.40	high
9	I enjoy using digital flashcards to learn word reading.	4.74	0.46	94.80	very high
11	I feel much better when I use digital flashcards to learn word reading.	4.00	0.00	80.00	high
10	I enjoy learning word reading through digital flashcards from electronic devices.	4.79	0.32	88.57	very high
12	Digital flashcards make me interested in learning	4.02	0.65	80.40	high
13	I want to practice reading the word more often.	3.85	0.77	77.00	high
14	I want to continue learning reading using digital flashcards.	3.78	0.67	75.60	high
15	Digital flashcards encourage me to read the words more often	3.59	0.47	71.80	high
	Total	**4.12**	**0.43**	**82.40**	High

Note: N=19

With the exclusion of Item 5, the participants ls expressed a high degree of agreement with the remaining statements. Before the aggregate mean score of the surveys could be calculated, the negative comment in Item 5 was ultimately retracted. The statement (Item 5) demonstrated that many participants agreed that the digital flashcards facilitated their development and learning of word reading. Supplementary pertinent data is shown in Table 3.

4.2.2 Qualitative results of students' perceptions of digital flashcards in word reading enhancement

This section presents the participants' perceptions and emotions regarding using digital flashcards to learn how to read words (i.e., word reading). The findings are derived from the qualitative depiction and analysis of the six individuals who were intentionally chosen to participate in the focus group interview. The selected participants were categorized according to their performance on the word reading exam. Students (LR) who scored below 50 percent on the word reading exam were classified as having low proficiency in reading. Conversely, students (HR) who achieved a score of 50 percent or higher were judged to have good proficiency in reading.

Through the development of themes derived from classroom interactions, the current study characterized the students perceptions. The themes found in the focus-group interview are displayed in Table 4. Further, the term "benefit" refers to the participant's perception of the benefits of reading words using digital flashcards in an English as a Foreign Language (EFL) environment during the research. In the study, the term "learning environment" pertains to the specific setting that fosters favorable attitudes among students toward acquiring word reading tasks. Empathy, which motivates or pushes students to continue learning, is a component of "engagement."

Table 6 The salient themes for qualitative data analysis

Themes	Salient characteristics
Benefit	useful, helpful, practical, improve, help, develop
Learning environment	fun, inviting, motivated, happy, relaxing, laughing
Engagement	need more, collaborate, encourage, group, team, cooperate, engage

Table 6 displays the replies provided by the participants regarding the theme of "usefulness." The table presents the perspectives of the participants regarding the perceived advantages of utilizing digital flashcards as a means to improve word reading skills in English language classes. Each of the six participants agreed that digital flashcards were a practical tool for classroom exercises and enhanced their

reading ability. Such results demonstrate the significance of digital flashcards in word learning (Nation, 2023; Yowaboot & Sukying, 2022).

Table 7 Participants' responses to the theme of 'benefit'

Participants	Statement or responses
LR1	*I think it is very easy and useful to read a new word from the digital flashcard.*
LR2	*The flashcards helped me improve my word reading.*
LR3	*Digital flashcard! I think it is very helpful.*
HR1	*I think using digital flashcards is a good way to learn word reading.*
HR2	*The pictures in the digital flashcards help me remember and make it easy for me to follow and repeat the word out loud.*
HR3	*Ummm…. I like the pictures and sounds in the digital flashcards used in my English class. So, I think it's very useful for me.*

The learning environment was another theme that surfaced from the focus group interviews. Every participant commented that the digital flashcard created an enjoyable and positive learning environment. The participants' responses to the six examples pertaining to the learning environment and the use of digital flashcards to enhance word reading skills are summarized in Table 7.

Table 8 Participants' responses to the theme of 'learning environment'

Participants	Statement or responses
LR1	*I liked the images of the digital flashcards because they were attractive and inviting.*
LR2	*The flashcards made fun, and I enjoyed learning.*
LR3	*I don't know. Umm…I just like it, teacher! I like pictures, music and flashcards.*
HR1	*I enjoyed repeating the digital pictures in the PowerPoint. Sometimes, I laughed when it talked. It was funny. Like it, Khun Kroo (teacher in English).*
HR2	*My friends and I like flashcards. It helped us read better and confidently.*
HR3	*Flashcards were motivating and made me fun, and I read the words with confidence, I think.*

The participants' responses to the theme of "engagement" are presented in Table 8. The examination of the qualitative data revealed that among the six participants, utilizing digital flashcards developed by their English instructor to supplement word reading activities was their favored method. Every participant stated that digital flashcards captivated their interest in the English class and inspired them to learn and

participate actively. The responses of a subset of the participants to the notion of "engagement" are presented in Table 8.

Table 9 Participants' responses to the theme of 'engagement.'

Participants	Statement or responses
LR1	*I liked the images of the flashcard, and I wanted the teacher to use it more often.*
LR2	*I liked to join my friends in guessing the answer.*
LR3	*I am more confident in talking and read loudly.*
HR1	*I like the sound of the flashcard. It was beautiful. So, I wanted to practice more to read like it sounded.*
HR2	*I wanted to help my team get the point, so I talked more.*
HR3	*I think my friends talked more, Khun Kroo. I think it is because of the digital flashcard.*

The qualitative findings were further corroborated by the examination of the quantitative results, which indicated that the word reading skills of the participants had improved. In addition, the results underscored the significance of digital flashcards in fostering proficiency in word reading. Furthermore, implementing digital flashcards enabled a greater sense of collaboration among the participants within the EFL classroom's physical boundaries. Consensus was reached in the present study about the efficacy of digital flashcards in facilitating language growth and learning (Nation, 2022; Yowaboot & Sukying, 2022).

4.3 Chapter Summary

This chapter provides an overview of the study's main findings. With more precision, the chapter details the quantitative findings concerning digital flashcards' impact on improving Thai primary school students' word reading skills. Furthermore, the qualitative findings enhance the quantitative results by providing perceptive information obtained from the semi-structured interview. These findings will be discussed in the following chapter in the context of English as a foreign language and with the conceptual framework and prior, existing literature.

CHAPTER V

DISCUSSIONS AND CONCLUSION

This chapter provides explanations and discusses the findings of the study. Overall, the results of this study demonstrate the effect of digital flashcards on Thai primary learners' word reading skills. This chapter concludes with implications for English word reading instruction through digital flashcards and recommendations for future studies.

5.1 Digital flashcards and word reading ability in Thai EFL primary students

The present study investigated the effect of digital flashcards on the improvement of Thai EFL primary school learners' word reading. Here, digital flashcards are described as a tool for learning word reading. It was hypothesized that digital flashcards could enhance students' word reading and development among primary school students. In order to address the research questions, one measure (i.e., the Word Reading Test (WRT)) was created and piloted before the main study. The findings showed significant effects of digital flashcards on word reading in Thai primary school students. These findings are consistent with previous results (Colbran et al., 2014; Predani et al., 2022), indicating that multimedia, namely visuals, sounds, and texts, are useful for word reading (Astuti & Chandra, 2023; Nation, 2022; Yowaboot & Sukying, 2022).

Regarding the findings, the improvement in participants' word reading skills could be attributed to the visual components. This aligns with previous studies indicating the usefulness of visuals in developing word reading ability (Astuti & Chandra, 2023; Kusumawardhani, 2019; Sinurat, 2022). Astuti & Chandra (2023) found that flashcards containing images or graphics that convey information about various subjects, behaviors, or individuals could be beneficial for developing word reading skills. Moreover, Kusumawardhani (2019) observed that these flashcards are typically designed using visually appealing colors and a variety of illustrations, such as fruits, animals, and different occupations. Young learners are typically introduced to these cards while each word or sentence is spoken aloud. Sinurat (2022) also found that young learners benefit from being introduced to the cards while each word or sentence is spoken aloud. Due to their aesthetically pleasing design and

straightforward application, flashcards have become a popular visual medium used in educational settings.

Utilizing visuals can improve understanding and memory recall. Digital flashcards frequently integrate images, videos, and audio elements alongside text, offering a multi-sensory learning opportunity that accommodates diverse learning preferences. This multimedia method not only enhances the appeal of learning materials but also enhances the likelihood of information being retained in long-term memory. For instance, images process visible objects. ST1 (LR1) stated that images in digital flashcards captivated his interest in the English class and inspired him to learn and participate actively. Furthermore, incorporating these resources into teaching methods might cultivate a more engaging educational setting, enhancing students' motivation. Kusumawardhani (2019) suggests that the use of visuals may provide an advantage in teaching word reading to young learners due to its ability to grab learners' attention and increase the likelihood of information being retained in long-term memory.

Apart from visual elements, sound in multimedia also plays a significant role in improving word ability. According to Mayer's cognitive theory of multimedia learning (2009), combining text with visuals enhances understanding and memory retention. Digital flashcards commonly include images, videos, and audio alongside text, offering a multi-sensory learning experience suitable for diverse learning styles. This multimedia method not only enhances engagement with the material but also improves the chances of encoding information into long-term memory. ST2 (LR2) stated that she liked digital flashcards and wished the teacher would use them more often. Additionally, the findings emphasized the importance of digital flashcards in enhancing word reading skills. Moreover, using digital flashcards encouraged increased collaboration among participants within the confines of the EFL classroom. The current study yielded agreement on the effectiveness of digital flashcards in supporting language development and learning (Nation, 2022; Yowaboot & Sukying, 2022).

In communication, there are two channels used to process information: the auditory and visual channels. The auditory channel processes information in the form of

sounds, while the visual channel processes visible objects. Both the visual and auditory channels process incoming multimedia information, which is then transferred to sensory memory before moving to working memory. In working memory, information is selected, organized, and integrated, leading to positive learning outcomes in long-term memory, especially when connected with prior knowledge.

The value of intentional learning practices could explain the effectiveness of digital flashcards in bolstering word reading skills. Central to this approach is the concept of focused repetition and memorization strategies, which are integral to the process of acquiring new vocabulary. Digital flashcards, by their very design, facilitate such targeted, conscious engagement with word reading, enabling learners to engage deeply with the material in a manner that promotes better retention and recall. This methodological approach to learning, where students actively participate in their educational process, enhances the effectiveness of vocabulary acquisition. The efficacy of digital flashcards over traditional paper-based counterparts is highlighted, suggesting that the digital medium offers advantages that can significantly improve word reading skills. These advantages likely stem from the interactive features of digital flashcards, such as multimedia elements, immediate feedback, and the ability to customize learning experiences to meet individual needs and preferences. The findings of this study align with existing literature, reinforcing the argument that deliberate efforts to enhance word reading skills through tools like digital flashcards are not only effective but also a practical approach to language learning (Bhumibhong, 2018; Tasawang, 2022; Wichayut, 2019).

In conclusion, multimedia learning aids students in learning more effectively because they are more engaged in processing information. Additionally, it adds an element of fun to learning activities as students find the materials interesting and engaging.

5.2 Thai primary school students' perception of using digital flashcards to enhance word reading ability

The study on primary school students' perceptions of using digital flashcards to enhance word reading skills offers insightful findings into this tool's educational value. The quantitative analyses reveal that students show their perceptions toward the digital flashcards at high level, particularly appreciating their role in facilitating rote

word skills. This positive perception can be attributed to the simplicity of digital flashcards, making them an accessible and straightforward method for practicing word reading skills. Despite the inherent decontextualization of flashcard learning, which might detach words from their natural usage in sentences or narratives, flashcards are acknowledged as an effective mechanism for word reading. They are recognized for prompting quick improvements in word reading ability and memory retention, likely contributing to the students' reported satisfaction.

The advantages of digital flashcards, such as their efficacy, ubiquity, and entertainment value, play a significant role in accelerating deliberate word reading skills among Thai primary school students. Incorporating visual images and sounds enriches the learning experience, providing motivation and aiding in understanding the meaning and spelling of words. Furthermore, the use of flashcards supports effective memorization and recall of word reading items, enhancing students' language acquisition process.

These current findings reinforce the assertion made by previous literature that digital flashcards are a potent tool for improving deliberate word reading ability (Al-Kandari, 2023; Eichstaedt, 2023; Hatiningsih & Adriyati, 2018). As reported by the students, the positive perceptions towards digital flashcards underscore the importance of engaging, interactive learning tools in educational settings. Digital flashcards serve as a method for word reading enhancement students' enjoyment and engagement with the learning material. This combination of educational effectiveness and motivational appeal highlights the value of digital flashcards in language education, particularly for primary school students navigating the initial stages of reading and vocabulary development.

The current study effectively combines qualitative and quantitative methodologies to explore the impact of digital flashcards on word reading proficiency among Thai primary school students. The quantitative results provide robust evidence of improved word reading skills, reinforcing the qualitative findings that highlight the significant role of digital flashcards in enhancing word reading skills. This dual approach underscores the effectiveness of digital flashcards not only in bolstering word reading skills and fostering a collaborative learning environment within the confines of the

EFL classroom. The consensus among researchers supports the notion that digital flashcards are a valuable tool for language growth, echoing the sentiments of previous studies (Nation, 2022; Yowaboot & Sukying, 2022).

In delving into the qualitative findings, the study identifies vital themes from classroom interactions and focus-group interviews, namely "benefit," "learning environment," and "engagement." These themes offer insights into the students' perceptions and experiences with digital flashcards in an EFL setting.

The study on the use of digital flashcards in Thai primary English language classes highlights significant benefits as perceived by the students, encompassing improved word reading skills, a more enjoyable learning environment, and increased engagement. The theme of "benefit" underscores the students' recognition of digital flashcards as an effective tool for enhancing their vocabulary and reading skills, pointing to the direct impact of these tools on language acquisition. Regarding the "learning environment," participants reported that digital flashcards created a positive and enjoyable atmosphere, which is crucial for a conducive learning setting. This positive atmosphere is further elaborated through the participants' experiences with specific examples of how digital flashcards were integrated into their learning environment, enhancing their word reading skills.

The theme of "engagement" reveals a unanimous preference among the students for using digital flashcards, developed by their English instructors, as a supplementary method for word reading activities. This preference is a testament to the captivating and motivational nature of digital flashcards, which held the primary school students' interest and actively encouraged their participation in English classes. The fact that every participant found digital flashcards to be their favored learning method indicates a strong consensus on the effectiveness of these tools in fostering an engaging and dynamic educational experience. Such enthusiasm and active participation show the profound impact that digital flashcards can have on primary school students' learning processes, making them a valuable addition to traditional classroom exercises and significantly enhancing reading skills. This collective feedback from the participants underscores digital flashcards' practicality and

educational value, affirming their role as an indispensable resource in the language learning landscape.

5.3 Conclusion of the study

The investigation into the use of digital flashcards among Thai primary school learners has yielded compelling evidence of their beneficial impact on word reading skills. Through a comprehensive analysis combining qualitative and quantitative research methods, this study has demonstrated that digital flashcards significantly enhance word reading skills. The findings underscore three primary areas of impact: improved word reading skills, creating a positive and engaging learning environment, and increased student engagement and participation in language learning activities.

Firstly, digital flashcards are an effective educational tool for boosting word reading skills. The deliberate practice and repetition facilitated by these flashcards enable students to enhance their vocabulary knowledge in a structured and focused manner. Secondly, the study highlights the role of digital flashcards in creating an enjoyable and conducive learning atmosphere. Such an environment fosters a positive attitude towards language learning, making the process more appealing to young learners. Finally, engagement is particularly noteworthy; digital flashcards have captivated students' interest, motivating them to participate actively in their learning process. This increased engagement is a critical factor in successfully acquiring word reading skills, as it encourages consistent practice and interaction with the learning material.

In conclusion, adopting digital flashcards in Thai primary EFL classrooms represents a significant step forward in language education. By offering a dynamic, interactive, and effective learning method, digital flashcards address various learning needs and preferences, facilitating a deeper understanding and retention of new vocabulary. The positive outcomes observed in this study affirm the value of integrating digital flashcards into the language learning curriculum and suggest a promising direction for future educational practices to enhance word reading skills among EFL learners.

5.4 Implications of the study

The findings from the study on the use of digital flashcards for improving word reading ability among Thai primary school learners underscore the pivotal role of integrating technology into language learning and teaching strategies. These results

carry wide-ranging implications for various stakeholders in the educational ecosystem, from classroom educators to curriculum developers, material creators, and assessment designers, emphasizing the need to embrace technological advancements in pedagogical approaches.

For educators, the study offers compelling evidence of the efficacy of digital flashcards as a tool for enhancing vocabulary and supporting the overall language learning process. This suggests that teachers across all educational levels should consider incorporating digital flashcards into their teaching methodologies to make learning more engaging, interactive, and effective. The ability of digital flashcards to cater to diverse learning styles and needs means that they can be a versatile addition to any language learning program, providing targeted support for vocabulary expansion, pronunciation improvement, and the mastery of grammar, listening, speaking, and other language subskills.

Curriculum developers, material creators, and assessment designers also stand to gain valuable insights from this study. The demonstrated success of digital flashcards in language acquisition highlights the importance of including technology-based learning tools in curriculum design, instructional materials, and language proficiency assessments. By integrating digital flashcards and similar technological tools, curriculum developers can create more dynamic and flexible learning experiences that cater to the evolving needs of students and the demands of modern educational contexts.

Moreover, the implications of this study extend to the broader goal of enhancing language proficiency, including pronunciation, vocabulary, grammar, listening, and speaking skills. Digital flashcards engage learners through multimedia elements and facilitate spaced repetition, offering a concrete method to make language learning more accessible, enjoyable, and effective.

In conclusion, the positive outcomes associated with using digital flashcards in language instruction underscore the necessity for educators and curriculum developers to incorporate the latest technological pedagogical strategies into their practices. This approach not only enhances language learning outcomes but also prepares students to succeed in a digitally interconnected world, making the findings of this study a

valuable resource for advancing foreign language education across diverse educational settings

5.5 Limitations and suggestions for future studies

The study's exploration of the impact of digital flashcards on word reading skills among Thai primary EFL learners is limited due to the COVID-19 pandemic. The constraints necessitated by social distancing measures led to a reliance on online lectures. They restricted the participant pool to a single government primary school in Northeastern Thailand, limiting the study's scope and generalizability. The ethical review's confinement to this single school and the selection of target L2 words from a specific school textbook designated for grade six further narrow the research's applicability.

Given these limitations, the study posits several recommendations for future research in L2 vocabulary acquisition using digital or traditional flashcards. It encourages investigations across a more diverse range of educational contexts, including students of different backgrounds, learning environments, and levels of language proficiency, to enhance the robustness and applicability of findings. Additionally, there's an interest in comparing the effectiveness of various types of flashcards (e.g., picture vs. paper) on language proficiency, suggesting that the medium of flashcards could significantly influence learning outcomes. Exploring the relationship between learners' motivation and retention rates when using digital vocabulary flashcards could provide deeper insights into the pedagogical value of these tools. Lastly, further research involving different participant groups is essential for understanding the nuances of vocabulary growth and the potential differential effects of flashcard use across diverse learner demographics.

These recommendations aim to broaden the understanding of flashcard efficacy in language learning, suggesting a multifaceted approach to future research that considers the complexity of language acquisition processes and the potential of digital technologies to support these processes in varied educational settings.

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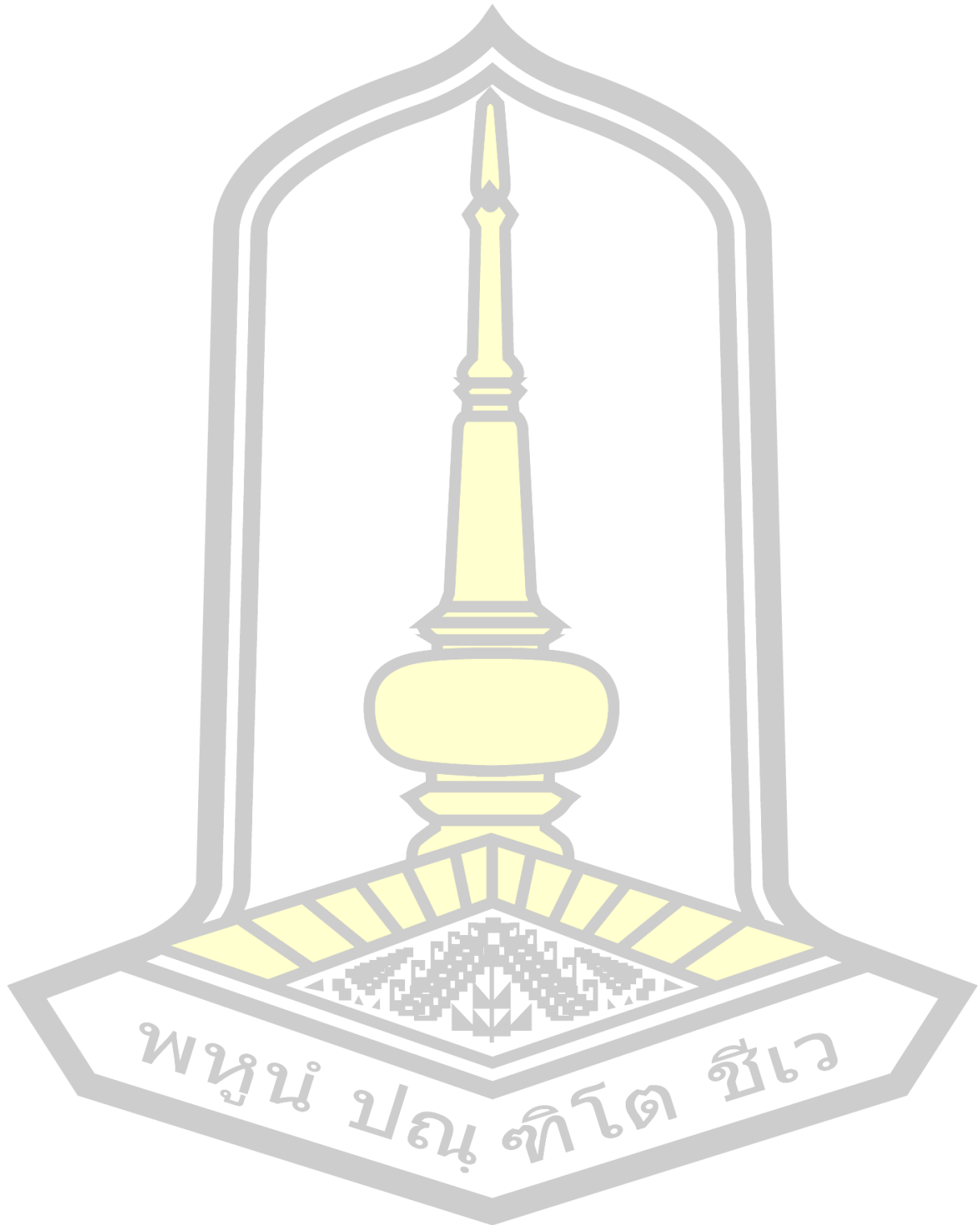
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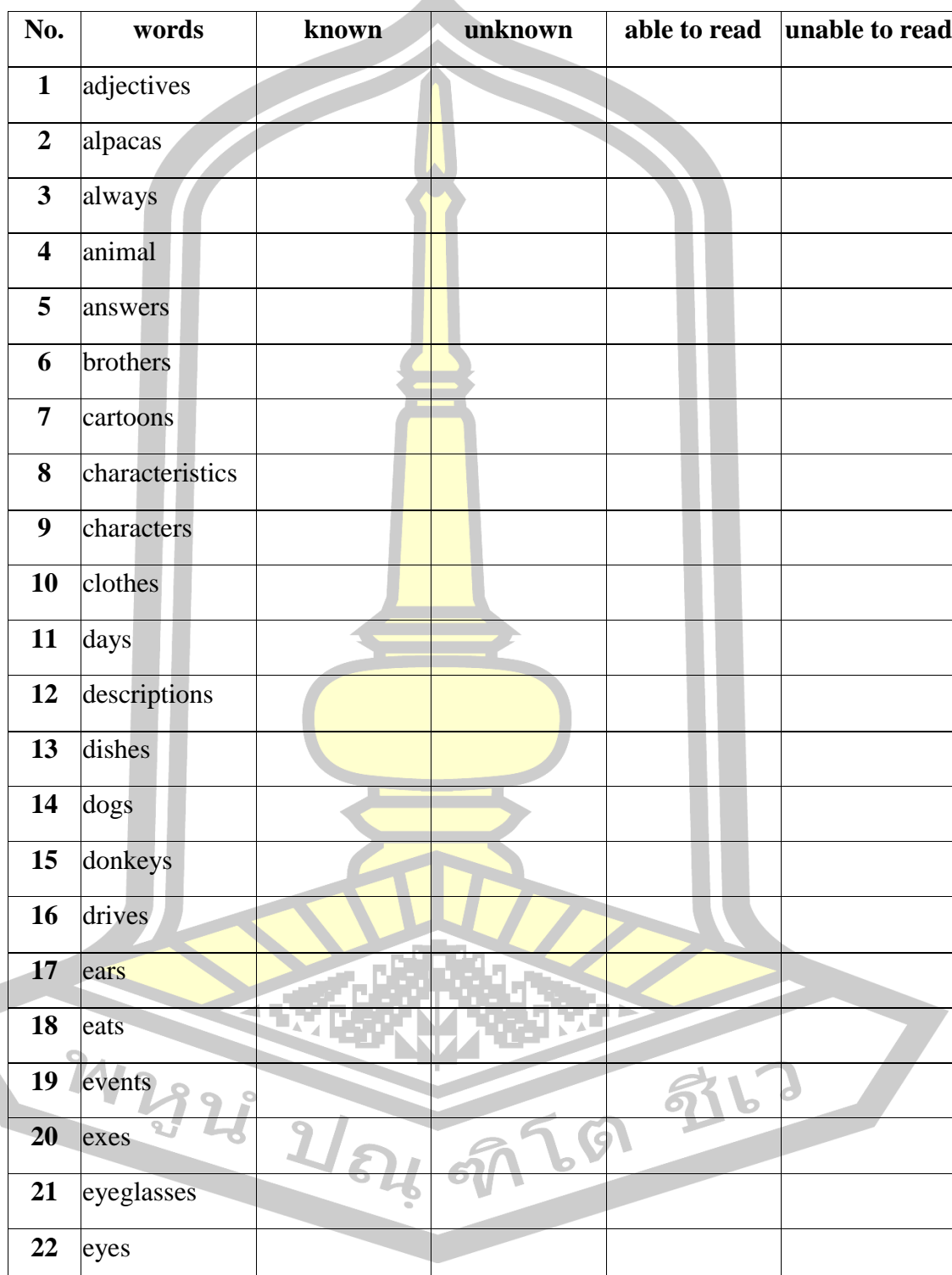
APPENDICES
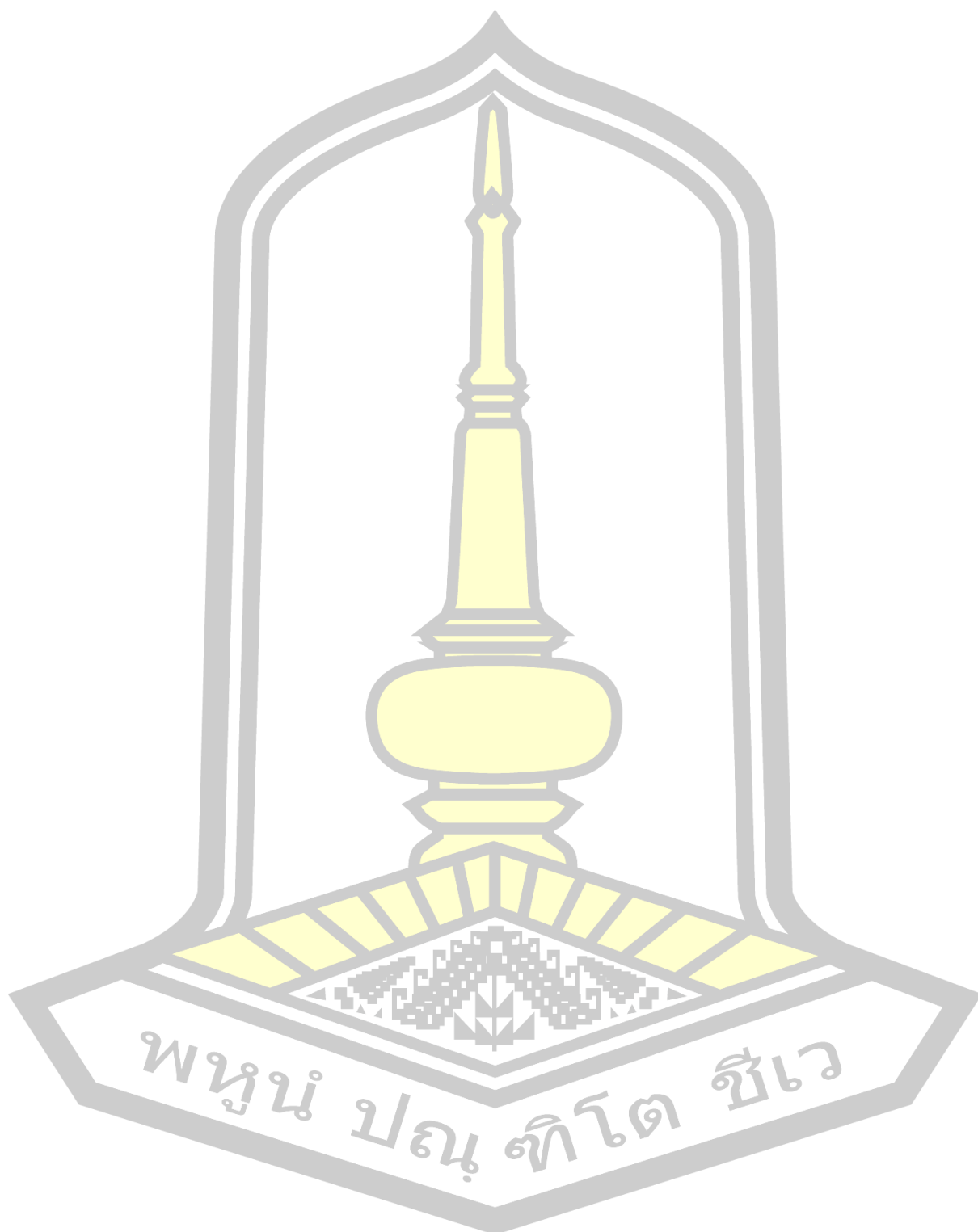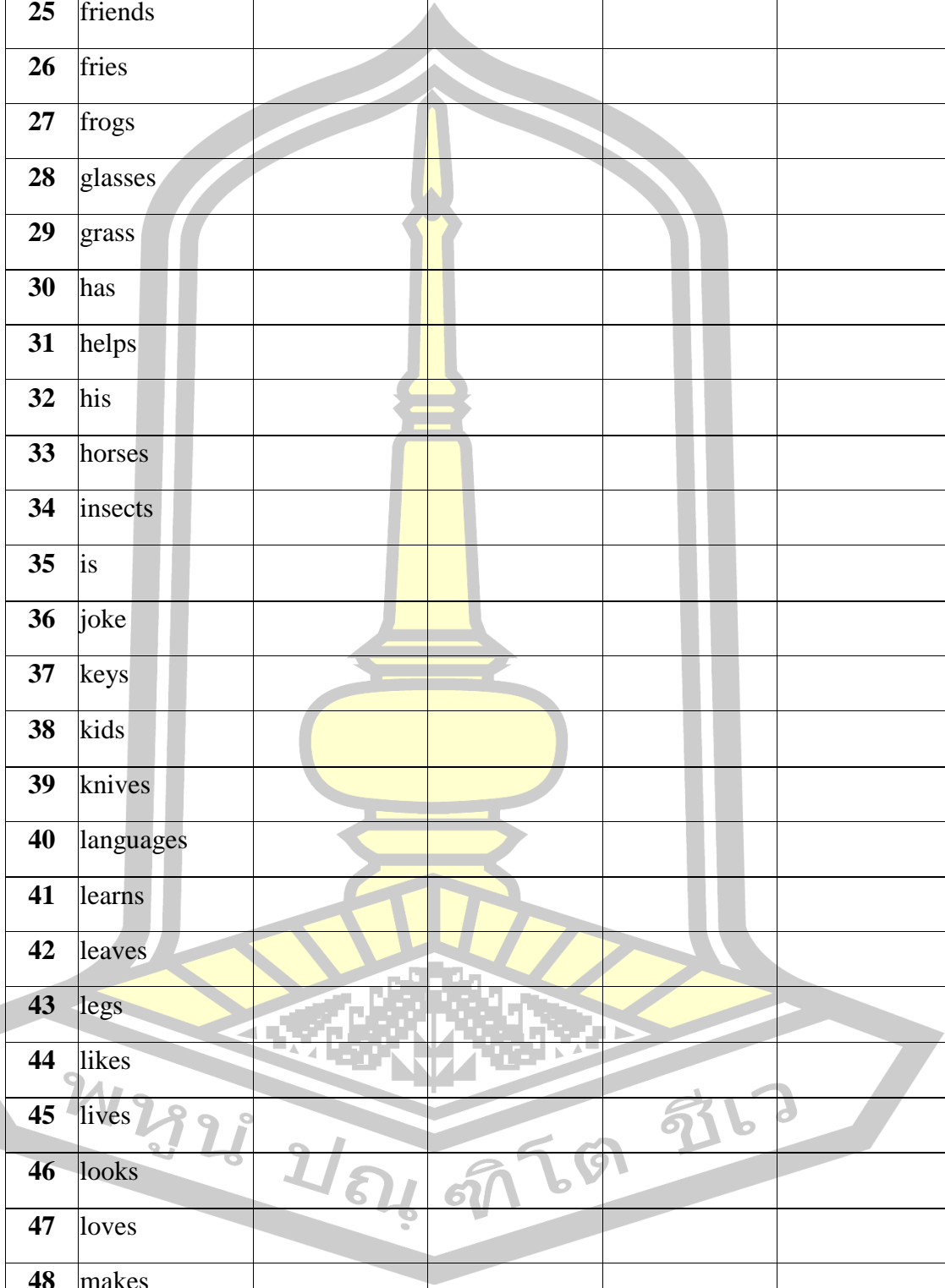
Appendix A: English word reading checklist test
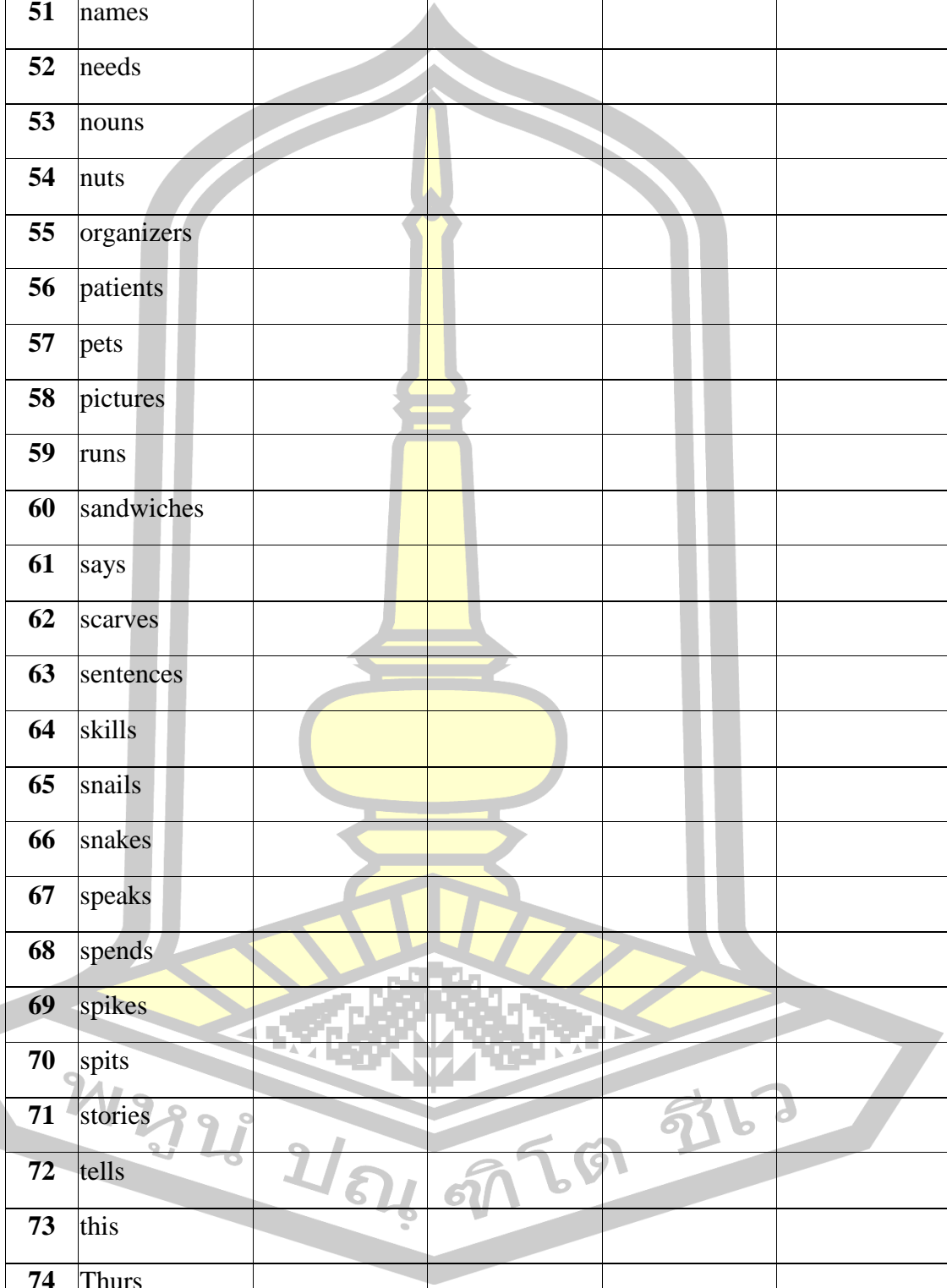
<u>**Unit 1**</u>

No.	words	known	unknown	able to read	unable to read
1	adjectives				
2	alpacas				
3	always				
4	animal				
5	answers				
6	brothers				
7	cartoons				
8	characteristics				
9	characters				
10	clothes				
11	days				
12	descriptions				
13	dishes				
14	dogs				
15	donkeys				
16	drives				
17	ears				
18	eats				
19	events				
20	exes				
21	eyeglasses				
22	eyes				
23	famous				
24	foxes				

No.	words	known	unknown	able to read	unable to read
25	friends				
26	fries				
27	frogs				
28	glasses				
29	grass				
30	has				
31	helps				
32	his				
33	horses				
34	insects				
35	is				
36	joke				
37	keys				
38	kids				
39	knives				
40	languages				
41	learns				
42	leaves				
43	legs				
44	likes				
45	lives				
46	looks				
47	loves				
48	makes				
49	miss				
50	months				
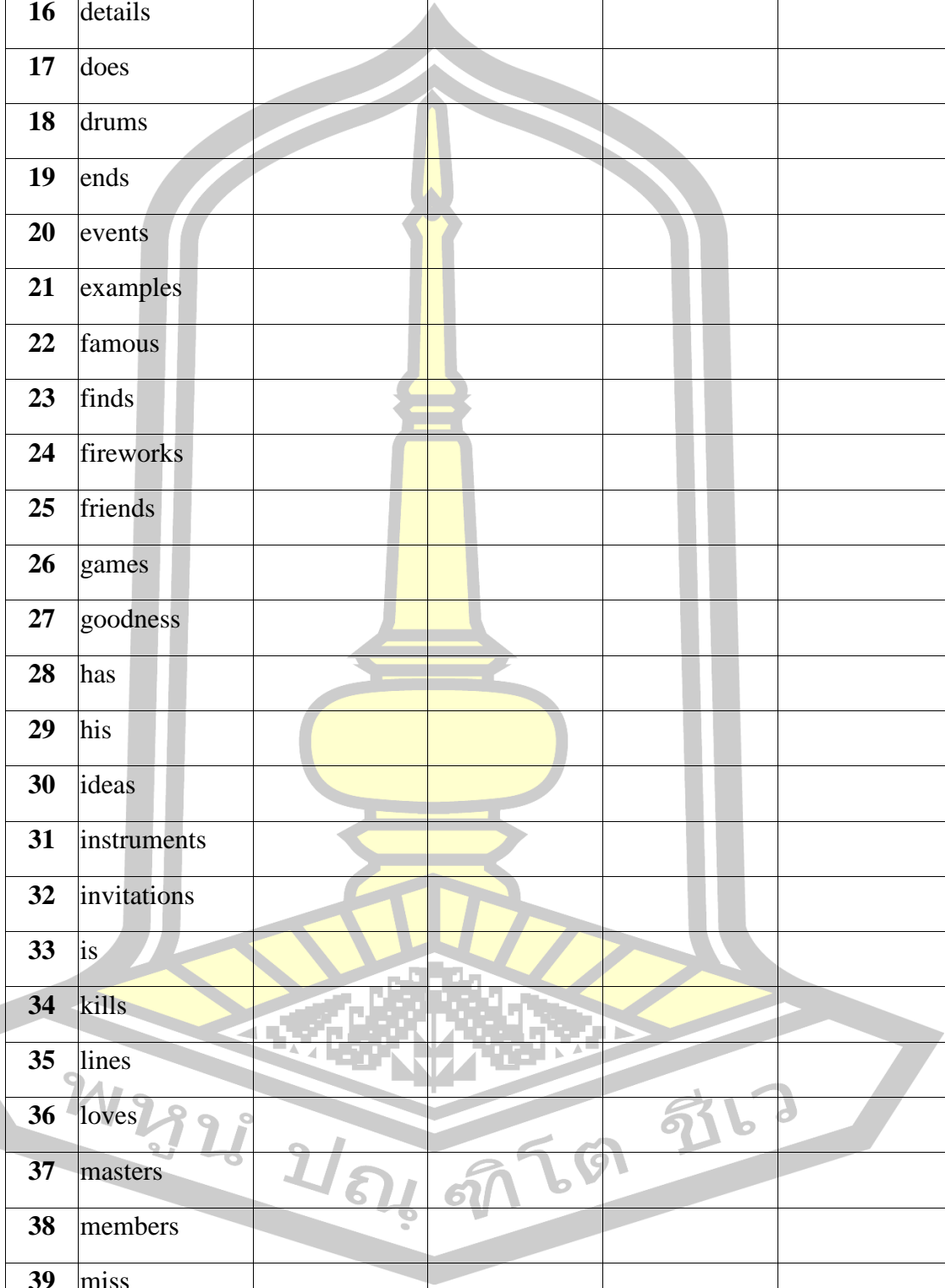
No.	words	known	unknown	able to read	unable to read
51	names				
52	needs				
53	nouns				
54	nuts				
55	organizers				
56	patients				
57	pets				
58	pictures				
59	runs				
60	sandwiches				
61	says				
62	scarves				
63	sentences				
64	skills				
65	snails				
66	snakes				
67	speaks				
68	spends				
69	spikes				
70	spits				
71	stories				
72	tells				
73	this				
74	Thurs				
75	toys				
76	us				
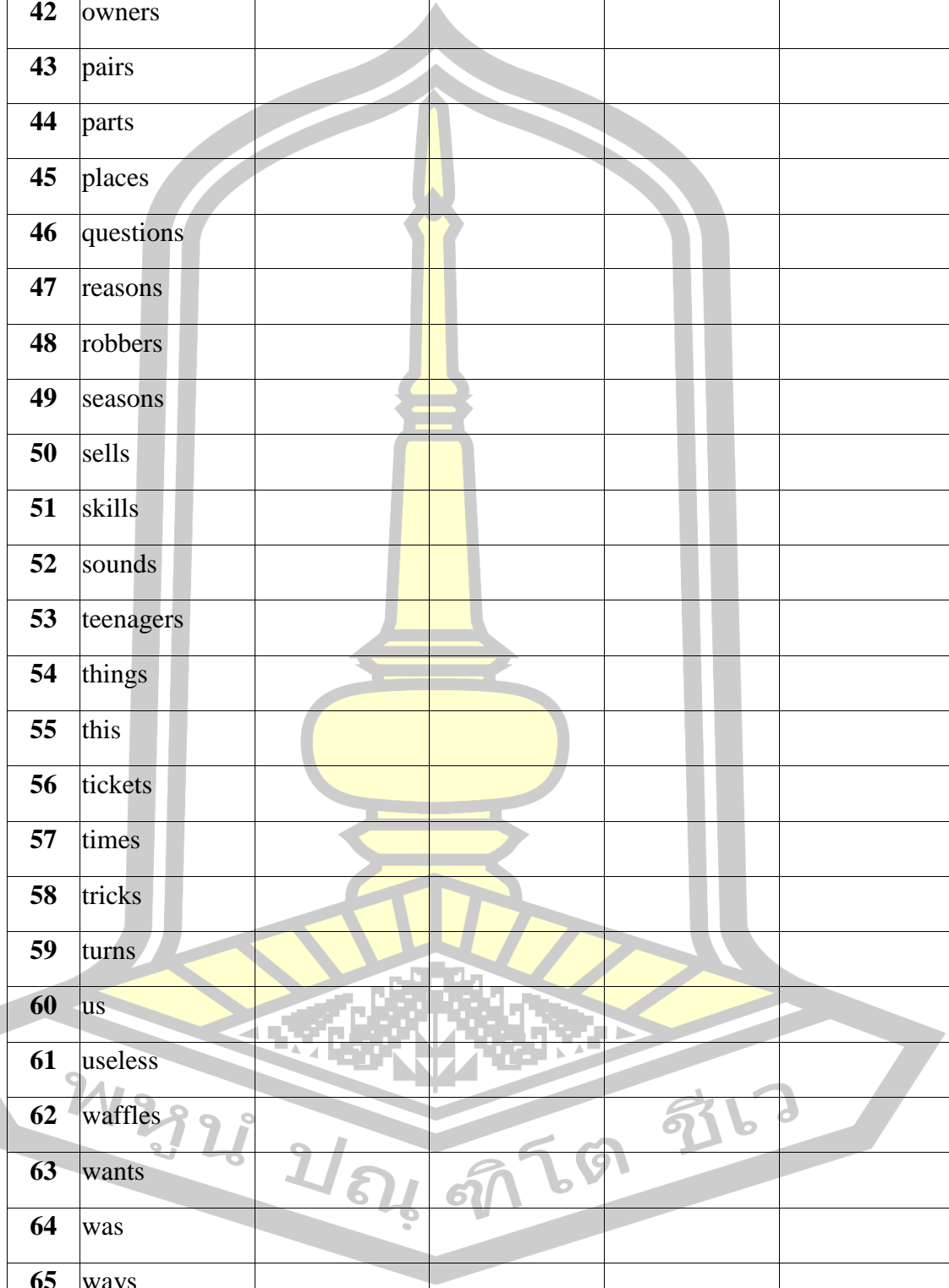
No.	words	known	unknown	able to read	unable to read
77	uses				
78	was				
79	watches				
80	wings				
81	wolves				
82	words				
83	years				
84	yes				

<u>Unit 2</u>

No.	words	known	unknown	able to read	unable to read
1	actors				
2	animals				
3	answers				
4	asks				
5	begins				
6	brothers				
7	characters				
8	chooses				
9	Christmas				
10	circus				
11	congratulations				
12	dangerous				
13	dates				
14	days				
15	delicious				

No.	words	known	unknown	able to read	unable to read
16	details				
17	does				
18	drums				
19	ends				
20	events				
21	examples				
22	famous				
23	finds				
24	fireworks				
25	friends				
26	games				
27	goodness				
28	has				
29	his				
30	ideas				
31	instruments				
32	invitations				
33	is				
34	kills				
35	lines				
36	loves				
37	masters				
38	members				
39	miss				
40	months				
41	musicians				
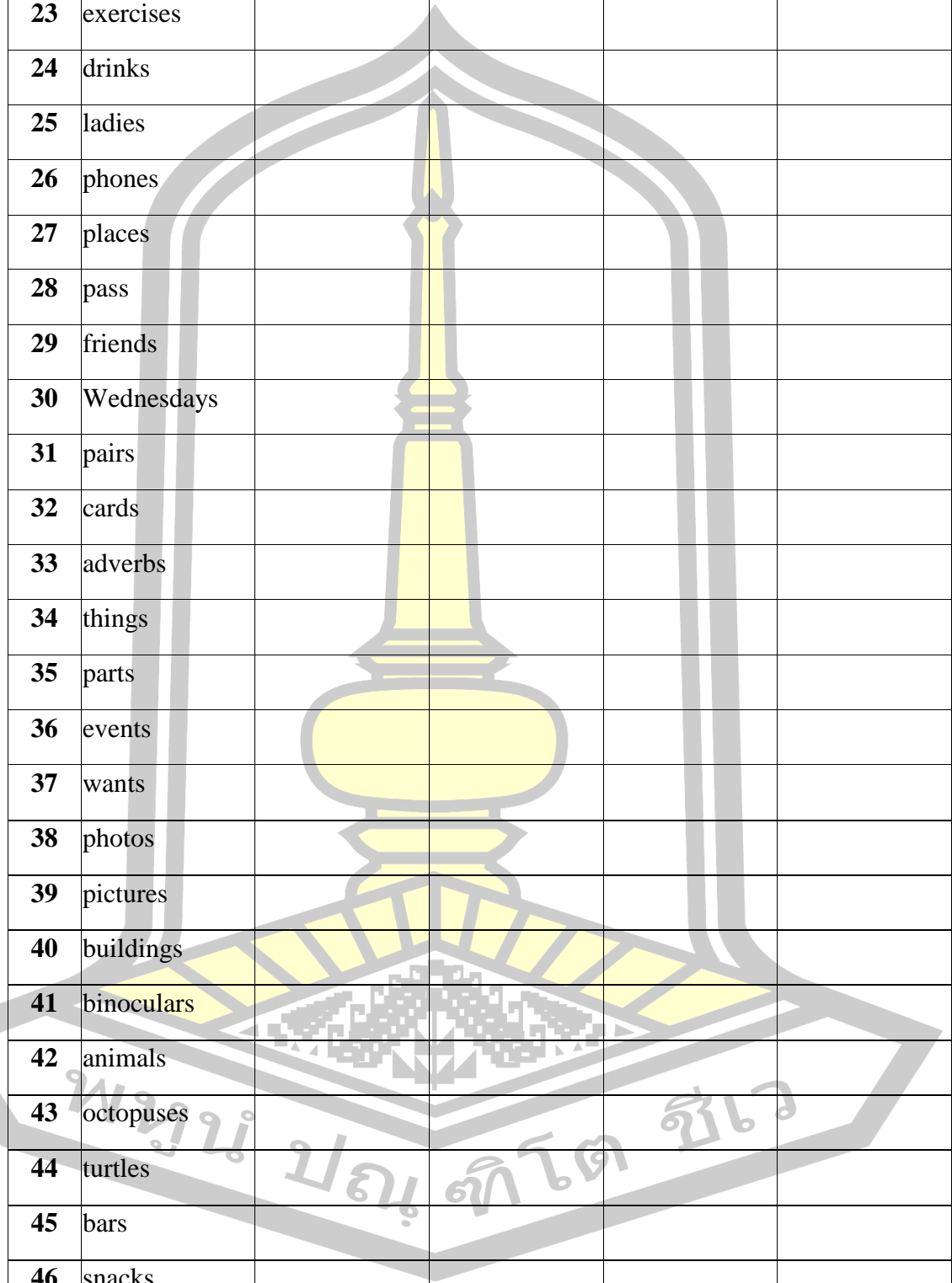
No.	words	known	unknown	able to read	unable to read
42	owners				
43	pairs				
44	parts				
45	places				
46	questions				
47	reasons				
48	robbers				
49	seasons				
50	sells				
51	skills				
52	sounds				
53	teenagers				
54	things				
55	this				
56	tickets				
57	times				
58	tricks				
59	turns				
60	us				
61	useless				
62	waffles				
63	wants				
64	was				
65	ways				
66	words				
67	years				

No.	words	known	unknown	able to read	unable to read
68	yes				

Unit 3

No.	words	known	unknown	able to read	unable to read
1	has				
2	is				
3	sentences				
4	laptops				
5	yes				
6	this				
7	knives				
8	us				
9	tickets				
10	years				
11	was				
12	flowers				
13	grass				
14	words				
15	meters				
16	ways				
17	takes				
18	bus				
19	questions				
20	answers				
21	yours				
22	skills				
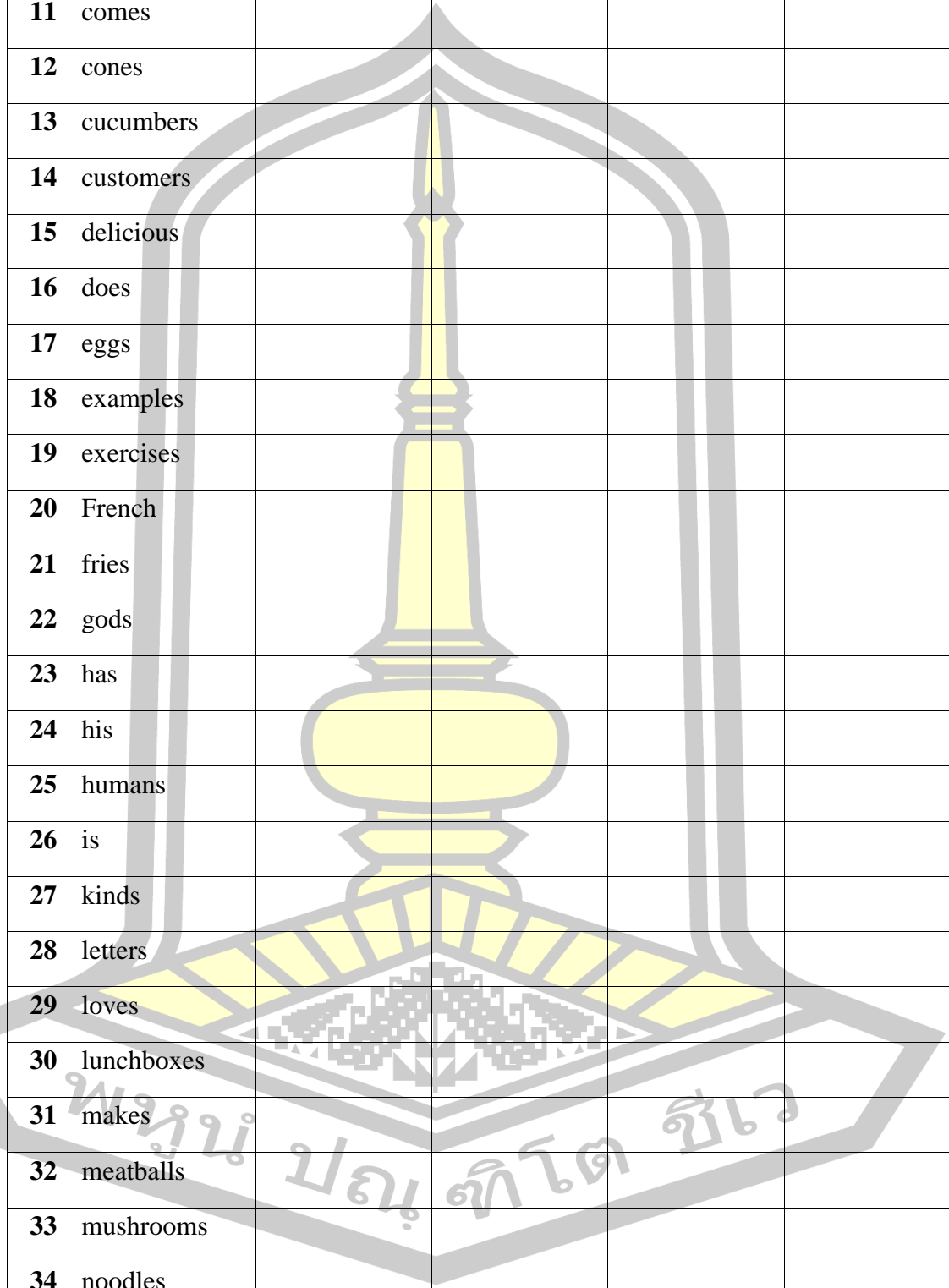
No.	words	known	unknown	able to read	unable to read
23	exercises				
24	drinks				
25	ladies				
26	phones				
27	places				
28	pass				
29	friends				
30	Wednesdays				
31	pairs				
32	cards				
33	adverbs				
34	things				
35	parts				
36	events				
37	wants				
38	photos				
39	pictures				
40	buildings				
41	binoculars				
42	animals				
43	octopuses				
44	turtles				
45	bars				
46	snacks				
47	Celsius				
48	castles				

No.	words	known	unknown	able to read	unable to read
49	churches				
50	temples				
51	covers				
52	fields				
53	lights				
54	sculptures				
55	his				
56	drivers				
57	sharks				
58	islands				
59	degrees				
60	activities				
61	kids				

Unit 4

No.	words	known	unknown	able to read	unable to read
1	always				
2	answers				
3	as				
4	burgers				
5	butterflies				
6	carrots				
7	characters				
8	choices				
9	Christmas				
10	cities				
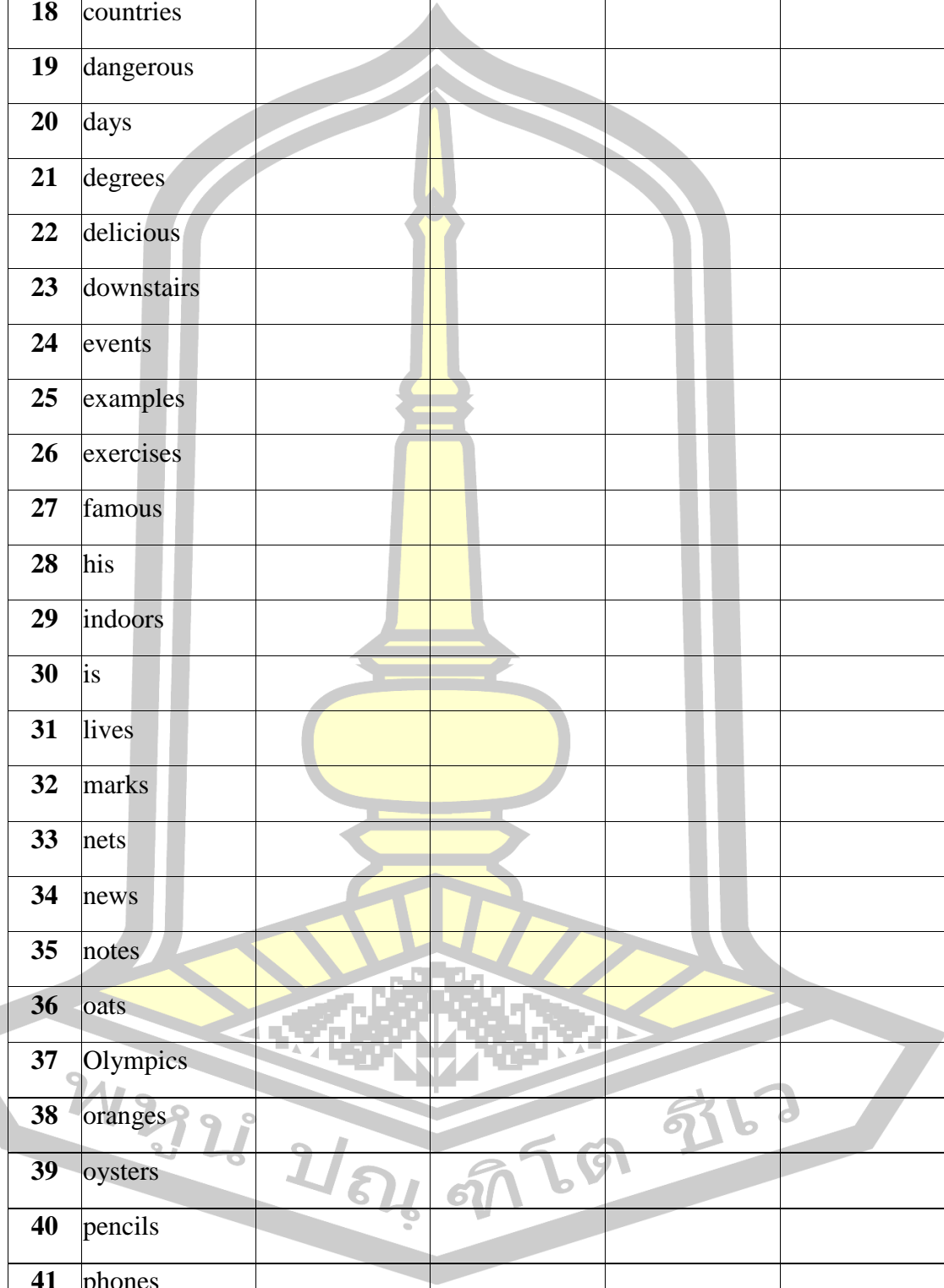
No.	words	known	unknown	able to read	unable to read
11	comes				
12	cones				
13	cucumbers				
14	customers				
15	delicious				
16	does				
17	eggs				
18	examples				
19	exercises				
20	French				
21	fries				
22	gods				
23	has				
24	his				
25	humans				
26	is				
27	kinds				
28	letters				
29	loves				
30	lunchboxes				
31	makes				
32	meatballs				
33	mushrooms				
34	noodles				
35	nuts				
36	onions				

No.	words	known	unknown	able to read	unable to read
37	peppers				
38	pictures				
39	pieces				
40	pizzas				
41	places				
42	prices				
43	sandwiches				
44	sausages				
45	seashells				
46	sentences				
47	sets				
48	shapes				
49	shows				
50	skills				
51	slices				
52	sports				
53	strawberries				
54	students				
55	tacos				
56	thanks				
57	things				
58	this				
59	tomatoes				
60	toppings				
61	types				
62	uses				
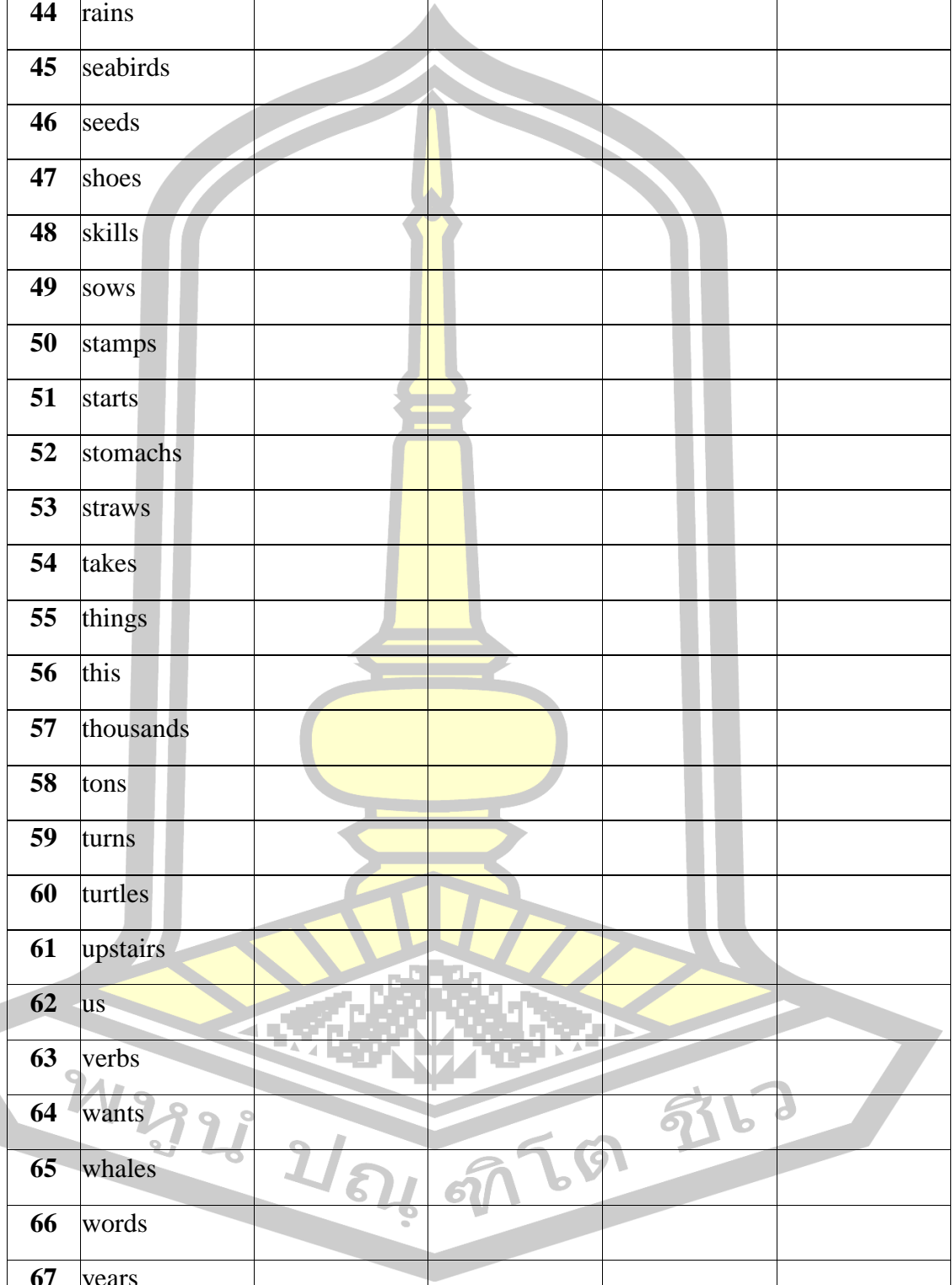
No.	words	known	unknown	able to read	unable to read
63	vegetables				
64	wants				
65	was				
66	wheels				
67	words				
68	yes				

Unit 5

No.	words	known	unknown	able to read	unable to read
1	adverbs				
2	animals				
3	apples				
4	bags				
5	barleys				
6	beaches				
7	beans				
8	Beatles				
9	bones				
10	bottles				
11	bus				
12	Caras				
13	Celsius				
14	Christmas				
15	cities				
16	clothes				
17	containers				
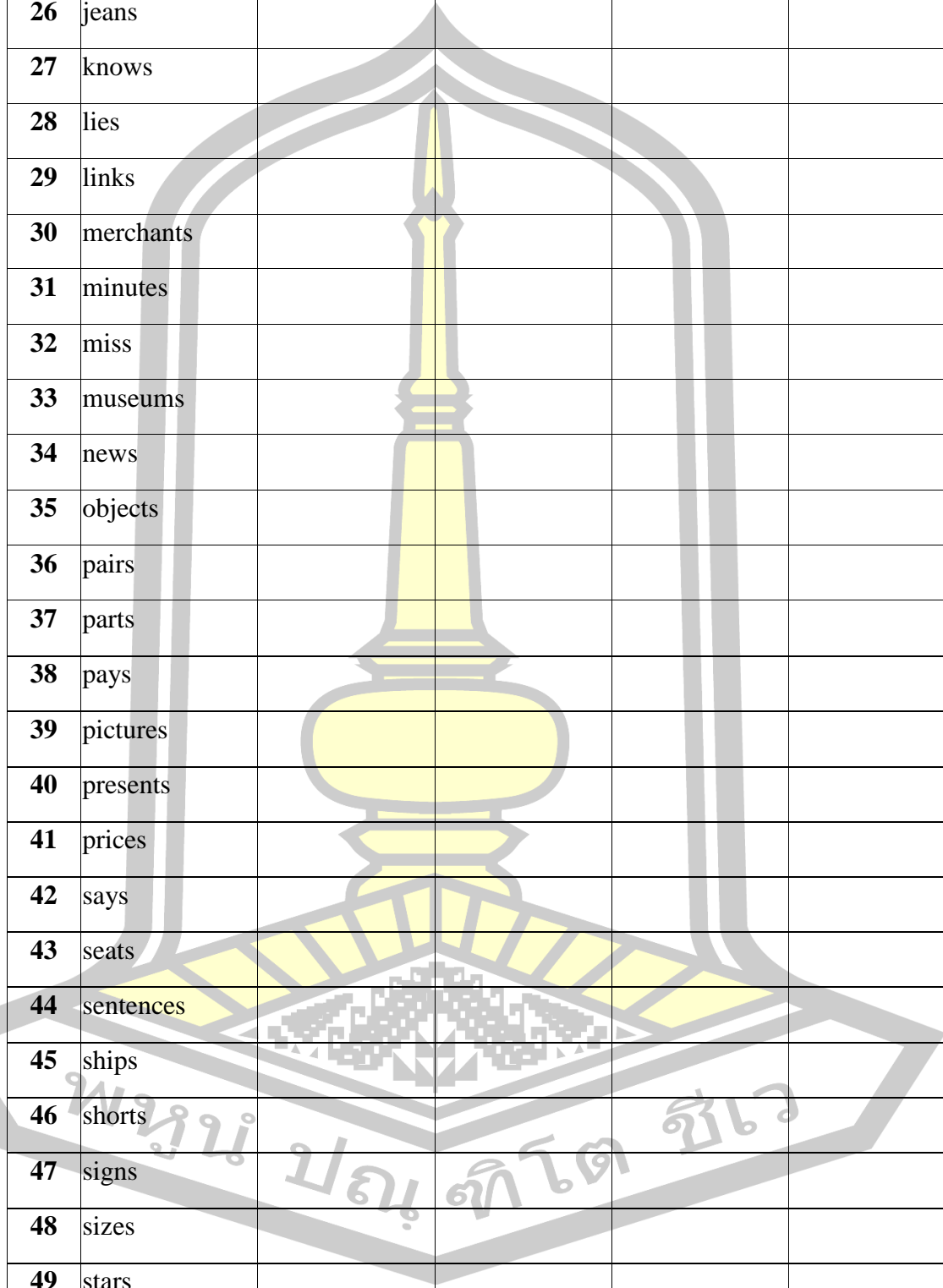
No.	words	known	unknown	able to read	unable to read
18	countries				
19	dangerous				
20	days				
21	degrees				
22	delicious				
23	downstairs				
24	events				
25	examples				
26	exercises				
27	famous				
28	his				
29	indoors				
30	is				
31	lives				
32	marks				
33	nets				
34	news				
35	notes				
36	oats				
37	Olympics				
38	oranges				
39	oysters				
40	pencils				
41	phones				
42	plastics				
43	problems				

No.	words	known	unknown	able to read	unable to read
44	rains				
45	seabirds				
46	seeds				
47	shoes				
48	skills				
49	sows				
50	stamps				
51	starts				
52	stomachs				
53	straws				
54	takes				
55	things				
56	this				
57	thousands				
58	tons				
59	turns				
60	turtles				
61	upstairs				
62	us				
63	verbs				
64	wants				
65	whales				
66	words				
67	years				
68	yours				

Unit 6

No.	words	known	unknown	able to read	unable to read
1	anchors				
2	asks				
3	bas				
4	bus				
5	cards				
6	choices				
7	Christmas				
8	Claus				
9	clothes				
10	conjunctions				
11	days				
12	decorations				
13	delicious				
14	divers				
15	does				
16	dress				
17	drivers				
18	famous				
19	flowers				
20	goss				
21	hands				
22	hates				
23	his				
24	ideas				
25	is				
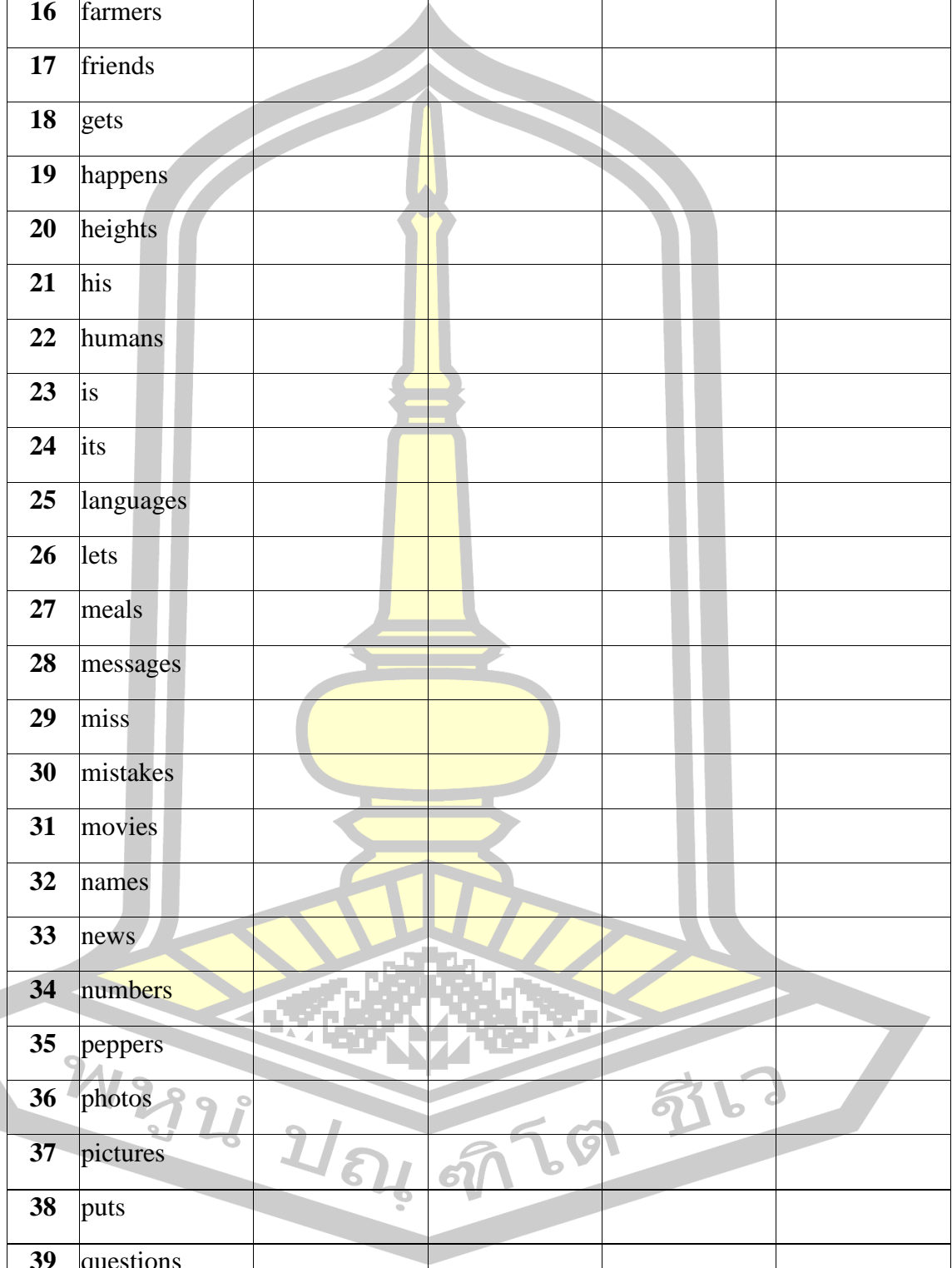
No.	words	known	unknown	able to read	unable to read
26	jeans				
27	knows				
28	lies				
29	links				
30	merchants				
31	minutes				
32	miss				
33	museums				
34	news				
35	objects				
36	pairs				
37	parts				
38	pays				
39	pictures				
40	presents				
41	prices				
42	says				
43	seats				
44	sentences				
45	ships				
46	shorts				
47	signs				
48	sizes				
49	stars				
50	starts				
51	stockings				

No.	words	known	unknown	able to read	unable to read
52	takes				
53	this				
54	tries				
55	was				
56	wishes				
57	words				
58	years				
59	yes				

Unit 7

No.	words	known	unknown	able to read	unable to read
1	animals				
2	answers				
3	as				
4	buildings				
5	cards				
6	cars				
7	chooses				
8	class				
9	classrooms				
10	details				
11	dinosaurs				
12	dogs				
13	drinks				
14	drones				
15	famous				
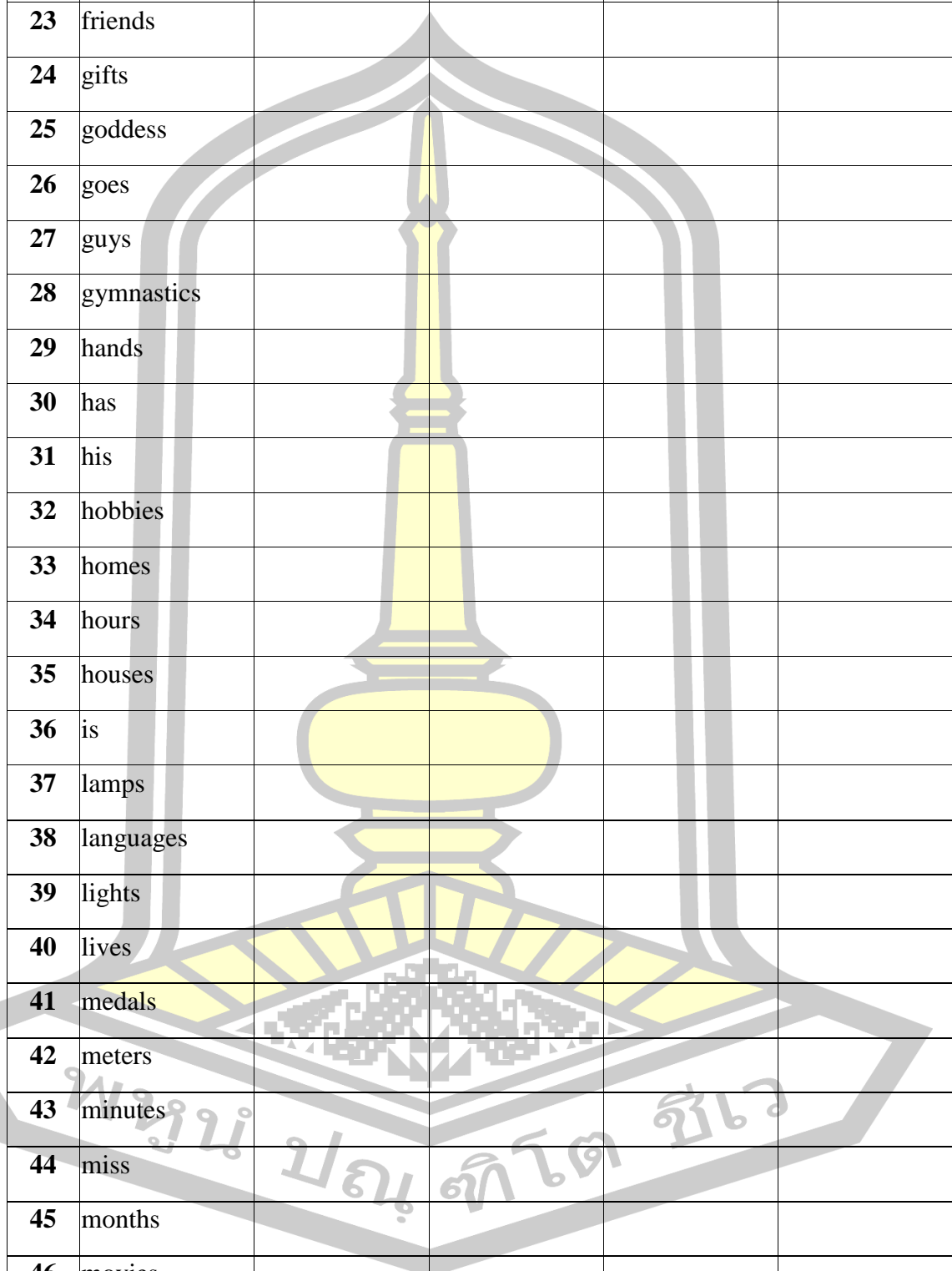
No.	words	known	unknown	able to read	unable to read
16	farmers				
17	friends				
18	gets				
19	happens				
20	heights				
21	his				
22	humans				
23	is				
24	its				
25	languages				
26	lets				
27	meals				
28	messages				
29	miss				
30	mistakes				
31	movies				
32	names				
33	news				
34	numbers				
35	peppers				
36	photos				
37	pictures				
38	puts				
39	questions				
40	recipes				
41	restaurants				

No.	words	known	unknown	able to read	unable to read
42	robots				
43	runs				
44	scientists				
45	sentences				
46	shapes				
47	shoes				
48	soldiers				
49	spiders				
50	stories				
51	students				
52	swords				
53	T-shirts				
54	technologies				
55	tenses				
56	things				
57	this				
58	tries				
59	turns				
60	twisters				
61	us				
62	uses				
63	visitors				
64	was				
65	ways				
66	words				
67	years				
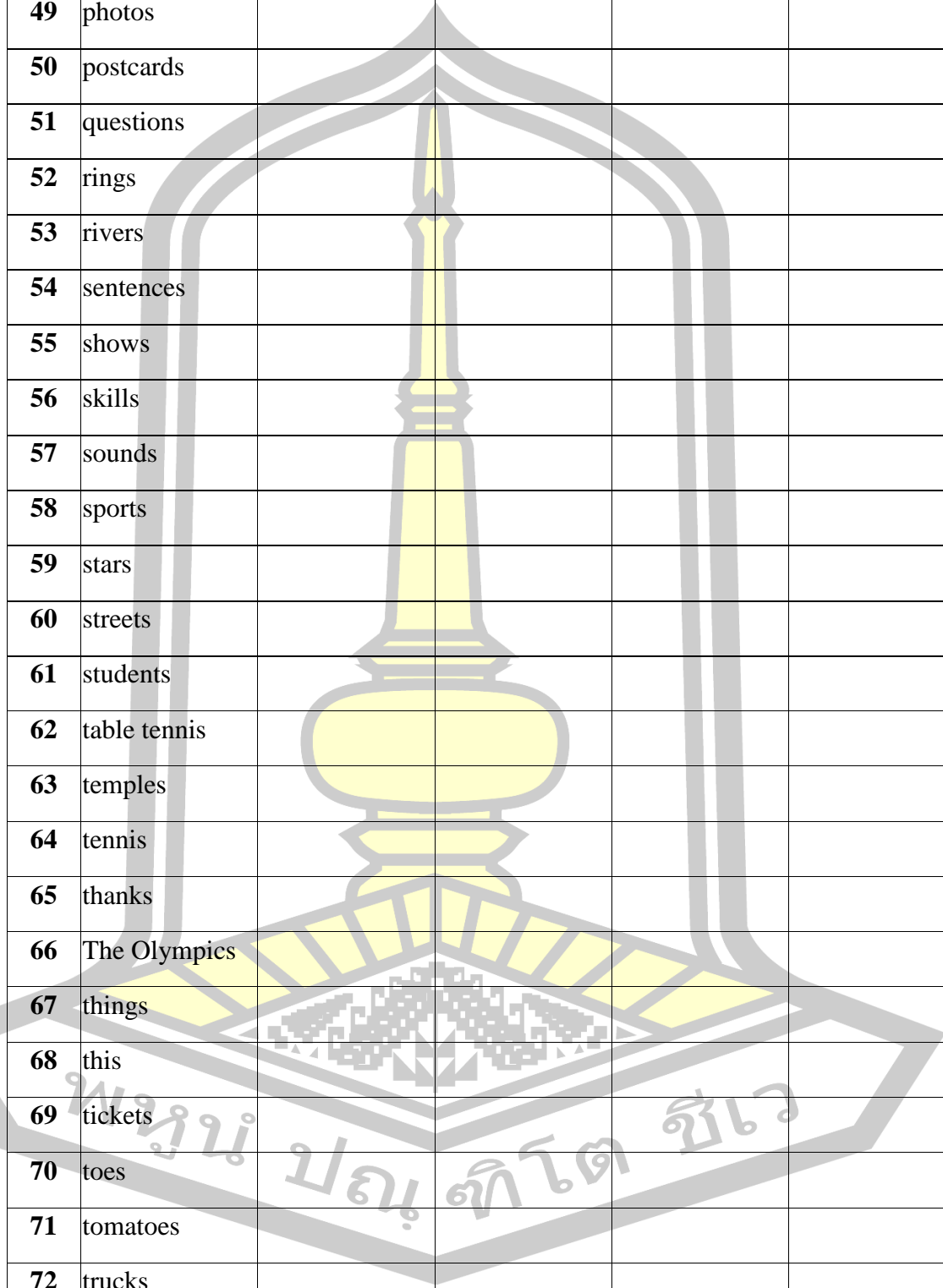
No.	words	known	unknown	able to read	unable to read
68	yes				

Unit 8

No.	words	known	unknown	able to read	unable to read
1	activities				
2	actors				
3	address				
4	answers				
5	asks				
6	bells				
7	breakdancers				
8	bus				
9	card				
10	cities				
11	clothes				
12	comes				
13	cross				
14	days				
15	delicious				
16	does				
17	families				
18	famous				
19	festivals				
20	filmmakers				
21	films				
22	fingers				

No.	words	known	unknown	able to read	unable to read
23	friends				
24	gifts				
25	goddess				
26	goes				
27	guys				
28	gymnastics				
29	hands				
30	has				
31	his				
32	hobbies				
33	homes				
34	hours				
35	houses				
36	is				
37	lamps				
38	languages				
39	lights				
40	lives				
41	medals				
42	meters				
43	minutes				
44	miss				
45	months				
46	movies				
47	parts				
48	past participles				

No.	words	known	unknown	able to read	unable to read
49	photos				
50	postcards				
51	questions				
52	rings				
53	rivers				
54	sentences				
55	shows				
56	skills				
57	sounds				
58	sports				
59	stars				
60	streets				
61	students				
62	table tennis				
63	temples				
64	tennis				
65	thanks				
66	The Olympics				
67	things				
68	this				
69	tickets				
70	toes				
71	tomatoes				
72	trucks				
73	turns				
74	us				

No.	words	known	unknown	able to read	unable to read
75	videos				
76	was				
77	waves				
78	wins				
79	words				
80	works				
81	years				
82	yes				
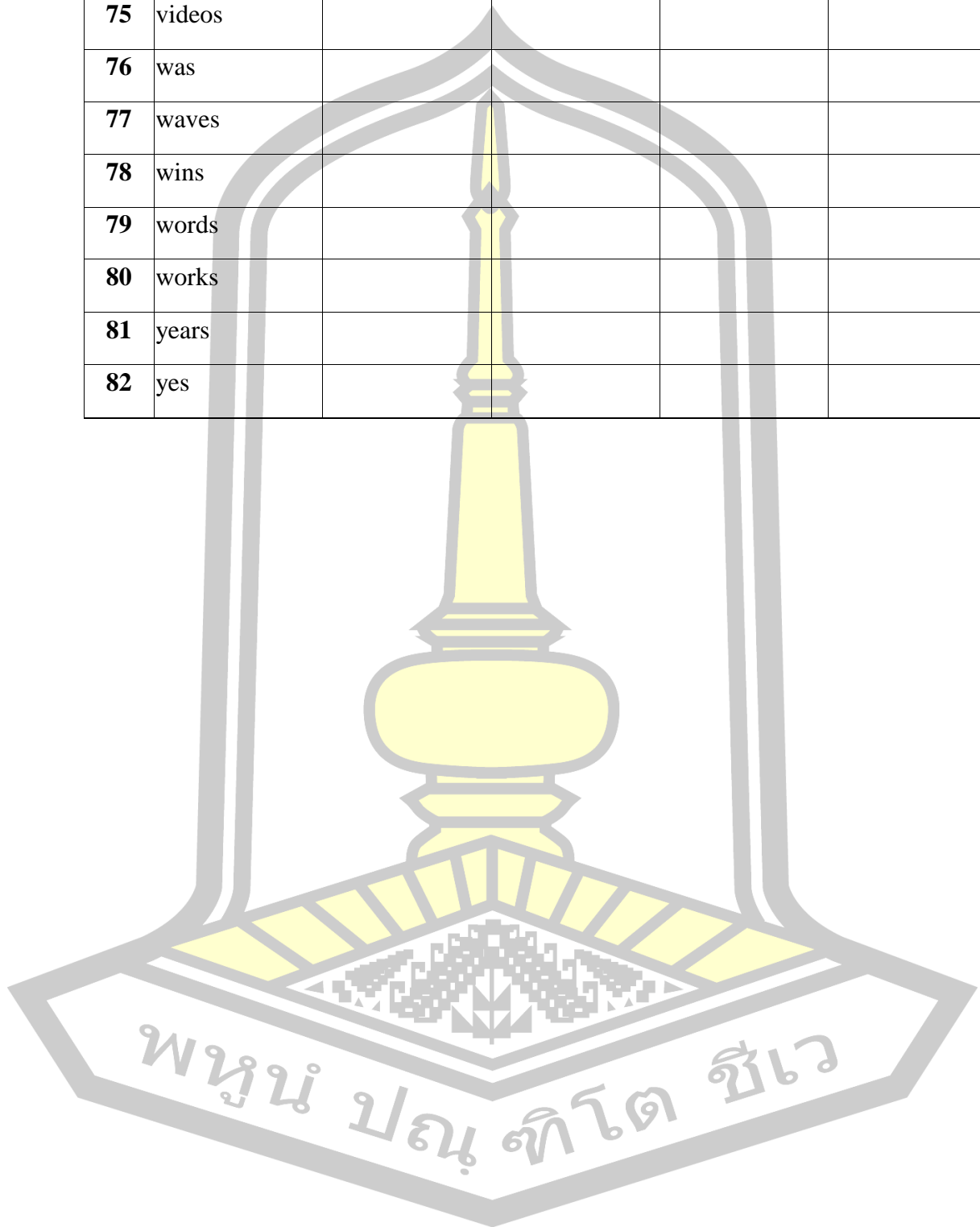
Appendix A: Questionnaire

Students' attitudes towards using digital flashcards

Directions: Please answer by checking (✔) sincerely according to your opinions.

5 = Strongly agree 4 = Agree 3 = Neutral 2 = Disagree 1 = Strongly disagree

	Items	Score Level				
		5	4	3	2	1
1	I enjoy using digital flashcards to learn word reading.					
2	Digital flashcards assist me in remembering to read the words.					
3	The pictures in digital flashcards help me read a word better.					
4	I want to continue learning reading using digital flashcards.					
5	Digital flashcards encourage me to read the words more often.					
6	I feel motivated to use digital flashcards to learn to read the words.					
7	I feel much better when I use digital flashcards to learn word reading.					
8	Using digital flashcards in word reading classes was fun.					
9	I enjoy learning word reading through digital flashcards from electronic devices.					
10	I want to practice reading the word more often.					
11	Using digital flashcards in word reading classes was useful.					
12	Using digital flashcards don't help me understand word reading better.					
13	Digital flashcards make me interested in learning.					
14	Word reading classes in which digital flashcards were practical.					
15	Using digital flashcards help me to improve word reading.					

Suggestion

_____

_____

แบบสอบถามทัศนคติของนักเรียนต่อการใช้บัตรคำอิเล็กทรอนิกส์

ส่วนที่ 1: ข้อมูลส่วนตัว

คำชี้แจง โปรดทำเครื่องหมาย ✔ หน้าข้อความที่ตรงกับข้อมูลของผู้ตอบแบบสอบถาม

1. เพศ ( ) ชาย ( ) หญิง

ส่วนที่ 2: ทัศนคติของนักเรียนต่อการใช้โสตทัศนูปกรณ์

คำชี้แจง โปรดทำเครื่องหมาย ✔ ในช่องระดับความคิดเห็นของท่าน

5 = เห็นด้วยมากที่สุด 4 = เห็นด้วย 3 = เห็นด้วยปานกลาง 2 = ไม่เห็นด้วย 1 = ไม่เห็นด้วยมากที่สุด

	หัวข้อ	ระดับคะแนน				
		5	4	3	2	1
1	ฉันสนุกกับการเรียนการอ่านภาษาอังกฤษโดยใช้บัตรคำศัพท์อิเล็กทรอนิกส์					
2	บัตรคำศัพท์อิเล็กทรอนิกส์ช่วยฉันในการจดจำการอ่านคำศัพท์					
3	รูปภาพบนบัตรคำศัพท์อิเล็กทรอนิกส์ช่วยให้ฉันอ่านคำได้ดีขึ้น					
4	ฉันอยากจะเรียนรู้การอ่าน ด้วยบัตรคำศัพท์อิเล็กทรอนิกส์ต่อไป					
5	บัตรคำศัพท์อิเล็กทรอนิกส์กระตุ้นให้ฉันอ่านคำศัพท์มากขึ้น					
6	ฉันรู้สึกมีแรงจูงใจในการใช้บัตรคำศัพท์อิเล็กทรอนิกส์เพื่อเรียนรู้การอ่านคำ					
7	ฉันรู้สึกดีขึ้นมากเมื่อฉันเรียนรู้การอ่านคำศัพท์ด้วยบัตรคำศัพท์อิเล็กทรอนิกส์					
8	การใช้บัตรคำศัพท์อิเล็กทรอนิกส์ในชั้นเรียนการอ่านคำศัพท์สนุกมาก					
9	ฉันชอบเรียนรู้การอ่านคำศัพท์ผ่านบัตรคำศัพท์อิเล็กทรอนิกส์บนอุปกรณ์อิเล็กทรอนิกส์					
10	ฉันต้องการฝึกอ่านคำบ่อยขึ้น					
11	การใช้บัตรคำศัพท์อิเล็กทรอนิกส์ในชั้นเรียนอ่านคำมีประโยชน์					
12	การใช้บัตรคำศัพท์อิเล็กทรอนิกส์ไม่ได้ช่วยให้ฉันเข้าใจการอ่านคำได้ดีขึ้น					
13	บัตรคำศัพท์อิเล็กทรอนิกส์ทำให้ฉันสนใจที่จะเรียนรู้					
14	บทเรียนการอ่านคำที่ใช้งานได้จริงด้วยบัตรคำศัพท์อิเล็กทรอนิกส์					
15	การใช้บัตรคำศัพท์อิเล็กทรอนิกส์ช่วยให้ฉันพัฒนาความสามารถในการอ่านคำ					

ข้อเสนอแนะ

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Appendix B: Pretest / Posttest

Practice saying these words until you are comfortable with them. Then, record the words, speaking as naturally as possible.

words	correct	incorrect	point
1. meets			
2. coats			
3. books			
4. roofs			
5. maps			
6. donkeys			
7. talks			
8. walks			
9. jumps			
10. sits			
11. hands			
12. girls			
13. boys			
14. birds			
15. cars			
16. windows			
17. wolves			
18. scarves			
19. leaves			
20. days			
21. classes			
22. dishes			
23. changes			
24. boxes			
25. glasses			
26. watches			
27. foxes			
28. kisses			
29. washes			
30. mixes			
Total			

Appendix C: Interview Questions

Interview questions will be asked to participants: Adapted from the effects of electronic mind mapping on students' reading abilities (Samonlux, 2020).

1. What do you think about learning English through digital flashcards?

   คุณคิดอย่างไรกับการเรียนภาษาอังกฤษผ่านบัตรคำอิเล็กทรอนิกส์

   _____

   _____

   _____

2. What do you think about using digital flashcards to enhance word reading skills?

   คุณคิดอย่างไรกับการใช้บัตรคำศัพท์อิเล็กทรอนิกส์เพื่อเพิ่มทักษะการอ่านคำ?

   _____

   _____

   _____

3. How do digital flashcards help you improve your word reading skills of words with /s/ /es/ ending sound?

   บัตรคำอิเล็กทรอนิกส์ช่วยให้คุณพัฒนาทักษะการอ่านคำศัพท์ที่มีเสียงลงท้าย /s/ /es/

   ได้อย่างไร

   _____

   _____

   _____

BIOGRAPHY

NAME   Miss Suwanan Longchin

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