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 learners. Moreover, the study explored learners' 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' perceptions 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. 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 twenty-item Likert scale survey aimed to determine how primary school learners in Thailand viewed the usage of digital flashcards for word reading instruction in the classroom. 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.

Keywords: digital flashcard, Thai EFL primary learners, word reading skills

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Introduction

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). 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 reading 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). Learners' early reading difficulties also cover the difficulty in distinguishing between similar consonant sounds, similarities in vocal and schwa sounds, similar sounds within 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, 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. (Wang, 2019). This complexity may hinder students' development of fluent word reading skills.

Among many forms of media, a flashcard has been increasingly used to promote reading skills, specifically word reading (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). Additionally, they typically feature appealing colors and illustrations of animals, fruits, alphabets, and professions (Kusumawardhani, 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 learners'

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.

There has been a growing body of studies exploring the use of flashcards in teaching reading skills, particularly word reading (e.g., Al-Kandari, 2023; Hatiningsih & Adriyati, 2018; 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.

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. 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.

Literature Review

1. Related Studies

Prior studies have demonstrated that flashcards can be utilized to instruct reading skills, precisely word reading (e.g., Al-Kandari, 2023; Hatiningsih & Adriyati, 2018; 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.

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 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. Learners' 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.

2. 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. 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).

Figure 1

Mayer's Cognitive Theory of Multimedia Learning (Mayer, 2002)
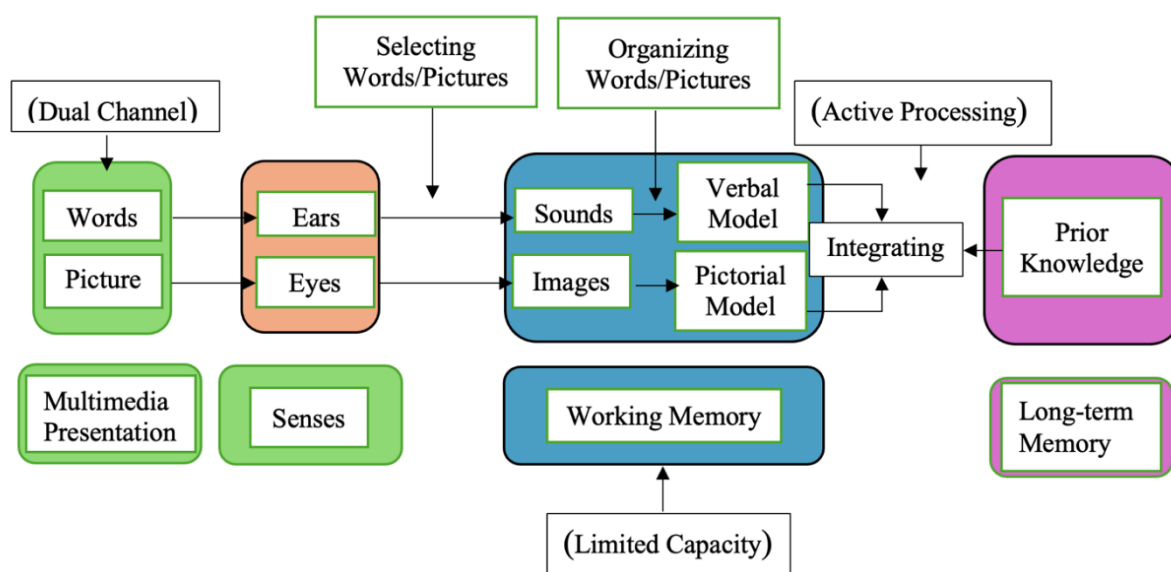
The cognitive load on working memory, the integration of auditory and visual components in multimedia learning has the potential to provide meaningful benefits. Learning results can be improved, according to Sorden's (2005) argument, when nonverbal visual pictures are combined with verbal and auditory 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 efficiently, learners demonstrate their better learning outcomes.

3. Reading Skills

For language learners, reading is considered one of the most essential skills. 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 is a complex skill for language learners, requiring the coordination of multiple abilities (Dujardin et al., 2023). Essential components for reading comprehension include vocabulary comprehension and spoken language fluency, as proposed by Gough and Tunmer (1986) in the Simple View of Reading (SVR). One common thread among these researchers is their focus on the importance of proficient word reading, which notably influences the understanding of text. (Rochman, 2018; Stahl & Nagy, 2006). Therefore, proficient reading comprehension is closely linked to word reading skills. Word reading skills as the ability to decode and understand words (Department for Education, 2023; Fraher et al., 2014; Hoover & Gough, 1990; Perfetti, 1985; Tonne & Pihl, 2013). Tonne and Pihl (2013) associate word reading with decoding and comprehension, while Hoover and Gough (1990) focus on the ability to read words in a text, emphasizing decoding and pronunciation as integral to word reading, with comprehension being a part of language comprehension, which involves connecting meanings with speech sounds.

Research Objectives

The present study investigated the effect of digital flashcards on improvement of Thai primary school students' word reading skills. It also explored learners' perception 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 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?

Methodology

1. Research Design

This study 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 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 up to assess the effectiveness of digital flashcards in improving EFL primary school students' word reading skills. A one-group pre-test and post-test 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.

2. Population and Samples

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 six 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. Learners' English skills were less than satisfactory, particularly in terms of Learners 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. Instrument(s) and Procedures

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 learners' Step-Up English textbook.

Words ending with 's' or 'es' in Chapters one to eight, 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. English words were selected from units one to eight of the textbook for Thai grade six 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 same participants. 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.

Example of Word Reading Test (WRT)

words	correct	incorrect	point
1. meets			
2. coats			

4. Data Collection

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 word list 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, teacher presents digital flashcards on the screen and tells the students to look at it and guess the word reading. Upon completion of the intervention, a post-test was conducted to measure learners' 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.

5. The Treatment: Digital Flashcards
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. The initial wordlist was piloted with a group of grade six 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.

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 Weber (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, p. 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.

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 (Yowaboot & Sukying, 2022). In addition, learners were assisted in developing their ability to decode words by emphasizing the correct pronunciation of specific words.

Over five weeks, the use of digital flashcards in the classroom systematically enhanced word reading skills, progressing from basic letter sounds to rhymes, syllables, and word clusters in sentences. Developed with Microsoft PowerPoint, the flashcards were presented using a computer, monitor, LCD projector, and speakers to display visuals and play precise audio pronunciations. The instructor provided Thai definitions and focused on phonological components, encouraging students to actively participate by examining and verbally expressing the phonological details of each word. Conducted twice weekly, the sessions introduced ten

new words and ten targeted words per session, giving students ample practice to strengthen their phonological awareness and word reading skills.

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.

Results

1. Digital Flashcards and Word Reading Ability Test in Thai EFL Primary Learners

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 (*S.D.* = 2.91) before the learning using digital flashcards, whereas the post-test participants scored a mean performance of 74.04% (*S.D.* = 2.90). Other relevant information is presented in Table 1.

Table 1

A Summary of Descriptive Statistics of Word Reading Skills Test

Time	Min	Max	*Mean*	(%)	*S.D.*	Skewness	Kurtosis
Pre-test	4	13	7.63	25.44	2.91	0.621	-0.757
Post-test	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 1, 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.

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 2

Comparisons between Pretest and Posttest

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

*Note: N=19; * p⩽.05*

2. Thai Primary School Learners' Perception of Using Digital Flashcards to Enhance Word Reading Ability

2.1 Quantitative Results of Leaners' Perceptions of Digital Flashcards in Word Reading Enhancement

Table 3

The Descriptive Statistics of Students' Perceptions towards using Digital Flashcards to Enhance Word Reading Ability

Items	Statements	*M*	*S.D.*	Percent	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
10	I feel much better when I use digital flashcards to learn word reading.	4.00	0.00	80.00	high

Table 4 (Continued)

Items	Statements	*M*	*S.D.*	Percent	Meaning
11	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 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 five 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 was shown in Table 3.

2.2 Qualitative Results of Students' Perceptions of Digital Flashcards in Word Reading Enhancement

This section presents the participants' perceptions 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 5

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 4 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 (Yowaboot & Sukying, 2022).

Table 6

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 about the learning environment and the use of digital flashcards to enhance word reading skills are summarized in Table 6.

Table 7

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 7.

Table 8

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 (Yowaboot & Sukying, 2022).

Discussion

1. Digital Flashcards and Word Reading Skills in Thai EFL Primary Learners

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 learners. 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; Yowaboot & Sukying, 2022). In communication, there are two pathways utilized for information processing: the auditory and visual pathways. The auditory pathway handles information through sounds, while the visual pathway deals with visible objects. Both the visual and auditory pathways process incoming multimedia data, which is then stored in sensory memory before being transferred to working memory. Within working memory, information undergoes selection, organization, and

integration, fostering favorable learning outcomes in long-term memory, particularly when interconnected with prior knowledge.

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). 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 often feature attractive color schemes and a range of illustrations, including fruits, animals, and various occupations.

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 (2002), 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.

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.

2. Thai primary School Students' Perception of Using Digital Flashcards to Enhance Word Reading Ability

The study examining primary school learners' views on using digital flashcards to enhance word reading skills yields valuable insights into the tool's educational benefits. Quantitative analyzed demonstrate that students perceived digital flashcards positively, particularly appreciating their role in facilitating rote word skills. This favorable perception is attributed to the simplicity of digital flashcards, which make them accessible and straightforward for practicing word reading. Despite potential decontextualization, flashcards are recognized as

effective for word reading, prompting quick improvements and aiding memory retention, contributing to student 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 learners. 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; Hatiningsih & Adriyati, 2018). As reported by the learners, 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 learners' 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 learners 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, 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. The consensus among researchers supports the notion that digital flashcards are a valuable tool for language growth, echoing the sentiments of previous studies (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 learners' 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 learners' learning environment, enhancing their word reading skills.

Students universally favored using digital flashcards, created by learners' English teachers, as an additional tool for word reading activities, citing their engaging and motivating qualities. This preference indicates that digital flashcards effectively sustain student interest and

prompt active involvement in English lessons. The unanimous consensus on the efficacy of digital flashcards suggests learners' substantial influence in cultivating stimulating educational experiences. The enthusiasm and participation displayed by students underscore the significant impact of digital flashcards on primary school learning, complementing traditional classroom methods and enhancing reading skills. This collective endorsement emphasizes the practicality and educational importance of digital flashcards, confirming learners' essential role in language education.

Conclusion

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 learners' 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.

Recommendations
1. Implications

The study on the use of digital flashcards for improving word reading ability among Thai primary school learners highlights the crucial role of integrating technology into language learning and teaching strategies. The findings suggest significant implications for educators, curriculum developers, material creators, and assessment designers, emphasizing the need to embrace technological advancements in pedagogy. Educators can leverage digital flashcards to enhance vocabulary and overall language learning, making teaching more engaging and effective. These versatile tools cater to diverse learning styles and needs, aiding in vocabulary

expansion, pronunciation improvement, and mastery of language subskills. Integration of technology-based learning tools into curriculum design, instructional materials, and language proficiency assessments is crucial for improving language learning outcomes and preparing students to success in a digitally interconnected world.

2. Further Studies

The study on the impact of digital flashcards on word reading skills among Thai primary EFL learners was limited by the COVID-19 pandemic, which necessitated online lectures and restricted the participant pool to a single government primary school in Northeastern Thailand, thus affecting the study's scope and generalizability. Additionally, the ethical review's focus on this single school and the use of L2 words from a specific grade six textbook further limited the research results. To address these limitations, future research should investigate a wider range of educational contexts, including students from diverse backgrounds, different learning and various language proficiency levels, to enhance the generalizability of findings. Moreover, it is important to compare the effectiveness of different types of flashcards (e.g., digital vs. paper, picture vs. text) to understand how the medium influences learning outcomes. Examining the relationship between learners' motivation and vocabulary retention rates when using digital flashcards could provide deeper insights into their pedagogical value. Lastly, including diverse participant groups in research is essential to understand how different demographics affect vocabulary growth and to identify any differential impacts of flashcard use. These recommendations aim to broaden the understanding of flashcard efficacy in language learning by considering the complexities of language acquisition and the potential benefits of digital technologies in varied educational settings.

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