Enhancing Vocabulary Knowledge through Multimodal Learning in Thai Primary Classroom

Pawinee Jaemsai

A Thesis Submitted in Partial Fulfillment of Requirements for
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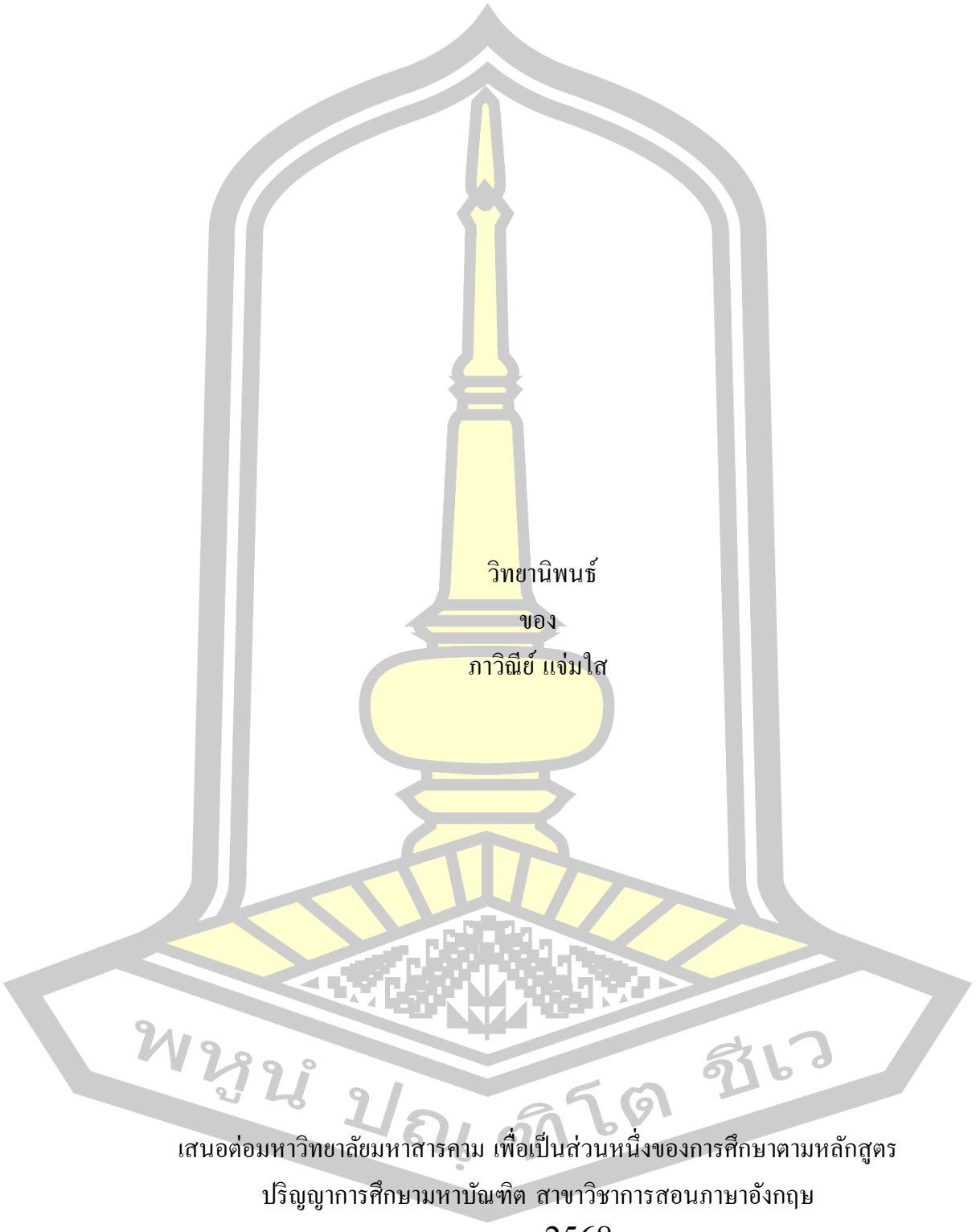

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ABSTRACT

In Thailand's EFL context, primary school students face significant challenges in vocabulary acquisition, with recent studies indicating that only 30% of students meet grade-level vocabulary requirements (Ministry of Education, 2024). While traditional vocabulary instruction often relies on rote memorization, recent research suggests that multi-sensory approaches may be more effective in addressing diverse learning needs and improving vocabulary retention (Smith et al., 2023; Johnson, 2024). This study investigates (1) the impact of multimodal learning on Thai primary school students' receptive and productive vocabulary knowledge and (2) students' perceptions of multimodal vocabulary learning. A mixed-methods design was employed, using a one-group pretest-posttest approach. Fourteen first- and second-grade students (3 females and 11 males, aged 7-8) from a primary school in Surin, Thailand, participated in an eight-week intervention. The intervention integrated visual, auditory, and kinesthetic elements, delivered in 1 hour sessions two times a week. Data collection included the validated Form Recall Test (FRT) and L2 Translation Test (L2TT), focus group interviews. Quantitative analysis revealed significant improvements in both receptive and productive vocabulary. Receptive vocabulary increased by 28.93% (L2TT: $t = 5.81$, $p < 0.05$), while productive vocabulary showed a 23.93% improvement (FRT: $t = 5.29$, $p < 0.05$). Qualitative findings, analyzed through thematic analysis, identified two themes: increased motivation from multi-sensory engagement, reduced anxiety in learning, improved vocabulary acquisition through multimodal learning, and greater classroom participation. These results show that multimodal learning significantly enhances vocabulary acquisition among Thai primary EFL students. Implications include integrating multi-sensory activities in vocabulary instruction, and promoting student-centered. Study limitations include a small sample size, no control group, and potential Hawthorne effect. Future research should use larger samples, include control groups, and assess long-term vocabulary retention.

Keyword : Multimodal learning, vocabulary acquisition, Thai primary school EFL students, vocabulary knowledge, form recall

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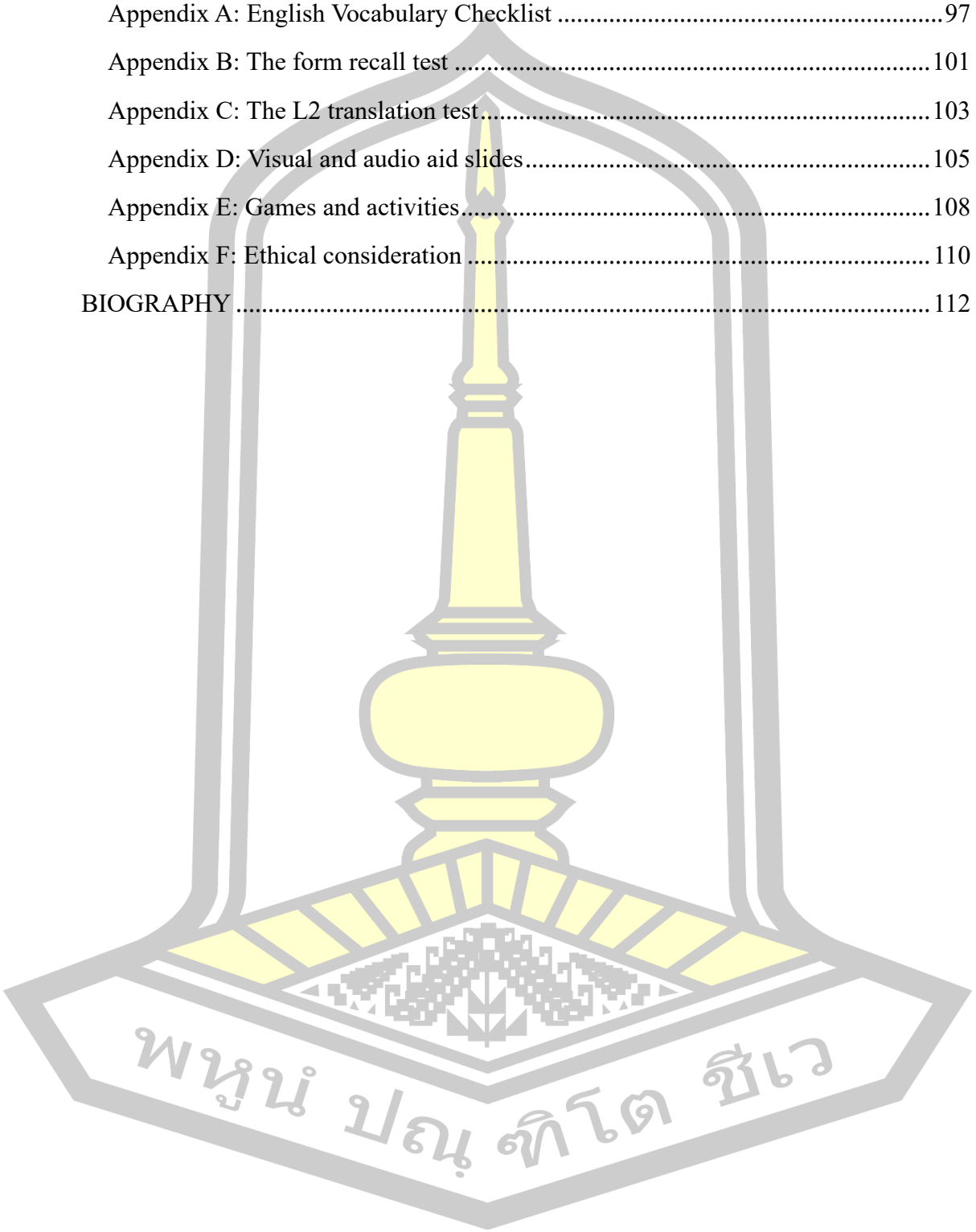

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CHAPTER I
INTRODUCTION

This introductory chapter provides an overview of the study, detailing its background, research purposes, scope, and significance. It begins by outlining the context and rationale behind the research, followed by a clear statement of the study's objectives. The chapter also describes the boundaries of the research, specifying the focus on primary school students in an EFL setting. Furthermore, it highlights the study's expected contributions to the language education field. Key terms relevant to the research are defined to ensure clarity and understanding throughout the document.

1.1 Background to the study

Exploring the multifaceted world of vocabulary knowledge, which encompasses understanding word meanings and relationships and a deep connection with vocabulary knowledge, comprehending diverse subjects and their interrelations, is vital for educational success (McEwan, 2009). Vocabulary is a complex construct, encompassing multiple dimensions such as form, structure, syntactic patterns, meanings, lexical relationships, and collocations, forming the backbone of language proficiency (Schmitt, 2010; Sukying, 2023). In the arena of second language classrooms, the emphasis on robust vocabulary explanations and active engagement in daily activities underlines the pivotal role that vocabulary plays in both language learning and overall comprehension (Cameron, 2002; Laufer & Goldstein, 2004; Nation, 2022; Schmitt, 2010; Schmitt & Schmitt, 2012). There are many parts to vocabulary explanation, such as using language, body language, logic, and the ability to adapt to different people and situations (Dalton-Puffer, 2007; Heller, 2016; Lauzon, 2014; Mortensen, 2011; Waring et al., 2013). This complexity can pose challenges for learners with limited L2 linguistic resources. However, the ability to explain is a crucial aspect of social recognition, allowing individuals to demonstrate initiative and expertise, with the skills developed being transferable beyond the classroom and essential in everyday and professional situations (Waring, 2011).

However, some students may be reluctant to memorize words and depend heavily on their teacher to find the meaning of a word, leading to an inadequate vocabulary. This can hinder their ability to use English effectively in examinations and potentially lead

to failure. Furthermore, limited vocabulary can cause difficulties understanding reading texts and applying appropriate vocabulary in sentences or paragraphs. To facilitate vocabulary learning, teachers should consider techniques that help students learn and remember words, emphasizing vocabulary learning from a young age. Teachers often face difficult choices among a variety of vocabulary strategies and seek answers on which strategy most impacts L2 vocabulary acquisition and long-term recall (Oxford, 2011)

In Thailand, English education is mandatory from kindergarten through university, emphasizing its significance as a crucial skill for global connectivity. However, despite continuous exposure to 000000English instruction, many Thai students still face significant challenges in learning and retaining English vocabulary. One of the most common issues in English classrooms is a lack of motivation and the perception that English is a complex subject, which leads to disinterest and disengagement in learning. This negative perception often stems from previous struggles with the language or a lack of opportunities to use English outside the classroom; according to a 2024 survey conducted by the Ministry of Education, which included 15,000 primary students, 68% of students reported feeling anxious about English classes, with 72% citing vocabulary acquisition as their biggest challenge. These findings highlight Thai students' difficulties in developing their vocabulary and overall English proficiency.

Vocabulary acquisition is crucial in mastering any language, mainly English as a Foreign Language (EFL). It plays a vital role in developing listening, speaking, speaking, reading, and writing skills and is directly linked to overall language proficiency (Sinatra et al., 2012; Webb & Nation, 2017). However, insufficient vocabulary knowledge remains a significant barrier for many EFL learners, particularly in Thailand, where students consistently score lower in English than other subjects (Mala, 2021). Various factors, such as the overwhelming number of new words, the abstract nature of many English terms, and the lack of consistent practice, compound the challenges in vocabulary acquisition. Traditional teaching methods often emphasize rote memorization and fail to promote deep understanding or long-term retention, leaving students disengaged and struggling to retain new vocabulary.

Additionally, learners' diverse learning styles must be considered, as visual learners benefit from charts and diagrams, auditory learners excel through listening activities, and kinesthetic learners retain vocabulary more effectively through physical activities and role-playing. Empirical data highlights these challenges, with the National Institute of Educational Testing Service (NIETS) reporting that in 2019, the average O-NET score for English was 34.4%, far below expectations. Furthermore, a study on Thai university students revealed that limited vocabulary significantly contributes to English-speaking anxiety (Poolperm & Boonmoh, 2024), underscoring the urgent need for effective vocabulary instruction that accommodates diverse learning needs. These findings underscore the urgent need for teaching strategies that address motivational issues, cater to diverse learning styles, and move beyond rote memorization. Implementing multimodal learning approaches incorporating visual, auditory, and kinesthetic elements can provide a more engaging and effective environment for vocabulary development, ultimately enhancing English proficiency among Thai students.

Amidst these challenges, teaching methodologies have evolved significantly, with technology increasingly playing a pivotal role in facilitating language learning and enriching the educational journey (Cope & Kalantzis, 2009; MacKenzie & Bathurst-Hunt, 2018). The advent of multimodal learning, which harnesses diverse modes and media, has transformed classroom environments, making learning more dynamic and substantially more engaging for students. By integrating various instructional media such as linguistic, visual, kinesthetic, and socio-cultural, multimodal learning captivates students and significantly enhances their linguistic abilities and vocabulary knowledge (Bansong et al., 2023; Pan & Zhang, 2020; Papadopoulou, 2019). This approach facilitates the teaching process, alleviates language learning difficulties, and enhances both learning and memorization capabilities, ultimately leading to profound mastery of vocabulary (Emerson et al., 2020; Ganapathy, 2016; Johnson et al., 2020; Mayer, 2014; Tosun, 2015).

Multimodality, a concept that emphasizes the interaction of various forms of representation, such as images, words, visuals, symbols, and signs, plays a significant role in language learning and comprehension (Bansong et al., 2023; Gee, 2005;

Yueguo, 2007). It involves multiple human senses interacting with the external world, stimulating different sensory responses. This concept focuses on constructing meaning through various modes, creating a communication and learning environment (Jewitt, 2008). It highlights the role of social and cultural contexts in shaping and interpreting these modes' meanings (Flewitt, 2019). Multimodality serves as a valuable benchmark for evaluating diverse meaning-making methods and has evolved rapidly in the current social, cultural, economic, and technological context. It primarily studies the interrelationships between various communicative modes, recognizing that traditional curricula may not be sufficient (Januarty, 2018). The multimodal principle suggests that learners gain knowledge through various modalities, not just texts or writing. Therefore, teachers may need to move beyond traditional norms to encourage students to gain abundant target language input (Bansong et al., 2023).

Multimodal learning engages learners in multiple forms of learning simultaneously, offering a diverse learning style that caters to all students. This approach uses various modes and perception channels to receive and convey information, allowing learners to produce what they have learned. It involves the combination of oral and written language, pictorial, gestural, physical, and spatial representations (Cope & Kalantzis, 2009; Jewitt, 2008). Multimodal learning is employed in English language teaching, using various modes and media to present content, explain concepts, and facilitate classroom interaction. This approach stimulates students' senses, enhances their interest in learning English, and motivates them to participate in language activities (Pan & Zhang, 2020). It allows learners to interact with the material in ways that suit them, using linguistic, visual, kinesthetic, and socio-cultural modes for meaning making (Francisco & Padilla, 2023). The rise of Multimodal learning in English as a Foreign Language (EFL) provides broader access to knowledge and information, equipping teachers with robust resources to conduct classes and provide high-quality lesson materials (Eisenmann & Summer, 2020). This approach fosters the development of students' language skills, including reading, writing, listening, and speaking. It emphasizes using various materials to convey information through the learner's senses, enhancing vocabulary knowledge.

Vocabulary plays a crucial role in second language (L2) learning and is essential at every stage of language development (Laufer & Shmueli, 1997; Nation, 2022). Effect teaching approaches are key to helping EFL learners acquire and retain vocabulary (Hees & Nation, 2017; Magnussen & Sukying, 2021). Research shows that multimodal learning can significantly enhance vocabulary acquisition by engaging in multiple senses and providing diverse learning experiences (Biria & Boshrabadi, 2014; Emerson et al., 2020; Ganapathy, 2016; Johnson et al., 2020). Multimodal learning incorporates visual, auditory, and kinesthetic elements to support vocabulary retention. Methods such as videos, audio recordings, interactive activities, and visual aids allow learners to process new words that match their learning styles. This approach helps students create stronger connections with vocabulary, making it easier to recall and apply in real-life contexts. This study delivered vocabulary instruction through images, gestures, pronunciation practice, and interactive activities, ensuring students could engage with words in meaningful and memorable ways. This study, guided by Mayer's (2009) cognitive theory of multimedia learning, emphasizes that learning is optimized when verbal (spoken or written words) and non-verbal (images, gestures, or actions) inputs are integrated, activating multiple cognitive pathways. Additionally, Schmidt's (1990) noticing hypothesis suggests that conscious attention to linguistic features enhances acquisition. By incorporating images, gestures, pronunciation, and interactive activities, multimodal learning draws students' attention to vocabulary engagingly and interactively, fostering active participation and long-term retention.

Beyond cognitive engagement, emotional factors play a key role in vocabulary acquisition. According to Krashen's (1982) affective filter hypothesis, learners' emotional states, such as anxiety, motivation, and confidence, significantly influence their ability to absorb and retain new language input. Traditional vocabulary instruction often creates high-anxiety learning environments, making it difficult for students to internalize new words due to several factors. First, the heavy reliance on rote memorization of word lists makes learning monotonous and cognitively demanding, which provides little meaningful context for retention. Moreover, traditional methods often lack multisensory engagement, which limits student's ability to process and recall vocabulary effectively. The fear of making mistakes further

increases anxiety, especially in oral recitation or direct questioning situations where students feel pressured to respond correctly in front of peers.

Additionally, traditional instruction frequently presents vocabulary in isolation, without sufficient contextualization, making it challenging for students to see how words function in real communication. The teacher-centered nature of traditional approaches also restricts student interaction and peer collaboration, discouraging active participation and reinforcing self-doubt. Furthermore, the emphasis on frequent testing and evaluation increases performance-related stress. This causes students to associate vocabulary learning with pressure rather than practical use. These challenges highlight the need for alternative approaches, such as multimodal learning, which integrates visual, auditory, and kinesthetic elements to create a more interactive and supportive environment that reduces anxiety, enhances engagement, and improves vocabulary acquisition and retention.

Recent studies suggest that traditional methods, which often rely on rote memorization, are insufficient in addressing the needs of young learners. Such methods fail to engage students in ways that align with their diverse learning styles and fail to foster long-term retention. In response to these limitations, multimodal learning, which integrates various sensory inputs like visual, auditory, and kinesthetic elements, has been identified as a promising strategy for enhancing vocabulary acquisition. Research by Xiuzhi (2023) and Cárcamo et al. (2016) has shown that multimodal approaches, particularly visual aids, audio, and physical movement, significantly improve vocabulary recognition and retention among EFL learners.

In Thailand, Bansong et al. (2023) demonstrated that multimodal learning techniques can effectively enhance vocabulary learning among Thai EFL primary school students. Their study, conducted in northeastern Thailand, found that after 16 hours of multimodal instruction over eight weeks, students showed substantial improvement in receptive and productive vocabulary knowledge. This suggests that integrating multiple sensory modes in vocabulary instruction can lead to better learning outcomes for young learners.

However, despite the growing body of research supporting the efficacy of multimodal learning in enhancing vocabulary acquisition, there remains a notable gap in applying

this method to younger EFL learners, particularly those in the early stages of their education, such as grades 1-2. Much of the existing research has focused on older students or more advanced learners (Xiuzhi, 2023; Cárcamo et al., 2016). Moreover, studies have often been conducted in different educational contexts, highlighting the need for research focusing specifically on younger Thai learners in primary education.

This study seeks to address this gap by investigating the effect of multimodal learning on vocabulary acquisition among Thai primary school students in grades 1-2. By focusing on this younger group, this research aims to fill the existing gap in the literature and contribute to the development of effective vocabulary teaching strategies tailored to young learners in the Thai EFL context. The study will explore how integrating visual, auditory, and kinesthetic elements in vocabulary instruction can enhance receptive and productive vocabulary knowledge, fostering greater student engagement and long-term retention.

Existing research highlights a notable gap in vocabulary knowledge among English as a Foreign Language (EFL) students, significantly impacting their overall language proficiency (Nation, 2013, 2022; Schmitt, 2008; Sukying, 2023). Studies have consistently shown that limited vocabulary knowledge is a key barrier to effective communication and academic success for many EFL learners, as vocabulary is foundational to mastering all four language skills—listening, speaking, reading, and writing. Nation (2013) emphasizes that acquiring a substantial vocabulary size is essential for learners to perform well in these areas, as vocabulary knowledge influences their ability to understand and produce language.

Subsequently, the study delivered vocabulary instruction through visual, auditory, and kinesthetic activities, providing learners with multiple opportunities to interact with and internalize new vocabulary. Visual learners benefited from pictures and flashcards, and auditory learners engaged with pronunciation drills, listening exercises, and songs. In contrast, kinesthetic learners participated in interactive word-matching games, gestures, and movement activities. By leveraging these different input modes, this study aimed to create a holistic and inclusive approach to vocabulary learning, ensuring sustained engagement, deeper cognitive processing, and improved retention. Given these insights, this research advocates integrating

multimodal learning in primary-level English language instruction. Educators can create engaging and effective learning experiences that accommodate diverse learning preferences and improve vocabulary acquisition by adopting a student-centred, multimodal approach. The findings of this study will shed light on an innovative instructional strategy beyond traditional rote learning, promoting an interactive, meaningful, and cognitively enriching environment that enhances vocabulary learning outcomes in young EFL learners.

1.2 Purposes of the Research

This study investigated the effects of multimodal learning methods on enhancing vocabulary acquisition among Thai primary school students in an EFL setting. Specifically, it aimed to (1) identify practical pedagogical strategies and instructional tools that facilitate vocabulary acquisition while increasing learning satisfaction among young learners in a formal classroom environment and (2) explore Thai primary school students' perceptions of multimodal learning as a tool to support their vocabulary learning development.

To achieve these objectives, the study incorporated a range of multimodal techniques that engaged multiple sensory modalities, including visual, auditory, and kinesthetic elements. These techniques included YouTube videos, animations, songs, video recordings, Microsoft PowerPoint presentations, and physical movements. By integrating these diverse instructional tools, the study sought to create an interactive and engaging learning experience that could enhance vocabulary retention and learner motivation.

The research was guided by the following questions:

1. To what extent does multimodal learning enhance vocabulary knowledge in Thai primary school students?
2. How do Thai primary school students perceive multimodal learning with English vocabulary learning?

1.3 Scope of the Research

The scope of this research was to examine the impact of multimodal learning on the English vocabulary knowledge of Thai primary school students. This study focused

on 14 beginner-level English students in grades 1-2 from a small Surin Province, Thailand school. The school was a small primary school near the Thailand-Cambodia border, with 54 students from kindergarten to grade 6. Each grade had only a few students. Since the researcher was the homeroom teacher of grade 2, the researcher had to use grade 2 students in this study, selecting students with the same language proficiency, which included grade 1 students. Due to the second-grade students had limited exposure to English because last year, as first-grade students, the first-grade homeroom teacher focused on reading and writing in Thai. As a result, first and second-grade students had similar levels of English proficiency. Their English skills needed improvement, as most students only knew the English alphabet, which included grade 1 students. The research design employed a one-group pretest-posttest design, where vocabulary tests were administered before and after implementing multimodal learning. Additionally, the study incorporated focus groups to identify the most effective multimodal learning.

The primary objective of this study was to enhance vocabulary learning among students learning English as a foreign language. To achieve this, the study utilized several instruments, including the Form Recall Test (FRT) and the L1-to-L2 Translation Test. The FRT measured productive knowledge of written forms, mainly focusing on vocabulary spelling, while the L1-to-L2 Translation Test assessed the students' understanding of form-meaning links. These instruments were developed based on previous research and were validated before implementation.

While the findings had limited generalizability to other EFL contexts and education levels, the primary aim was to improve vocabulary knowledge among students in the specific classroom setting of northeastern Thailand. The insights gained from this research could inform future educational strategies and contribute to the broader field of language education.

1.4 Significance of the study

This study provides valuable insights into the effectiveness of multimodal learning in EFL vocabulary instruction, particularly in Thai primary school contexts. By integrating visual, auditory, and kinesthetic modalities, multimodal instruction enhances both receptive and productive vocabulary knowledge, making language

learning more engaging, interactive, and effective. The findings highlight the need to move beyond traditional rote memorization toward student-centered, multisensory teaching strategies that align with young learners' cognitive and emotional needs.

This study offers evidence-based strategies for EFL teachers to enhance vocabulary instruction through multimodal learning. By incorporating visual aids, videos, songs, gestures, and interactive activities, teachers can create dynamic and meaningful learning experiences that support memory retention, comprehension, and active engagement. Structured group activities and individualized learning tasks help accommodate diverse learning preferences, ensuring all students benefit from multimodal instruction. The findings reinforce that integrating multiple sensory inputs strengthens cognitive associations, making vocabulary learning more accessible and effective for young learners.

For EFL learners, multimodal instruction fosters a more enjoyable, engaging, and effective vocabulary learning experience. Its interactive nature reduces learning anxiety, encourages active participation, and builds students' confidence in using new vocabulary. By leveraging images, audio, kinesthetic activities, and collaborative learning, students engage more deeply with language content, improving both retention and application of vocabulary in different contexts. Additionally, the study emphasizes the importance of emotional engagement, demonstrating that a supportive, low-anxiety environment enhances language acquisition and motivation.

Regarding the impact on curriculum and material development, this research provides valuable guidance for curriculum designers and educational material developers on creating resources that effectively support multimodal vocabulary learning. The study underscores the need for instructional materials, such as interactive textbooks, digital applications, and multimedia resources, that integrate visuals, sounds, and movement to maximize student engagement and learning outcomes. By leveraging technology and multimodal strategies, educational materials can be designed to offer high-quality, student-centered instruction that promotes meaningful language exposure.

Beyond its immediate classroom applications, this study contributes to the broader field of language education by advocating for innovative, student-centered, and multisensory teaching methods. It highlights interactive instruction's cognitive,

emotional, and social benefits, reinforcing the need for diversified teaching approaches catering to different learning styles. The study's findings offer practical applications for teachers, researchers, curriculum developers, and policymakers, ultimately supporting more effective and engaging vocabulary instruction in EFL classrooms.

1.5 Definitions of terms

Multimodal learning in this study refers to an instructional approach that integrates multiple sensory modalities to enhance Thai primary school students' English vocabulary acquisition. It involves the use of visual (images, videos, PowerPoints), auditory (songs, recorded speech, pronunciation practice), and kinesthetic (gestures, physical movements, interactive activities) elements to support learning.

Vocabulary knowledge refers to the ability to recognize, understand and use words accurately in different contexts. In this study, vocabulary knowledge is further categorized into two main aspects: receptive and productive vocabulary knowledge.

Receptive knowledge refers to the ability to recognize and understand the form and meaning of vocabulary.

Productive knowledge refers to the ability to recall and spell the written form of a word correctly.

Student perceptions refer to students' perceptions, engagement, and emotional responses toward vocabulary learning through multimodal instructional strategies. This includes their level of interest, motivation, and perceived effectiveness of using multimodal techniques, including visual (seeing), auditory (hearing), and kinesthetic (movement) input. Specifically, student perceptions are measured through focus group interviews, where students express their experiences, preferences, and reactions to multimodal learning. The data are analyzed to identify patterns of engagement, enjoyment, and behavioral and emotional responses.

Student Engagement refers to students' attention, participation, and emotional involvement in learning. It includes behavioral engagement (active participation in activities) and affective engagement (emotional responses such as motivation or anxiety)

Thai primary students refer to the first and second graders who study English as a foreign language at a small primary school in Surin province. They have a beginning level of English language proficiency.

1.6 Outlines of the Thesis

This thesis is structured into five chapters, each serving a distinct purpose in elucidating the conducted research.

Chapter I starts with the study background and emphasizes the importance of vocabulary knowledge in language use. The chapter also addresses vocabulary learning and teaching issues, the scope of the study, the significance of the study, and definitions of key terms.

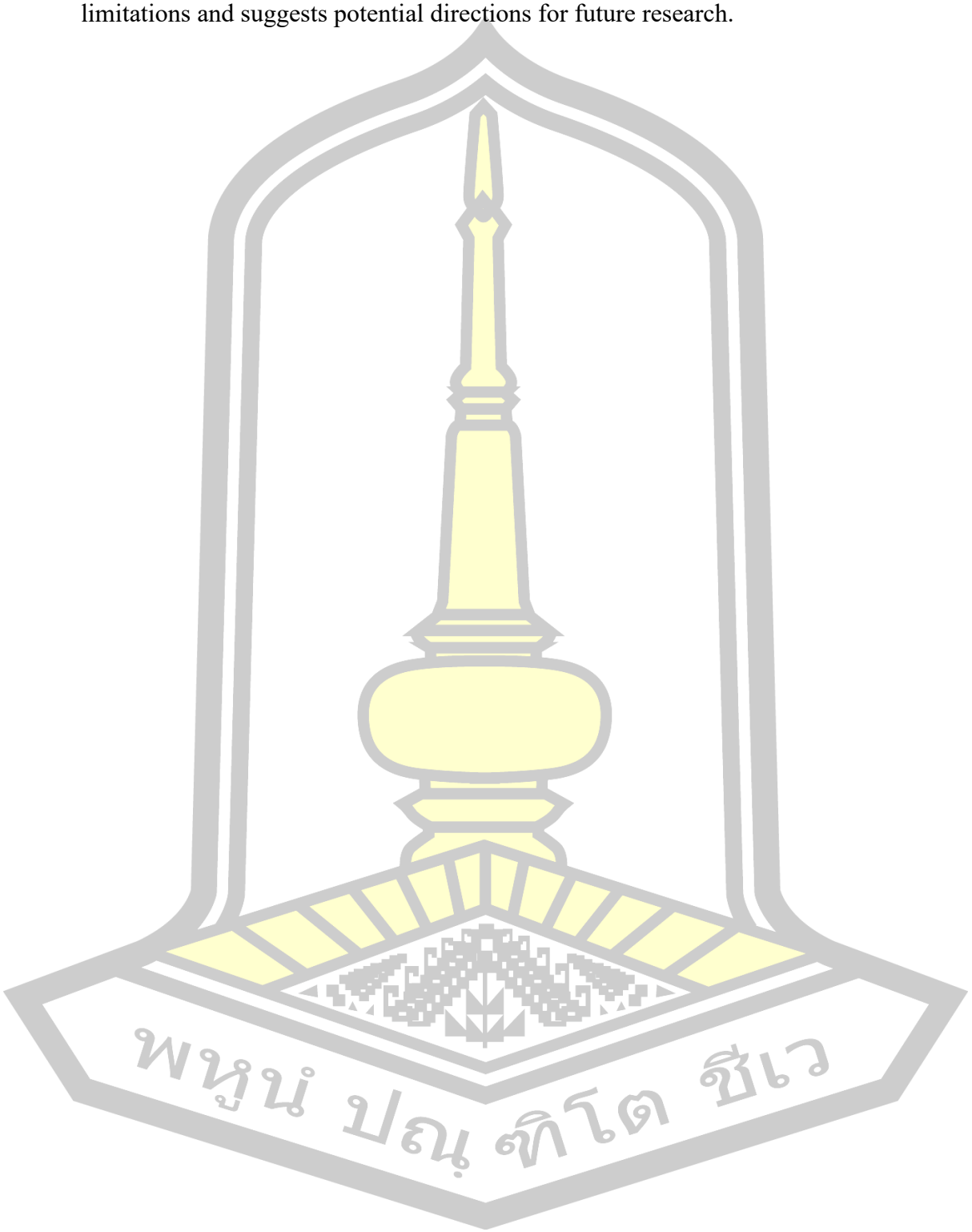
Chapter II reviews the theoretical framework for the study. First, it conceptualizes knowing a word and vocabulary knowledge, and the chapter points out vocabulary learning and teaching, multimodal learning and the roles of multimodal learning in vocabulary learning, particularly in an EFL context. This chapter then critically reviews previous studies related to the study.

Chapter III outlines the research methodology. The chapter describes the research paradigm and design, participants and setting, the research instruments, data collection procedure and data analysis techniques.

Chapter IV presents research findings both quantitatively and qualitatively. Quantitative results are analyzed using descriptive and inferential statistics, demonstrating significant improvements in receptive and productive vocabulary knowledge through multimodal learning. Qualitative findings are explored using thematic analysis based on behavioral and affective engagement, supported by excerpts from students' focus group discussions.

Chapter V consolidates the study's main findings. This chapter provides insights into the role of multimodal learning in enhancing vocabulary acquisition and development among Thai primary school students. It offers valuable implications for pedagogy, theoretical frameworks, and research methodology in EFL vocabulary instruction. The findings highlight the effect of integrating visual, auditory, and kinesthetic modalities

to support language learning. Additionally, the chapter acknowledges the study's limitations and suggests potential directions for future research.



CHAPTER II
LITERATURE REVIEW

This chapter provides the theoretical framework for the current study and reviews related studies to justify the research. The chapter begins with the conceptual framework of vocabulary knowledge and follows with approaches to teaching vocabulary. It then explores the idea of multimodal learning and discusses the roles of multimodal learning to vocabulary learning. Testing vocabulary knowledge is covered in the section. The chapter also reviews previous studies to identify research gaps and frame the study. Finally, the chapter ends with a summary of the chapter.

2.1 Conceptual Framework of Vocabulary Knowledge

Vocabulary knowledge is knowing the meanings of words, the relationships between words (word schema), and linguistic knowledge about words. Vocabulary knowledge is having an understanding (background knowledge) of many different subjects and disciplines (domains) and how they relate to one another (McEwan, 2009)

Vocabulary knowledge is a complex construct that includes various aspects such as form, word structure, syntactic pattern, meaning, lexical relations, and common collocations (Laufer, 1990). The word structures refer to the morphological knowledge of a word, while linguistic relations reflect the relations of words with their synonyms, antonyms, and hyponyms. The syntactic pattern is related to using a word in phrases or sentences. Henriksen (1999) offered a three-dimensional vocabulary continuum to reflect the progressing process of knowing a word, including a partial-to-precise knowledge dimension indicating the degree of meaning comprehension, a depth-of-knowledge dimension representing the knowledge association of a word, and a receptive-productive dimension reflecting learners' control and access to vocabulary knowledge.

Anderson and Freebody (1981) present a comprehensive notion of vocabulary knowledge, where "depth" means the comprehension level of a specific word or lexicon, and "breadth" refers to the quantity of vocabulary each student can understand. In contrast to the intricacy of understanding the depth of knowledge, constructing and conceptualizing the breadth of knowledge is comparatively

straightforward due to the extensive use of polysemous meanings and numerous associative networks in its conceptualizations. According to Henriksen (1999), three components comprise vocabulary knowledge: the proportion of receptive versus productive knowledge, the depth of knowledge, and the knowledge scales of partial-precise features. Partial-precise knowledge generally encompasses a range of vocabulary knowledge levels.

Words are not isolated language units but fit into many related systems, with various aspects of knowing about any particular word and many degrees of understanding. This involves exploring the relationship and boundaries between learning individual items and learning systems of knowledge. Recognizing a word can include memorizing its form or learning the systematic sound-spelling correspondences in the language. Nation (2022) details the various types of information involved in knowing a word, dividing word knowledge into three general aspects: form, meaning, and use, each with sub-aspects covering receptive and productive vocabulary knowledge.

Nation's (2022) framework presents the components involved in acquiring vocabulary, comprising three primary categories of vocabulary knowledge: form, meaning, and use. Students learning English as a Foreign Language (EFL) may supplement their existing knowledge with new information to develop a more robust foundation in the concepts of form to meaning and meaning. However, human learning strategies depend on individual characteristics, backgrounds, and experiences, and the optimal classroom implementation method is contingent upon combining various techniques. Nation's (2022) framework categorizes vocabulary knowledge into 18 sub-knowledge aspects, divided into three main categories: form, meaning, and use. Each category is split into receptive (R) and productive (P) knowledge. Form knowledge includes spoken, written, and word parts, meaning knowledge covers form-meaning links, concepts and referents, and associations; use knowledge encompasses grammatical functions, collocations, and constraints on use. This comprehensive model emphasizes recognizing (receptive) and actively using (productive) vocabulary in language learning. Nation's (2022, p. 54) knowledge of a word is presented in Table 1

Table 1: Knowing a word (Nation, 2022, p.54)

Form	Spoken	[R] What does the word sound like? [P] How is the word pronounced?
	Written	[R] What does the word look like? [P] How is the word written and spelled?
	Word parts	[R] What parts are recognizable in this word? [P] What word parts are needed to express the meaning?
Meaning	Form and meaning	[R] What meaning does this word form signal? [P] What word form can be used to express this meaning?
	Concept and referents	[R] What is included in the concept? [P] What items can the concept refer to?
	Associations	[R] What other words does this make us think of? [P] What other words could we use instead of this one?
Use	Grammatical function	[R] In what patterns does the word occur? [P] In what patterns must we use this word?
	Collocations	[R] What words or types of word occur with this one? [P] What words or types of words must we use with this one?
	Constraints on use	[R] Where, when and how often would we meet this word? [P] Where, when and how often can we use this word?

Notes: R = receptive knowledge, P = productive knowledge

Form knowledge identifies a word's phonological and morphological features in written and spoken modes. Meaning knowledge entails a learner having insight into form and meaning, concepts and referents, and word associations. According to Nation (2022), knowing a word consists of spoken form, written form, and word parts. Primary knowledge, in both spoken and written form, aids students in developing ongoing literacy skills. It enables learners to discern the definition and apply the term "related" across various contexts. In receptive, the spoken form of vocabulary is the capacity to utilize it. People can perceive the meaning of a sound and subsequently communicate that meaning to others, thereby facilitating conversation; this constitutes branded knowledge rather than productive knowledge. Utilizing knowledge of vocabulary and the contexts in which each vocabulary can be used, students can apply their vocabulary skills to simple conversations or short-answer questions. This demonstrates the benefits of vocabulary learning and enhances motivation to learn new vocabulary.

2.2 Approaches to Teaching Vocabulary

2.2.1 Deliberate vocabulary learning

Deliberate vocabulary learning is an intentional and focused effort to acquire new words and expand one's vocabulary. One essential factor in learning vocabulary is the ability of a learner to restore words to their short-term memory (Gathercole & Baddeley, 1983). This process relies on the familiarity and frequency of encountered words, allowing learners to recall them when needed. Unlike incidental learning, deliberate vocabulary learning involves instructional strategies focusing on the word as part of a system rather than merely part of a message. Nation and Newton (2006) emphasize the importance of context in providing clues to a word's meaning, which enhances understanding and retention. This method of learning is valuable as it can significantly boost vocabulary acquisition and result in implicit and explicit knowledge (Nation & Newton, 2020).

Techniques for deliberate vocabulary learning include using flashcards, word lists, vocabulary notebooks, and spaced repetition systems, as well as engaging in exercises that promote deep processing, such as creating sentences, learning word families, and using new words in various contexts. Learners can systematically enhance their language proficiency and communication skills by consciously focusing on vocabulary acquisition. Research has shown that deliberate vocabulary learning is particularly effective when combined with meaningful context and usage. For instance, Nation (2013) emphasizes that deliberate learning should be supplemented with extensive reading and listening activities, where learners encounter new words in different contexts, aiding in more profound understanding and retention.

Moreover, deliberate vocabulary learning can be tailored to individual needs, allowing learners to focus on words most relevant to their personal, academic, or professional lives. This targeted approach makes learning more efficient and motivating, as learners can see the immediate applications and benefits of their expanded vocabulary. A direct approach, where a deliberate effort is made to learn vocabulary (Nation, 1982), can augment the shortcomings of incidental vocabulary learning. Pellicer-Sánchez and Schmitt (2010) reveal that deliberate attention to unknown words leads to higher gains in all aspects of vocabulary knowledge.

Additionally, deliberate vocabulary learning is timesaving and more effective for long-term memory retention (Nation, 1982). Learners frequently use wordlists and word cards to deliberately learn vocabulary and study word parts (Nation, 1982; Nation, 2001). Studying word parts, such as prefixes, stems, and suffixes, is a valuable technique (Nation, 2008) because it helps learners see connections between related words, guessing meanings from context, strengthen form-meaning connections, and work out the meanings of some words (Nation, 2001). Learning vocabulary from word parts is significant for receptive vocabulary as it facilitates incidental techniques, such as guessing from context, to decode the meaning of unknown words (Nation, 2009; Wysocki & Jenkins, 1987).

Techniques for deliberate vocabulary learning

Flash cards or Word cards

Flashcards are described by Nation (2022) as compact cards that display a foreign word along with its definition on their respective sides, which are recognized as an effective method for acquiring vocabulary. These cards facilitate the process of repeatedly recalling the connection between the form and meaning of second language (L2) words by flipping them over, offering a quick method to expand one's vocabulary through intentional study. Flashcards can be crafted from materials such as paper or cardboard, featuring an illustration on one side and the related vocabulary on the opposite side (Aslan, 2011). Learning a foreign language is expected to include translations into the learner's native language on one side to aid in memorizing vocabulary and its meanings (McLean et al., 2013).

Flashcards are categorized into traditional paper cards and electronic or digital versions. Both varieties are designed to be sufficiently visible to all students in a classroom, utilizing both sides for vocabulary instruction. The effectiveness of flashcards lies in the student's ability to remember the answer on the opposite side upon viewing the word or picture. Beyond vocabulary acquisition, flashcards also enhance reading comprehension skills (Tan & Nicholson, 1997).

Flashcards have been employed for decades in English as a Foreign Language (EFL) pedagogy and are pivotal for direct vocabulary learning. This learning involves a three-step process: (1) selecting appropriate words, ensuring they are relevant and do not cause confusion; (2) creating the flashcards with the word on one side and its meaning, possibly in Thai, on the other for improved recall; and (3) consistently using these cards for practice both in and outside the classroom (Yowaboot & Sukying, 2022).

Flashcards must be used frequently over time for effective vocabulary acquisition, as a single exposure is insufficient for L2 learners to memorize the words (Nation, 2022). They also motivate learners positively (Ashcroft & Imrie, 2014) and can be utilized within formal education settings and more casual learning environments, making them versatile tools for study at any moment. A variety of flashcards are available commercially, but teachers and students alike have the option to create personalized ones. These cards are essential for practicing new alphabets, syllables, words, and other data, aiding in memorization through spaced repetition.

Effective use of flashcards involves several practices: (1) focusing on retrieval rather than mere recognition, (2) using an optimal number of cards, typically 15 to 20, (3) spacing out repetitions, (4) vocal repetition to enhance long-term memory, (5) applying deep processing when creating cards, (6) avoiding confusing elements, (7) frequently shuffling the card order, and (8) incorporating context and collocations (Tabrizi & Feiz, 2016). Adhering to these guidelines can significantly improve the efficacy of flashcards in learning vocabulary.

Word games

Games have a rich history, divided into two main periods: before and after the 19th century. Initially, games were primarily physical activities associated with special occasions like religious rituals, celebrations, and festivals. However, after the 19th century, games began to evolve into educational tools, with the first educational game, “The Mansion of Happiness,” aiming to teach children the difference between good and bad. Over time, games have improved with new materials, techniques, and approaches for better learning and educational experiences (El-Shamy, 2001).

In language learning, games are a source of amusement, relaxation and a pedagogical tool for vocabulary instruction. They provide an enjoyable atmosphere for students to practice language skills and increase their vocabulary mastery, stimulating their interest and motivation to learn English. Games offer a break from traditional teaching methods and allow learners to use the language in a practical context (Akdogan, 2017; Hadfield, 1990; Huyen & Nga, 2003; Wright et al., 2006). Games play a crucial role, particularly in vocabulary classes. Vocabulary is integrated into speaking, listening, reading, and writing lessons rather than being taught as a separate subject. Games help students understand new concepts or ideas, see from different perspectives, and experiment with various options. The primary purpose of vocabulary games is to provide students with much vocabulary input through play, allowing them to learn vocabulary in a single game session without requiring rigorous memorization. They contribute significantly to the teaching and learning process, making learning an enjoyable experience rather than a forced activity (Akdogan, 2017).

Game-based learning, particularly in vocabulary instruction, is highly effective and beneficial. Wright et al. (2006) asserted that games motivate students to exert continuous effort and maintain their interest in learning. Games are entertaining and challenging and provide a respite for students, enabling them to enhance their language proficiency. They implement practical and significant terminology within authentic situations, fostering and improving students' collaboration within the instructional setting (Nga, 2023).

Nation's (2022) strategies for successful vocabulary teaching emphasize a meaning-focused input, allowing learners to encounter new words in various forms through games. This approach also incorporates language-focused instruction, where learners are encouraged to memorize new words by understanding their importance in the game. This process enhances their understanding of the new words' meanings and parts of speech. Once learners know more details about the new words, they are expected to apply them to the game, receiving a meaning-focused output. This approach provides an opportunity to use the information in a real-life situation.

In conclusion, games serve as a valuable tool in vocabulary instruction, transforming the learning process from a passive activity into an engaging and interactive experience. They stimulate learners' interest and motivation to learn English, making vocabulary learning an enjoyable experience rather than a forced activity (Tanago, 2017). As most games need a winner, learners are stimulated to use their knowledge to achieve their goals, providing them with a fun and practical way to practice using new words.

2.2.2 Total Physical Responses (TPR)

Total Physical Response (TPR) is a teaching method developed by James J. Asher in the 1960s - 1970s that promotes physical movement while learning languages. This method, inspired by earlier efforts to include physical movement in language teaching, aims to activate the brain's right hemisphere in language learning, contrasting with traditional methods that primarily engage the left hemisphere. TPR allows learners to enjoy a less stressful learning process and provides a more successful approach to engaging with and acquiring a foreign language (Brown, 2007).

Asher's approach was informed by his observations of children learning their first language (L1) from their parents, where language exposure often consists of short commands resulting in simple actions. This led to the assumption that children acquire language by listening to simple commands and physically responding to them. Hence, physical movements are demonstrated first in TPR, followed by an oral demonstration (Richards & Rodgers, 2014). The learning theory behind TPR is based on three concepts: constructing a mental web for L1 while listening and acquiring the language, rapid language acquisition with motor movements when responding to commands, and natural speech following sufficient language acquisition. Today, TPR is widely used in classrooms globally.

The Total Physical Response (TPR) method, developed by James Asher, is a language teaching approach that integrates physical movement with language learning. Based on the brain's wiring for languages, Asher's theory posits that the left and right hemispheres play different roles in language learning. While most language learning

occurs in the left hemisphere, activating the right hemisphere with physical movement enhances learning as it helps learners relax and reduces anxiety levels. This method is particularly effective with young learners and beginners as it aligns with their natural learning processes involving movement and physical actions. In the classroom, the TPR procedure involves students listening to a constructor giving the commands and acting them out, then listening and repeating the actions without repeating the words. This approach emphasizes the importance of physical movement in language learning and the benefits of a low-stress learning environment. Studies have shown that TPR can have a “strong” effect on academic achievement, particularly in vocabulary learning, by fostering creativity and increasing active participation.

Total Physical Response (TPR) combines physical movement with verbal input to enhance vocabulary learning. This method significantly benefits elementary students by emphasizing vocabulary within imperatives, facilitating easier recall and comprehension, and improving vocabulary mastery. TPR's success is attributed to its child-friendly nature, which encourages active participation and positive reinforcement through familiar daily activities. Teachers can create an interactive and engaging learning environment where students respond to verbal commands with corresponding actions, reinforcing the connection between words and their meanings and aiding memory retention and recall. For example, when teaching action verbs, a teacher might say “jump,” and students would physically jump, linking the word to the action. This multisensory approach reduces anxiety, promotes active participation, and makes learning more enjoyable, especially for young learners and beginners (Asher, 2009; Celik et al., 2021; Richards & Rodgers, 2014; Setiawan et al., 2022). By involving the whole body in the learning process, TPR caters to kinesthetic learners and helps solidify vocabulary in long-term memory, demonstrating the method's effectiveness in creating a stress-free learning environment through body language.

2.3 Multimodal learning

Jewitt (2008) states, “multimodal attends to meaning as it is made through the situated configurations across image, gesture, gaze, body posture, sound, writing, music, speech, and so on. From a multimodal perspective, image, action, and so forth are

referred to as modes, as organized sets of semiotic resources for meaning making" (p.246). However, each mode has limitations and potential, and it communicates and represents ideas in distinct ways from other modes. For example, written text and visual images convey information and meaning differently (Kress, 2010). Multimodal learning in language teaching involves engaging two or more senses in interactions, using various channels, such as networks, pictures, and role play, to enhance learners' abilities and experiences (Pan & Zhang, 2020).

Multimodality can be described as the multiple human sensory organs interacting with the outside world (Yueguo, 2007), which can stimulate different human senses. There are generally five communication modalities: visual modality, auditory modality, tactile modality, olfactory modality and gustatory modality.

Multimodality is a concept that examines how meaning is made through various modes, such as image, gesture, gaze, body posture, sound, writing, music, speech, and more. These modes are seen as organized sets of semiotic resources that can be combined in different ways to create situated configurations of communication and learning (Jewitt, 2008). Multimodality also emphasizes the role of the social and cultural contexts in shaping and interpreting the meanings of these modes (Flewitt, 2019). Moreover, multimodality is a useful standard for measuring and evaluating meaning-making diversity. It is a complex combination of meaning-making activities that have undergone rapid changes in the contemporary social, cultural, economic and technological context. Multimodality mainly studies the interrelationships between various communicative modes, visual or auditory, words or images (Januarty, 2018). Multimodality is a concept introduced and developed in the last two decades to account for the different resources used in communication to express meaning. The term is used both to describe a phenomenon of human communication and to identify a diversified and growing field of research (Donaghy, 2023).

A mode is a means of communicating. Each mode serves different purposes and works in different ways. It is essential to be aware of people's various modes when communicating to fully understand the conveyed meanings (Serafini, 2013). There are five modes or semiotic systems of communication: linguistic, visual, aural, gestural, and spatial. These are explained in more detail below.

Linguistic mode: The linguistic mode focuses on the meaning of written or spoken language in communication. This includes choice of words, the organization of words into sentences and paragraphs, vocabulary, grammar, and structure.

Visual mode: The visual mode focuses on the meaning of what can be seen by the viewer. This includes images, symbols, signs, and videos. It also includes aspects of visual design such as color, physical layout (the way the parts of something are arranged), font type (the style and design of letters) and size.

Aural mode: The aural mode focuses on the meaning of what can be heard by the listener. This includes voice, sound effects, background noise, music, and silence. This meaning can be realized through volume, tone, pitch (how high or low a sound is), speed, and rhythm.

Gestural mode: The gestural mode focuses on the meaning of communication through movement. This includes expressions on the face, hand gestures, body language, and interaction between people.

Spatial mode: The spatial mode focuses on the meaning of communication through physical layout.

This includes position, spacing, the distance between elements in a text, and space between people/objects. Writers use the spatial mode of communication in the physical layout and organization of a text. For example, a bi-fold pamphlet (text printed on paper and folded twice) presents information spatially on four panels (Donaghy, 2023).

Multimodality, as a form of communication instruction, employs advantageous modes to convey information or subjects, and is considered and highlighted by several scholars (Beetham & Sharpe, 2013; Falk-Ross & Evans, 2014; Ganapathy & Seetharam, 2016; Marantika, 2021; Papageorgiou & Lameras, 2017; Varaporn & Sitthitikul, 2019). It is demonstrated as a more collaborative, constructive, and interactive method of instruction by administering quizzes and coursework that require students to use their voices and bodies to demonstrate their understanding. This enhances students' comprehension and inspires them to participate more actively

in a multimodal classroom, emphasizing the substantial effect that multimodal instruction has on student motivation.

Li (2022) posits that integrating multimodal learning underscores the relationships between task-based learning and communication. This approach requires using multiple senses to integrate various communication modes into teaching. English teachers apply theoretical knowledge to practical teaching, training students' practical abilities. The process of learning English is concurrent with the acquisition of knowledge. Teachers employ scientific teaching methods to facilitate efficient learning of English. Teachers incorporate teaching environments, contents, purposes, and additional factors in designing multimodal learning. They create interactive activities and scene simulations to convey knowledge through listening, speaking, reading, writing, and classroom participation. Body language teachers can assist in using stance, movement, facial appearance, and eye contact to stimulate students' visual senses and deepen their understanding of lessons. Multimodal learning environments present materials in more than one sensory mode, enhancing learners' perception of ease in learning and improving their attention. Teachers and educational researchers develop multimodal tools, such as digital technologies or multimedia, that align with the current curriculum to enhance students' learning and improve their multimodal competencies. Teaching is multimodal in educational contexts when incorporating more than one mode (Li, 2022).

Multimodal learnings in language teaching

Multimodality, a concept that examines how meaning is made through the use of various modes such as image, gesture, gaze, body posture, sound, writing, music, speech, and more, has been increasingly recognized for its potential to make sense of the text when only printed materials cannot convey the meaning (Jewitt, 2013; Kress & Leeuwen, 2001; Phengsuai, 2019; Tongton, 2018) This approach, intricately linked to multimodality, focuses on the diverse modes employed to dynamically represent meanings and is particularly applicable in teaching English reading. Multimodal learning environments allow the presentation of materials in more than one sensory mode, enhancing learners' perception of ease in learning and improving their attention.

Teachers and educational researchers strive to develop multimodal tools, such as digital technologies or multimedia, that align with the current curriculum to enhance students' learning and improve their multimodal competencies. Teaching is deemed multimodal in educational contexts when it incorporates more than one of these modes, and this approach is believed to be beneficial to English language learners with limited English as it can help them engage in multiple reading and writing activities. Shifting modes from visual to verbal or vice versa can help students better understand, appreciate, and interpret complex concepts in English (Julinar, 2019). Modes, which can be understood as ways of representing information or the semiotic channels used to compose a text, include words, sounds, moving images, animation, and color, while media are the tools and material resources used to produce texts. Using multimodality to stimulate students can enhance their learning interest and memory, facilitating knowledge acquisition and comprehension. Multimodal symbols in teaching, such as pictures, videos, audios, texts, and languages, can appeal to multiple senses, stimulating students' interest, memory, and attention (Ji & Luo, 2019). In this context, multimodal resources in language learning provide students with various affordances tailored to their unique learning styles and aptitudes. For instance, visual resources might improve the comprehension and retention of information for visual learners, while audio materials might be helpful for auditory learners. By utilizing these resources, language teachers can provide students with a variety of learning options that fit their individual interests, resulting in a more interesting and individualized learning experience (Anis & Khan, 2023)

In English teaching, teachers use various modes and media, such as graphs, words, colors, pictures, movement, audio clips, videos, or tangible objects, to present teaching content, explain, and organize classroom interaction. This process employs different communication channels and semiotic systems to stimulate students' other senses, enhancing their interest in learning English and motivating them to participate in language activities (Pan & Zhang, 2020). The multimodal learning in teaching provides opportunities for learners to interact with the given material in ways suitable to them. For example, the linguistic mode refers to the use of words in meaning-making, the visual mode refers to the use of images, the kinesthetic mode refers to the

use of body movement, and the socio-cultural mode refers to the learner's cultural background and social interaction (Francisco & Padilla, 2023).

Instructional materials, including flashcards, posters, comics, videos, and games, can enhance classroom multimodal learning. These materials support multimodal learning by offering different access points for comprehension, inviting participation, and motivating repeated practice so that natural language samples are memorized and can become part of the learners' language repertoire (Kaminski, 2019). Strategies for teachers to design and use these materials effectively include considering students' needs and interests, providing scaffolding, encouraging peer interaction, and assessing students' learning outcomes (Yawiloeng, 2022).

2.4 Roles of multimodal learning to vocabulary learning

Multimodal learning is a method of instruction that uses various sensory inputs, including visual, aural, and kinesthetic components, to enhance language acquisition. This approach helps students improve their skills by utilizing images, role-playing, and a variety of sensory passages. Still, it also assists students in effectively recognizing, comprehending, translating, and retaining information. According to Bansong et al. (2023), this approach lays the groundwork for applying knowledge and automatically retrieving information. Using this strategy considerably improves the feeling of ease in learning, increases students' attention, and enhances overall educational outcomes by making learning more interesting and less monotonous (Pellerin & Lavoie, 2019). This is accomplished by activating various senses.

The use of multimodal learning approaches also provides teachers with improved techniques for teaching vocabulary, improving students' ability to acquire vocabulary and their pragmatic language abilities (Ding & Fan, 2022). To cultivate an atmosphere conducive to learning, educators implement pedagogical practices supported by scientific research. They develop engaging games and simulations covering all aspects of language acquisition, including listening, speaking, reading, writing, and active involvement in the classroom. Not only does this method accommodate the unique needs of learners, but it also considerably enhances knowledge retention. This is accomplished by integrating a variety of learning modalities.

Furthermore, the development and integration of multimodal tools such as digital technology and multimedia are carefully coordinated with current curricula to improve students' learning experiences and multimodal competencies. Instructors enhance the interactive nature of teaching by including quizzes and coursework that require students to demonstrate their understanding physically and vocally, thereby affirming the collaborative, constructive nature of multimodal learning (Ding & Fan, 2022; Ferguson, 2022; Pellerin & Lavoie, 2019). This dynamic method incorporates real-world topics into the classroom, encouraging creativity in both students and teachers while preparing them for a diverse global context.

Recent research, building upon the findings of Nation (2022), has demonstrated that using resources such as video, audio, and captions (VAC) can greatly improve student performance in both listening and writing evaluations. Nevertheless, significant inconsistencies arise when video and audio are employed without subtitles. These gaps emphasize the need for additional research on the auditory vocabulary proficiency of beginner and intermediate learners. This aspect has been traditionally neglected in favour of focusing on aural vocabulary identification without addressing recall. To have a deeper comprehension of knowledge retention, it is essential to measure students' capacities in recognizing and recalling information using written and auditory evaluations (Nation, 2022).

In summary, multimodal learning is an interactive and efficient educational approach that incorporates various resources, including diagrams, words, colors, pictures, symbols, gestures, aural clips, videos, and tangible items, to create captivating teaching materials and facilitate classroom interactions. This strategy increases the learning experience and develops vast vocabulary skills, facilitates efficient learning, improves retention, and encourages an active and participatory learning environment, preparing students with the required abilities to succeed in a diverse, multimedia-rich world.

2.5 Frameworks underlying vocabulary acquisition through multimodal learning

2.5.1 Cognitive theory

Cognitive Theory, first proposed by Jean Piaget in the 1930s, posits that learning, whether in general education or second language acquisition, is a conscious and

reasoned process involving the deliberate use of learning strategies. This theory emphasizes how a person receives, organizes, stores, and retrieves information, suggesting that learners play an active role in information processing, focusing on developing knowledge, memory, thinking, and problem-solving areas (Feder, 2024). It goes beyond observable behavior, emphasizing the internal mental processes in learning. In education, integrating cognitivist principles involves adapting instructional strategies to match these internal cognitive processes (Feder, 2024). For instance, adult learning principles can help guide professors, while other learning theories may be better suited for elementary learners.

Regarding second language acquisition, cognitive theory emphasizes the central role of cognition in the conscious and explicit learning of the rules of a language as a code (Ellis & Wulff, 2019). It suggests that acquisition is primarily driven by what learners pay attention to and become aware of in target language input (O'Malley & Chamot, 2012). Piaget, one of the first to create a standardized model for language acquisition from a cognitive perspective, addressed Plato's problem by referring to four developmental stages, each marked by a 'genetic epistemology,' meaning that the limits of knowledge at each stage were marked with biological functions. As the child progresses through each stage, they combine various schemas, and as these schemas become complex, the child can accommodate increasingly complex grammar and vocabulary.

Cognitive theory can significantly enhance vocabulary learning by promoting deep processing and meaningful connections between new and existing knowledge. Instead of relying on rote memorization, Cognitive Theory encourages learners to engage in activities that require them to process information at a deeper level, such as using images, diagrams, and real-life contexts to understand and remember new vocabulary. By organizing vocabulary into categories or themes, students can better structure their knowledge, making it easier to retrieve and use terms when needed. The Schema Theory aspect of Cognitive Theory suggests that connecting new vocabulary to existing cognitive frameworks helps deepen understanding and retention (Anderson, 1984). Regular practice, review, and constructive feedback reinforce long-term memory and vocabulary application. By addressing diverse learning styles and

incorporating various sensory inputs, Cognitive Theory creates a more effective and engaging vocabulary learning experience (Schmitt, 2000).

Cognitive Theory connects deeply with multimodal learning in vocabulary acquisition because it emphasizes how learners process, store, and retrieve information through multiple cognitive pathways. According to this theory, learning is not a passive reception of information but an active construction of knowledge, where new vocabulary is integrated into existing mental structures (schemas). When learners encounter words through multiple sensory modalities, such as visual (images or videos), auditory (listening to pronunciation), and kinesthetic (gestures or interactive activities), they engage in different cognitive processes that reinforce memory encoding and retrieval. This aligns with Dual Coding Theory (Paivio, 1986), which suggests that verbal and non-verbal information are stored in separate but interconnected cognitive systems. Learners create multiple memory traces by processing vocabulary through visual and linguistic representations, leading to better retention and recall.

Additionally, Schema Theory within Cognitive Theory suggests that learning occurs more effectively when new knowledge is connected to prior experiences. Multimodal Learning facilitates this by activating multiple schemas simultaneously, deepening comprehension, and making vocabulary learning more meaningful. Moreover, Cognitive Load Theory (Sweller, 1988) highlights the limitations of working memory, emphasizing that distributing cognitive load across different sensory channels—rather than overloading one—enhances learning efficiency. When learners engage in multimodal activities such as images, videos, listening to pronunciation, gestures, and interactive activities, they are not just memorizing words but actively constructing and contextualizing their meaning. This approach, grounded in Cognitive Theory, ensures that vocabulary is retained longer and applied more effectively in real-world communication.

2.5.2 Multimedia learning theory

Multimedia learning theory, proposed by Richard Mayer, posits that individuals learn more effectively when information is presented through multiple modalities, such as

text, images, audio, and video, rather than through a single modality. This theory is grounded in cognitive psychology and focuses on how people process and integrate information from different sensory inputs. Mayer's theory suggests that using multiple forms of media can help learners build connections between verbal and visual representations of information, leading to deeper understanding and better retention. The theory emphasizes the importance of coherent and well-designed multimedia presentations that align with cognitive principles, such as minimizing cognitive overload, using relevant multimedia elements, and promoting active learning through interaction and engagement.

According to multimedia learning theory, effective multimedia instruction should incorporate both words and pictures, as this dual coding helps to create mental models that are more comprehensive and easier to recall. Mayer identifies several principles to guide the design of multimedia educational materials, including the multimedia principle (using both text and images), the spatial contiguity principle (placing related text and images close together), and the temporal contiguity principle (presenting corresponding words and pictures simultaneously). By following these principles, teachers can enhance learning experiences, making complex information more accessible and memorable. This theory is particularly relevant in today's digital age, where multimedia resources are abundant and can be effectively utilized to support various educational objectives (Mayer, 2009).

In other words, multimedia does not necessarily mean technology; instead, it involves any method that engages two sensory input channels, visual and auditory. This definition underscores the broad applicability of Multimedia Learning Theory in various educational contexts, highlighting the versatility and effectiveness of combining different types of media to facilitate learning.

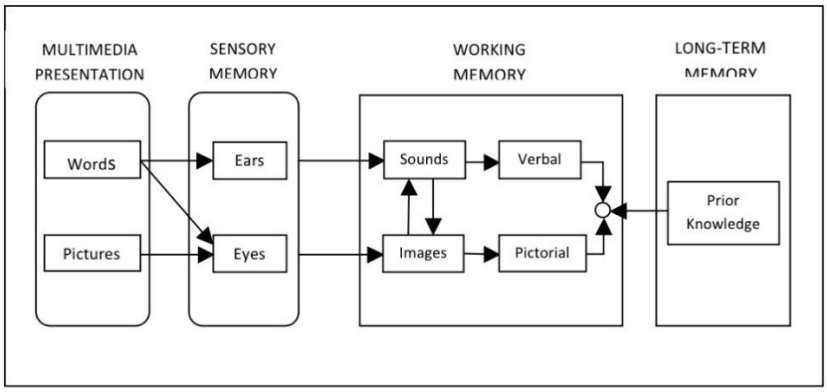


Figure 1: multimedia learning theory

This theory can significantly enhance vocabulary learning by providing a rich and engaging learning environment that caters to different learning styles. For instance, pairing new vocabulary words with relevant images and audio pronunciations can help learners create stronger associations between the word and its meaning, facilitating deeper understanding and retention. Additionally, multimedia presentations can incorporate context-rich scenarios, allowing learners to see and hear how words are used in various contexts, aiding comprehension and application. Interactive elements, such as quizzes and games, further reinforce vocabulary by providing immediate feedback and opportunities for practice. By leveraging the principles of Multimedia Learning Theory, teachers can create dynamic and effective vocabulary lessons that improve both the retention and application of new words (Mayer, 2009).

Using text, visuals, and sounds simultaneously, Multimedia learning, which uses text, images, and sound simultaneously, enhances the dual coding process where learners encode information in linguistic and non-linguistic forms. This leads to more substantial memory traces and more effective information retrieval. For instance, when learners encounter a new word, such as "eat," they learn the vocabulary alongside an image, audio pronunciation, and gestures. These experiences create multiple associative connections, making the word easier to remember and apply. Furthermore, multimedia learning supports cognitive engagement by making vocabulary learning more interactive and appealing. It keeps learners motivated and actively involved in the learning process. It also helps manage cognitive load, as

explained by Sweller's (1988) cognitive load theory, by distributing information across various sensory channels. This prevents a single cognitive pathway overload and enables learners to process new vocabulary more efficiently.

2.5.3 Noticing hypothesis

The noticing hypothesis, developed by Richard Schmidt over 20 years ago, posits that language input must be consciously registered, or "noticed," to become intake for language learning. This hypothesis suggests that what learners notice and become aware of in the target language is crucial for second language acquisition (SLA). Schmidt emphasized that attention is necessary to convert input into intake, highlighting distinctions between noticing, attention, and consciousness.

Schmidt proposed four levels of consciousness: intention (intentional and incidental learning), attention (focusing on attractive elements), awareness (sensing stimuli with explicit and implicit learning), and control (choosing the language to use). The hypothesis underscores the importance of intrinsic motivation and the interaction between the language environment and the learning mechanism (Kalashi, 2023).

The concept of noticing is crucial for language acquisition, as it suggests that conscious focus and awareness significantly aid learning. Language learners must consciously notice linguistic features in input to acquire new language forms, making it particularly essential for vocabulary learning. This hypothesis emphasizes that mere exposure to language input is insufficient; learners need to actively notice new words and their usage in context to remember and integrate these words into their active vocabulary. Teachers can guide students' attention to essential vocabulary aspects through explicit techniques like highlighting and underlining or implicit methods like converting text formats. Activities such as running dictation can also help students notice language features independently. Engaging learners in activities that require them to consciously focus on and use new words, such as sentence construction or contextual guessing, further solidifies their understanding and recall. Thus, the Noticing Hypothesis underscores the necessity of conscious awareness in vocabulary acquisition, providing a framework for effective language teaching strategies (Schmidt, 1990; Ellis, 1995).

This concept aligns with Multimodal Learning, which enhances the learner's ability to focus on and process vocabulary by presenting it through various sensory modalities such as text, images, audio, and interactive activities. In a multimodal learning environment, new vocabulary is presented in multiple ways, making it more likely for learners to notice and internalize key linguistic features. For instance, when learners encounter a new word through flashcards featuring an image, the word, and its pronunciation, they will likely become aware of that word's meaning, pronunciation, and word form. This aligns with Schmidt's claim that noticing is a prerequisite for learning. Multimodal learning enhances the prominence of vocabulary items, ensuring learners deeply engage with new words rather than merely encountering them superficially.

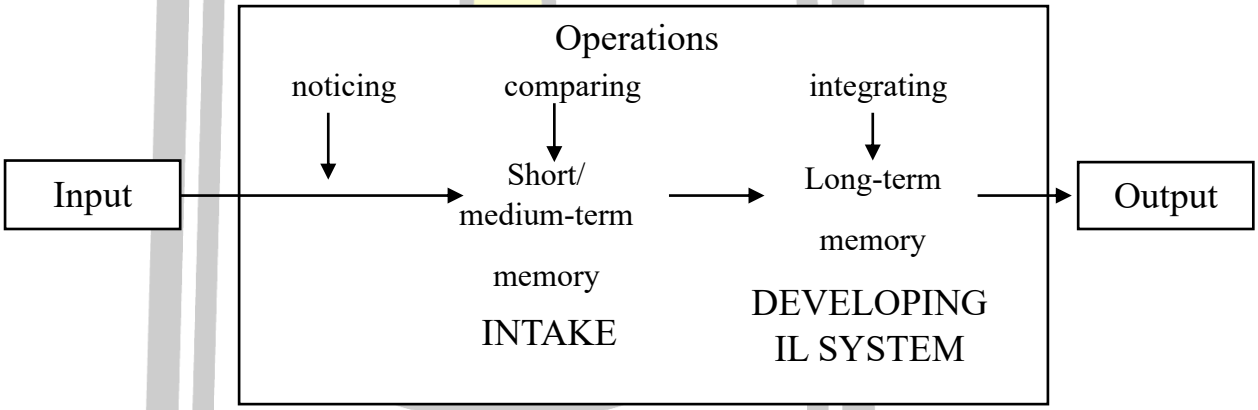


Figure 2: The process of learning implicit knowledge

2.5.4 Affective filter hypothesis

The affective filter hypothesis, proposed by Stephen Krashen and initially introduced by Dulay and Burt (1997), posits that emotional factors such as motivation, anxiety, and self-confidence significantly influence language acquisition, including vocabulary learning. According to this hypothesis, emotional factors determine the strength of a learner's affective filter, which can either facilitate or hinder the learning process. A high affective filter, often caused by low motivation, low self-confidence, or high anxiety, acts as a barrier that blocks language input, making it less effective. Learners with a high affective filter are less likely to absorb and process the language they are exposed to, even if the input is comprehensible. On the other hand, a low affective filter, resulting from high motivation, self-confidence, or low anxiety, allows language

input to be more effectively processed and internalized. Learners with a low affective filter are more receptive to language input and can achieve better acquisition outcomes.

Teachers can help lower the affective filter by creating a supportive and engaging learning environment, using techniques that reduce anxiety and boost confidence, such as positive reinforcement, interactive activities, and culturally relevant materials. The hypothesis underscores the importance of creating a supportive and motivating classroom environment. Teachers are crucial in providing comprehensible input in a low stress setting to help reduce students' affective filters. By fostering a positive attitude towards language learning and minimizing anxiety, teachers can enhance students' motivation and self-confidence, leading to more effective language acquisition and improved vocabulary learning outcomes (Krashen, 1982).

Multimodal learning lowers the affective filter by making vocabulary acquisition more engaging, interactive, and emotionally stimulating. Learners interacting with vocabulary through images, animations, games, and auditory input are more likely to feel motivated and less anxious, fostering a positive learning environment. Multimodal Learning provides personalized learning experiences, allowing learners to engage with vocabulary in ways that suit their preferences and strengths. For example, visual learners benefit from pictures and flashcards, auditory learners from songs and pronunciation exercises, and kinesthetic learners from gesture or interactive activities. This learner-centered approach aligns with Krashen's claim that lowering the affective filter enhances language acquisition, as students feel more in control of their learning and develop a stronger sense of confidence in using new vocabulary.

Moreover, social interaction and feedback in multimodal environments create low-pressure opportunities for learners to practice vocabulary without fearing making mistakes. This supportive and interactive learning setting ensures that vocabulary input is not just received but actively processed and retained, making language learning more natural and effective.

2.6 Testing vocabulary knowledge

Mastering vocabulary is fundamental to acquiring a foreign or second language. Effective vocabulary learning requires repeated exposure to words in diverse contexts and active engagement with those words. Activities such as glossing, where learners focus on the meaning of unfamiliar words, can significantly enhance vocabulary retention (Rbamezanali et al., 2021). Words, as the building blocks of language, form the foundation of complex structures like sentences, paragraphs, and texts. However, learners often need help with lexical gaps, where they encounter words or concepts in their second language (L2) that are difficult to understand or articulate in their first language (L1). The process of acquiring new vocabulary often requires deliberate effort, with learners spending substantial time memorizing word lists and relying heavily on bilingual dictionaries. This approach underscores the perception that language acquisition is largely about learning vocabulary. Recently, after years of emphasizing grammatical proficiency, language educators and researchers have started to recognize the critical role of vocabulary acquisition in language learning. As a result, assessments are increasingly focused on monitoring students' vocabulary growth to ensure that their lexical knowledge aligns with their communication needs (Nontasee, 2023).

Measuring vocabulary knowledge is essential for evaluating learners' language proficiency, particularly in terms of word knowledge. This is vital not only for teaching and learning a second language but also for understanding a learner's overall language ability (Anderson & Freebody, 1981; Nation, 2022; Palmberg, 1987; Saehr, 2008; Vermeer, 2001). Various assessments have been developed to capture different aspects of vocabulary knowledge, with some researchers advocating for tests that assess multiple facets simultaneously, while others emphasize the need to evaluate learners' progress along a continuum of knowledge (Laufer & Goldstein, 2004; Read, 2000; Schmitt et al., 2020; Wesche & Paribakht, 1996). Word knowledge, a critical component of language proficiency, can be divided into receptive and productive knowledge. Receptive knowledge involves recognizing and understanding words, while productive knowledge requires the ability to recall and use words appropriately (Read, 2000). These types of vocabulary knowledge are generally independent of each

other, with receptive knowledge focusing on comprehension and productive knowledge on language use.

There is ongoing debate about the specific aspects of word knowledge that vocabulary assessments should target. Bachman (1990) proposed a model that integrates lexical knowledge with communicative abilities, suggesting that vocabulary assessments should reflect both the breadth and depth of a learner's lexical knowledge. Read and Chapelle (2001) emphasized the need for assessments that go beyond decontextualized word lists to provide meaningful feedback on the teaching and learning process. The design of vocabulary tests often depends on their objectives; for example, tests aiming to measure overall vocabulary size should capture both full and partial knowledge, while tests focusing on complete knowledge of specific words should be more detailed (Cameron, 2002). However, many vocabulary tests tend to assess only one area of knowledge, either receptive or productive, which can lead to incomplete assessments of vocabulary learning (Read, 2000; Webb, 2009). Consequently, a more comprehensive approach that includes both receptive and productive tests is necessary to measure vocabulary knowledge accurately.

Schmitt (2010) identified several challenges in studying the relationship between receptive and productive vocabulary knowledge, including the difficulty of assessing all aspects of vocabulary and the practical usefulness of different assessment methods. Given the developmental nature of vocabulary acquisition, longitudinal studies that track learners over time are essential for a deeper understanding of the learning process (González-fernández & Schmitt, 2020; Schmitt & Meara, 1997; Sukying, 2017; Sukying, 2020; Zhong, 2018). In this study, a series of tests will be employed to measure various aspects of vocabulary knowledge, focusing on both receptive and productive knowledge, to provide a comprehensive assessment of learners' vocabulary abilities.

Test of receptive vocabulary knowledge

The Test of Receptive Vocabulary Knowledge evaluates a learner's ability to recognize and comprehend words when they are presented in context without requiring the learner to produce the words themselves. This type of assessment

typically includes tasks such as matching words to definitions, selecting the correct meaning of a word from multiple choices, or identifying the meaning of a word within a sentence or passage. Receptive vocabulary knowledge is crucial for understanding and interpreting language, particularly in reading and listening contexts. Unlike productive vocabulary tests, which require learners to generate words, receptive tests focus on recognition and comprehension, making them an essential tool for evaluating language comprehension skills. These tests are widely used in language proficiency assessments because they can efficiently cover a broad range of vocabulary, providing a reliable measure of a learner's ability to understand language in real time (Nation, 2022; Schmitt, 2010).

Test of productive vocabulary knowledge

The test of productive vocabulary knowledge assesses a learner's ability to recall and produce words in appropriate contexts actively. Unlike receptive vocabulary tests, which focus on recognizing and understanding words, productive tests require learners to generate words from memory. These assessments typically involve tasks such as fill-in-the-blank exercises, word formation tasks, or speaking and writing prompts where learners must use specific vocabulary accurately. Productive vocabulary knowledge is directly related to a learner's ability to use language effectively in communication, making this type of test particularly valuable for evaluating how well learners can apply their vocabulary in real-world situations. By requiring active word production, productive vocabulary tests provide a more rigorous assessment of a learner's depth of vocabulary knowledge and their ability to use language creatively and precisely (Laufer & Nation, 1995; Webb S. , 2008).

2.7 Related Studies

Many studies have used multimodal learning to investigate students' vocabulary knowledge. This approach has been applied in foreign and Thai contexts and significantly enhanced students' vocabulary knowledge. multimodal learning, which engages multiple senses, has been found to capture students' attention and facilitate the learning of word knowledge. These findings underscore the effectiveness of multimodal learning in vocabulary instruction.

Xiuzhi (2023) examined multimodal instruction's influence on students' vocabulary recognition. The research revealed that the acquisition of vocabulary by participants was substantially improved by multimodal vocabulary instruction. In addition, it was discovered that the groups that received visual text with graphic mode or spoken text with graphic mode outperformed the other groups in vocabulary recognition, underscoring the influence of new media on the acquisition of foreign language vocabulary. However, Montero-SaizAja's (2022) research aimed to investigate the productive vocabulary of English as a Foreign Language (EFL) learners, who were classified as either multimodal or unimodal according to their preferred learning styles. In the investigation, there were 60 12th-grade EFL learners, 24 of whom were multimodal and 36 of whom were unimodal. A 2,000-word Productive Vocabulary Levels Test (PVLT) version and a Learning Style Survey (LSS) were employed to gather data. According to the results, multimodal learners who employ multiple sensory modalities possessed a more extensive productive vocabulary (1,186 words) than unimodal learners (948 words). However, their modality preferences did not substantially influence the learners' vocabulary knowledge.

Cárcamo et al. (2016) examined the role of multimodality in vocabulary acquisition among pupils in school. Eighth- to eleventh-grade students from two semi-public institutions participated in the investigation through an action research methodology. Thirty words were taught through a multimodal instruction method during five intervention sessions. Pre-post-test results were compared using the Kruskal-Wallis test, and students' dominant learning preferences were assessed using the VARK test. The research discovered a substantial increase in vocabulary acquisition due to multimodal instruction, which implies that multimodal exposure, such as associating words with imagery, aids in vocabulary acquisition. Similarly, the current study supports this idea but incorporates kinesthetic activities in the multimodal approach. Integrating physical movement and visual and auditory input provides an extra dimension to vocabulary learning that Cárcamo et al.'s research did not emphasize. This extension of multimodal learning is particularly valuable for young learners, whose physical engagement often enhances their cognitive processing.

Ding and Fan (2022) examined the efficacy of multimodal learning methods in teaching English vocabulary. To ascertain whether the implementation of multimodal theory in the instruction of English vocabulary in junior high school can enhance students' vocabulary learning abilities and increase teachers' vocabulary teaching abilities, the investigation included 110 seventh-grade students and 10 teachers. According to the research, students' pragmatic skills, teachers' instructional abilities, and students' vocabulary acquisition were all enhanced by multimodal vocabulary instruction. Also, it underscored educators' need for more comprehensive comprehension and theoretical knowledge of the multimodal learning approach. The research determined that applying multimodal theory to junior high school English vocabulary instruction benefited students' learning and the instructors' abilities.

Yu and Liu (2022) examined the impact of various sequences of L1 translations and images on the retention and enhancement of the vocabulary meanings of EFL learners. Learners' word-meaning acquisition and retention in English as a Foreign Language (EFL) were compared in the study between text-first and picture-first multimodal input. The pupil participants were 14 to 15-year-olds studying English as a second language for eight years. The research revealed that, although both groups made substantial progress, participants who learnt with picture-first input made significantly more progress and exhibited more positive attitudes. The results of this study demonstrate that the presentation of images before L1 translations positively impacts the acquisition of L2 vocabulary meaning. This is attributed to the advantages in mental construction, working memory, and attention, which enable learners to make more substantial progress in their vocabulary knowledge.

Lee and Aspiranti (2023) assessed the impact of a multimodal vocabulary instruction app, Endless Alphabet, on the vocabulary learning of first-grade students. The study involved 69 students from economically disadvantaged suburban neighborhoods and used a pretest-posttest within-subject design. The research aimed to investigate the effects of exposure to new vocabulary items within the app, the impact of additional recorded explanations of target words, and whether less-skilled and more-skilled readers benefit equally from the app. The findings demonstrated that the app significantly enhanced vocabulary learning, with recorded word explanations leading

to more pronounced vocabulary gains. Less-skilled and more-skilled readers found the app beneficial, with less-skilled readers demonstrating more substantial improvements when supplemented with recorded explanations. The study also found that most students had a positive experience with the app, feeling it aided their vocabulary learning, and teachers observed a positive change in their students' vocabulary knowledge.

A study by Barwasser (2021) investigated a combined storytelling intervention for its potential to increase expressive vocabulary and the number of sight words for struggling L2 German adolescents with learning and behavior problems. The study involved four participants aged 13–15 with learning disabilities and special needs. Small groups conducted the intervention, which involved a two-stage storytelling intervention using flashcards and personalized stories. The study found that this intervention significantly improved the participants' expressive vocabulary and sight-word reading skills, demonstrating its effectiveness in enhancing vocabulary and reading performance. Wang and Chen (2018) combined the Integrated multimodal Framework of Learning Analytics (IMFLA) with the Concept Mapping (Cmap) approach to improve students' vocabulary and reading abilities. The study involved 70 students from a public university in Taiwan, divided into an experimental group and a control group. The experimental group learned English vocabulary using a corpus-based wordlist, wrote online logs, translated a novel, and took tests at the end of each semester. In contrast, the control group used a more traditional approach, memorizing vocabulary, writing assignments, and translating a novel. The research found that the IMFLA and Cmap significantly boosted students' vocabulary and reading skills, with the experimental group exhibiting sustained progress in reading skills even post-experiment. The study recommends using digital wordlists and Cmaps in language instruction to improve students' vocabulary and reading skills.

This multimodal learning instructs English and other subjects, including science. According to a study conducted by Townsend et al. (2018), the instructional practices of middle school instructors were used to investigate the development of academic vocabulary among students. The study employed a mixed-methods approach, incorporating instruments such as the Academic Vocabulary Spelling Inventory

(AVSI) and the Content-Area Academic Language Task (CAALT), video-recorded teaching observations, and focus group discussions. The study conducted with 30 middle school students, predominantly English language learners from a U.S. public school, indicated that multimodal instruction can effectively improve students' academic vocabulary, particularly in science education. The study also underscored incorporating students' perspectives regarding their learning environment into instructional design.

To accommodate the technological era, multimodal learning is implemented when instructing students using mobile devices, desktops, or applications. It serves an indispensable function in daily existence. Jie (2023) proposed a cloud computing-based multimodal vocabulary teaching mode and assessed its efficacy, in addition to researchers who incorporate technology into their research. The research determined that this interactive learning method, which employs cloud computing hardware to facilitate vocabulary acquisition, effectively motivates students and improves their capabilities. The results of this study verify the feasibility and efficacy of this approach in the instruction of English vocabulary, thereby demonstrating a substantial improvement in the integration of cloud computing into conventional education. However, the investigation also pinpointed areas that require enhancement. Furthermore, Rahimi and Allahyari (2019) conducted a study that examined the influence of multimedia-assisted explicit Vocabulary Learning Strategies (VLS) instruction on the strategy use and vocabulary acquisition of foreign language learners. According to the investigation, the experimental group, which received multimedia-assisted VLS instruction, demonstrated a substantial improvement over the control group regarding vocabulary acquisition and size. The research determined that multimedia-assisted VLS instruction significantly improves the acquisition of vocabulary and the effectiveness of strategy use among foreign language learners.

In the Thai context, Bansong et al. (2023) investigated the effects of multimodal learning on English vocabulary knowledge among Thai EFL primary school students. The quasi-experimental study involved 59 students from northeastern Thailand, divided into experimental and control groups. The research instruments included two tests based on Nation's (2013) word knowledge framework and a questionnaire to

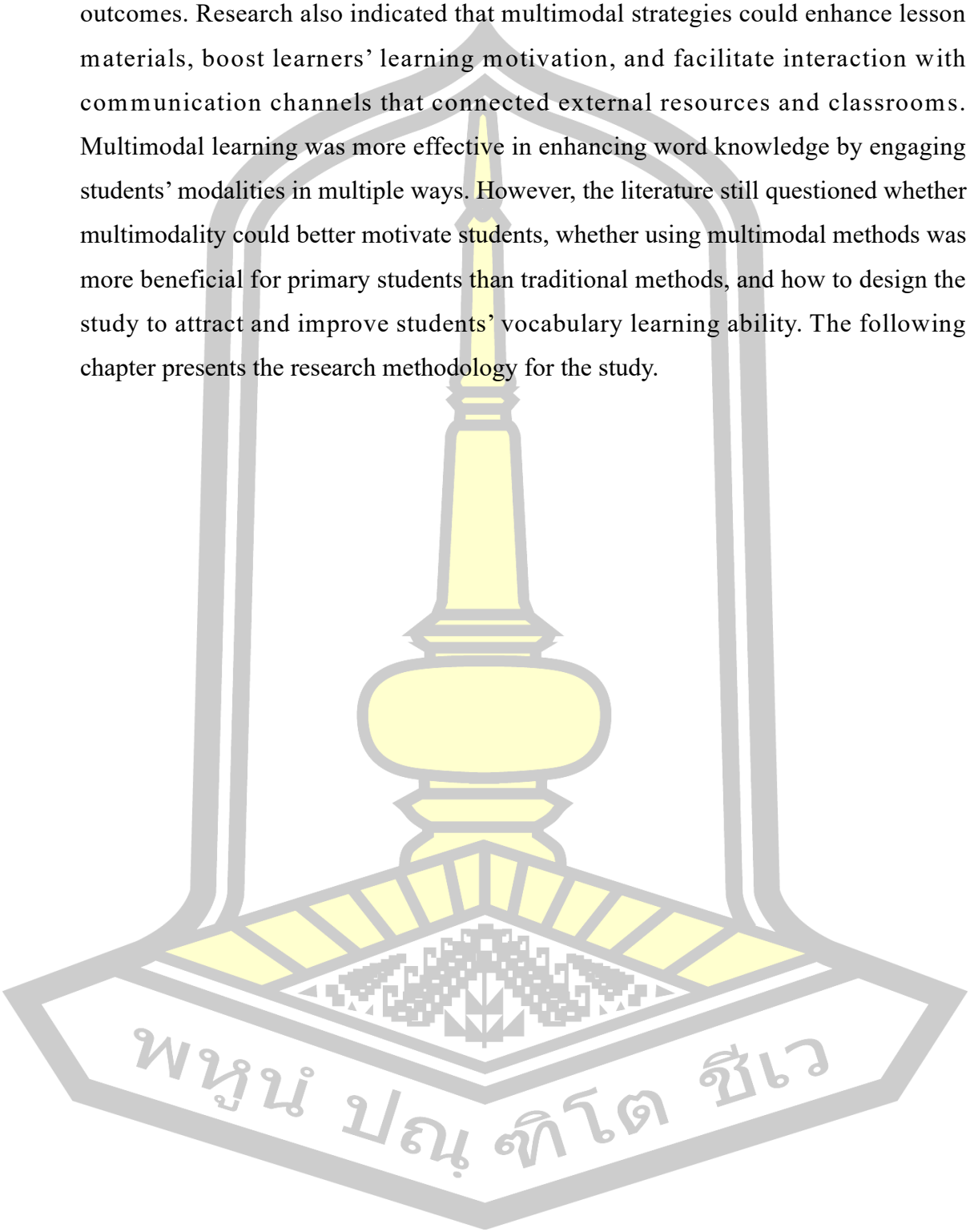
explore the participants' attitudes towards multimodal learning methods. After pre-testing, students received 16 hours of multimodal instruction over eight weeks. The study found that multimodal learning techniques effectively enhanced vocabulary learning among Thai EFL primary school learners.

In conclusion, the findings from previous studies provide empirical evidence that various aspects of word knowledge can significantly facilitate vocabulary acquisition and language development. These studies highlight the effect of multimodal learning on supporting and enhancing students' vocabulary learning. The use of diverse learning strategies in multimodal learning has shown positive effects, making it a recommended approach by many researchers due to its applicability to various learning styles. Therefore, these studies' conclusions provide practical insights into simplifying word knowledge complexities and enhancing vocabulary acquisition and overall language proficiency. Hence, multimodal learning caters to the three primary learning styles: auditory, visual, and kinesthetic. This adaptability improves academic performance as students receive information through the modalities that best suit their learning styles. The literature strongly suggests that multimodal learning effectively enhances vocabulary among Thai primary school learners. By integrating various modes of communication, teachers can foster a more engaging and interactive learning environment, thereby boosting student motivation and vocabulary learning outcomes. Teachers can apply diverse methods, such as visual aids, songs, and games, in the classroom to enhance vocabulary acquisition among primary school learners in Thailand through the multimodal learning.

2.8 Chapter summary

Vocabulary was a crucial part of the language learning processes, especially in English, and included all four skills: listening, speaking, reading, and writing. Vocabulary knowledge comprises three main aspects: form, meaning, and use, as well as two processes: receptive and productive. Based on a literature review, this research focused on first- and second-grade primary learners at a small school in Thailand. The aim was to enhance vocabulary knowledge to the CEFR-A1 level of 1,050 English words selected and compared from the student's textbook. The study employed multimodal learning to achieve this level of word knowledge. As previous studies

showed, this teaching strategy significantly enhanced learning capability and positive outcomes. Research also indicated that multimodal strategies could enhance lesson materials, boost learners' learning motivation, and facilitate interaction with communication channels that connected external resources and classrooms. Multimodal learning was more effective in enhancing word knowledge by engaging students' modalities in multiple ways. However, the literature still questioned whether multimodality could better motivate students, whether using multimodal methods was more beneficial for primary students than traditional methods, and how to design the study to attract and improve students' vocabulary learning ability. The following chapter presents the research methodology for the study.



CHAPTER III
RESEARCH METHODS

This chapter details the research design and methods used in this study, starting with the quasi-experimental research to implement a multimodal approach. This study will employ a mixed-method research approach. It describes the participants as 14 Thai primary school students aged 7 to 8 and students with various learning styles. The research instruments include the Form Recall Test (FRT) and the L2 Translation Test (L2TT) to measure vocabulary knowledge and focus group interviews to gain qualitative insights. Reliability and validity are ensured through pilot studies, expert evaluations, and statistical measures such as the Item-Objective Congruence (IOC) index and Cronbach's alpha. Data analysis combines quantitative methods using SPSS software and qualitative analysis of focus group interviews, providing a comprehensive view of the multimodal teaching approach's effectiveness. The chapter summarizes the integration of these methods to evaluate the impact on vocabulary acquisition, offering valuable insights into effective language teaching practices for young learners.

3.1 Research Design and Paradigm

This study employed a mixed-method research approach, integrating qualitative and quantitative methods to provide a comprehensive understanding of the research problem (Creswell & Plano Clark, 2007). This study used a one-group pretest-posttest design; the quantitative aspect examined primary school students' receptive and productive vocabulary knowledge through multimodal learning. Qualitatively, a focus group explored learners' perceptions of multimodal learning to investigate the qualitative data and describe the phenomenon of using the intervention with the participants. The current research emphasized qualitative more due to a small number of participants (N=14). Quasi-experimental research in language classrooms was a well-regarded approach in applied linguistics and educational research, often used to enhance pedagogical methods.

The primary objective of this design was to foster positive transformations in the classroom environment, augmenting student collaboration and participation. This approach encouraged continuous change, self-improvement, and growth. When

students were actively involved in learning, the dynamic classroom environment demanded constant teacher attention, often limiting reflection and formative assessment opportunities. Thus, this quasi-experimental design aimed to provide a more intentional and critical evaluation to improve pedagogical practices. Over eight weeks, the study assessed whether multimodal learning could enhance primary school students' vocabulary knowledge, focusing on the connection between vocabulary form and meaning.

3.2 Participants and Setting

The participants of this study were 14 Thai EFL primary school learners, aged 7 to 8 years old, from grades 1 and 2 at a small primary school in northeastern Thailand. The school was located near the Thailand-Cambodia border and had 54 students, ranging from kindergarten to grade 6. Due to the small number of students per grade, each class consisted of only a few learners. In particular, there were only nine second-grade students, making it necessary to include five first-grade students to ensure a sufficient sample size for the study. As a result, first- and second-grade students were combined in the same classroom for every research session, participating in the same learning activities throughout the study period.

These students were selected based on classroom context and comparable language proficiency levels. Although second-grade students had been studying English for about four hours per week, their exposure to the language was limited because their first-grade homeroom teacher had primarily focused on reading and writing in Thai the previous year. Consequently, both first and second-grade students had similar levels of English proficiency, making them a suitable group for assessing the effect of multimodal learning. Their English skills required further development, as most students were only familiar with the English alphabet and needed to expand their vocabulary to improve their reading and writing abilities. Additionally, their primary means of communication with peers and teachers at school was their first language (L1) rather than English.

These students were chosen to align with the research objectives, which focused on vocabulary acquisition through multimodal learning, including first- and second-grade students, ensuring a consistent learning environment while allowing for a broader

range of learners with similar language abilities. This setup was particularly beneficial for evaluating how multimodal learning strategies impact vocabulary acquisition, engagement, and overall language development.

Moreover, selecting students aged 7-8 was based on language development research, which identifies early childhood as a critical period for vocabulary acquisition. Young learners are highly responsive to multisensory learning, such as visual, auditory, kinesthetic, and interactive activities at this stage.

The research was conducted over eight weeks, and each participant devoted two hours per week to multimodal learning. Utilizing critical sources such as the internet, news articles, or films was uncommon. Instead, the focus was on direct interaction with learning materials tailored to accommodate different learning styles. This study was designed as quasi-experimental research to implement multimodal learning to enhance vocabulary acquisition among these students. The primary focus was to examine the effect of multimodal learning on students' vocabulary knowledge development and their perceptions of Multimodal Learning. Despite the unique challenges posed by their learning styles, the study aimed to improve their English vocabulary knowledge.

3.3 Research Instruments

In this research, two primary instruments were used to examine the impacts of Multimodal Learning. The first instrument was the vocabulary knowledge test, which evaluated the students' vocabulary knowledge before and after implementing the multimodal orientation. The second instrument was an attitude focus group. Additionally, the research incorporated two specific tests: the L2 Translation Test, which assessed the knowledge of form-meaning links, and the Form Recall Test (FRT), designed to measure the productive knowledge of written form, specifically word spelling knowledge. The instruments were provided in detail in the following sections.

3.3.1 The L2 Translation Test (L2TT)

The L2 Translation Test (L2TT) is a tool designed to measure students' receptive vocabulary knowledge, specifically their ability to recognize and understand vocabulary and translate vocabulary from their first language (L1) into a second

language (L2). This test was developed based on the translation tasks proposed by Laufer and Goldstein (2004) and Webb (2005, 2009). The L2TT was formatted as an L1-to-L2 translation task, which required the ability to recognize English vocabulary. It primarily measured receptive knowledge of form-meaning links, an aspect of vocabulary knowledge that referred to understanding a word's meaning. The L2TT was validated by Nontasee and Sukying (2021), achieving a reliability of 0.76 on Cronbach's Alpha, indicating acceptable reliability. This suggested that the L2TT was reliable for learners' receptive form-meaning link knowledge.

The L2 Translation Test (L2TT) assessed students' receptive vocabulary knowledge. The test encouraged participants to memorize the form and meaning of words. The task required participants to translate Thai vocabulary into English. The scoring system was designed to assess the students' vocabulary knowledge accurately. A correct word definition was awarded one point, while no points were given for no answer or an incorrect answer. This test primarily measured the receptive knowledge of form-meaning links, encouraging students to recognize the meaning of each prompt vocabulary. The first letter of the target English word was provided to guide the students, ensuring that there was only one correct answer for each target vocabulary. An example of this test is shown as follows.

Instructions: Look at the choices and choose the correct meaning of the word in Thai.

1. "ไข่"

a. egg b. ear c. earth d. eye

2. "นอน"

a. sit b. sleep c. swim d. sing

Figure 3: Example of The L2 Translation Test (L2TT)

3.3.2 The Form Recall Test (FRT)

The Form Recall Test (FRT), adapted based on the productive knowledge of orthography task by Webb (2005), was employed to measure productive knowledge of written form, particularly word spelling knowledge (Nation, 2013; Webb, 2020; Sukying & Nontasee, 2022). The current test format was adjusted in terms of the

looks to fit the level of the participants at the primary school level. The images, the colors, and the fonts were included in the test format. The test format version was considered an isolated measure of productive spelling knowledge. As such, the test was kindly designed to measure the participants assumed to be A1-level learners according to CEFR (Webb, 2005) and likely to have learned and seen high-frequency words (Nation & Waring, 1997). At least, that was enough to lead them to recall a close approximation of the target words. In this regard, this test could independently measure learners' productive knowledge of word spelling.

The test, consisting of 20 items, required participants to rewrite or reproduce the misspelling of the target word plus one extra letter into the correct form following the spaces given within 60 minutes. This test encouraged participants' ability to recall the word and produce it correctly in the form to match the meaning by looking at the image given. All target words were provided as derivative forms to prevent the recognition of knowledge from other tests. No points were awarded for a blank or more than two incorrect letter positions. Instead, one point was awarded for less than two incorrect letter positions for their partial knowledge. Two points were awarded for each entirely correct response. An example is shown as follows.

Please use the given letters to spell the word in the blank to match the image given.

Image	Target word	Answer	Point
	b o k o	b o o k	2
	g r l i	g r i l	1
	s g i n	g s n i	0

Figure 4: Example of The Form Recall Test (FRT)

3.3.3 Focus Group Interview

The focus group aimed to gain high-quality data in a social context (Patton, 2002) and understand a particular issue from the research participants' viewpoint (Khan & Manderson, 1992). In this study, the focus groups investigated learners' perceptions regarding using Multimodal Learning to support their English language learning, specifically focusing on form-meaning vocabulary knowledge. Content analysis was applied to the data collected from these discussions. The interviews occurred one week after participants completed the post-test in a closed room at the school to ensure privacy and minimize distractions. Questions were posed in the participants' mother tongue, Thai, to prevent misunderstanding or confusion, allowing them to express their perceptions comfortably and candidly. All students participated in the focus group discussions, with the 14 students divided into three groups, each consisting of 4 - 5 students. This division allowed for more manageable group sizes, promoting active participation and ensuring that each student had the opportunity to contribute to the discussion. Each focus group session lasted approximately 30–45 minutes, ensuring adequate time for students to share their experiences while maintaining focus and engagement. The moderator facilitated the discussion by setting clear expectations encouraging participation from all members and maintaining neutrality to allow students to express positive and negative perspectives freely.

The focus group interviews featured open-ended questions, addressing the research question and concentrating on the "what," "why," and "how" aspects of the topic (Lochmiller, 2021). Example questions included:

1. Did you feel excited about learning new vocabulary through images, sounds, and games? Why did you feel that way?
2. Which type of media do you prefer the most for learning—looking at pictures, listening to sounds, or playing games? Why do you prefer that method?

3. Do you feel more engaged when playing games or participating in group activities? Does this type of learning help you remember vocabulary better? If so, how?

This approach ensured the students could provide detailed and nuanced responses, giving more profound insight into their experiences and perceptions. By structuring the focus groups in this manner, the study aimed to gather comprehensive and meaningful data that could inform the effectiveness and reception of multimodal learning in enhancing English vocabulary learning.

3.3.4 Developing Research Instruments

To determine the effects of multimodal learning, the researcher designed two vocabulary tests: The L2 Translation Test (L2TT) and The Form Recall Test (FRT). These tests aimed to measure students' vocabulary knowledge of form and meaning, providing comprehensive insights into their language acquisition. The tests were administered before and after the intervention to assess the impact of multimodal learning. Each test consisted of 20 questions, with vocabulary selected from students' grades 1-2 textbooks.

The development process for these tests involved several methodologically sound steps to ensure reliability and validity. Initially, the purpose of the tests was specified. The FRT focused on assessing student's ability to recall the form of vocabulary words, while the L2TT measured their understanding of the meaning of this vocabulary through translation from L1 to English. The researcher then created the test items and scoring rubrics. Each test item was carefully crafted to align with the learning objectives and grade-level content. The scoring rubrics provided clear guidelines for scoring each item, ensuring consistency and objectivity in the evaluation process.

The Item Objective Congruence (IOC) method used in this study was selected to ensure content validity by evaluating the alignment of each test item with the learning objectives. This method involved expert judgment, where a panel of experienced English language educators assessed the relevance and appropriateness of each test item. The selection of the IOC threshold (greater than 0.5) was based on standard

educational research criteria, which indicate that an IOC value of 0.5 or higher signifies an acceptable level of alignment between the test items and the intended learning objectives. Items with an IOC value below 0.5 were considered insufficiently relevant and were either excluded or revised to enhance the overall quality of the assessment.

This method was chosen because it provides a systematic and quantifiable approach to measuring the validity of test items. By using expert evaluations and setting a clear threshold, the researcher ensured that only high-quality and well-aligned test items were included in the final assessment, thereby improving the reliability and accuracy of the instruments.

The IOC evaluation panel consisted of three experienced English language educators selected based on their teaching expertise and assessment experience to ensure the validity and appropriateness of the test items. The panel members included, One English teacher from the school where the study was conducted and held the position of professional level teacher and English teachers from neighboring schools, holding the positions of professional level teacher and senior professional level teacher. These experts played a crucial role in reviewing the test items, ensuring they were educationally appropriate, relevant to the student's proficiency levels, and methodologically sound. Their feedback allowed for necessary revisions, ultimately refining the assessment tools better to measure students' vocabulary recall and comprehension abilities. By incorporating expert evaluations through the IOC method, this study maintained a high standard of content validity, ensuring that the test items effectively aligned with the intended learning outcomes.

A pilot study was conducted with a sample of students who had educational backgrounds similar to those of the main study participants. This pilot group completed both the FRT and L2TT. The primary aim was to identify any issues with the test items and to gather preliminary data on the reliability of the instruments. The results from the pilot tests were analyzed using Cronbach's alpha, a statistical measure of internal consistency. This analysis helped determine how closely related the items were as a group, indicating the reliability of the tests. Items that lowered the overall reliability (as noted in the 'Cronbach's Alpha if Deleted' analysis) were reviewed and,

if deemed necessary, removed. This process ensured that the tests were reliable and produced consistent results.

The experts also reviewed the tests for construct validity (ensuring the tests measured the intended construct), face validity (the tests appeared to measure what they were supposed to measure), and content validity (the extent to which the tests covered the content they were intended to cover). This comprehensive review helped confirm that the instruments were valid measures of vocabulary knowledge.

The interview questions also underwent a validation process. The researcher developed a set of interview questions designed to gain deeper insights into the student's learning experiences and the effect of multimodal learning. These questions focused on various aspects of the learning process and students' perceptions of their progress. The interview questions were piloted with a different group of students who shared characteristics similar to those of the target participants. This pilot phase helped identify any ambiguities or issues with the questions, ensuring they were clear and effective in gathering relevant data. The pilot study feedback refined the interview questions to accurately capture the students' experiences and insights. This refinement process enhanced the reliability and validity of the qualitative data collected through the interviews.

3.3.5 Selecting Words

According to the research design and its scope, the vocabulary that language learners needed to focus on should have been relevant to their current level of knowledge. Nation (2022) emphasized the importance of frequency in vocabulary learning, suggesting that frequently used words provided learners with the best return on investment and were more likely to be retained in long-term memory. This principle was also supported by other researchers such as Hulstijn (2001), Webb (2020), and Webb & Nation (2017). Nation and Waring (1997) advised that learners of English as a second or foreign language should have mastered at least 2,000 high-frequency words. As Read (2004) and Schmitt and Zimmerman (2002) indicated, these words were particularly beneficial for learners as they comprised approximately 80% of written or spoken text.

In Thailand, the Ministry of Education expected students to have mastered approximately 3,700 words by graduating high school, including 2,000 high-frequency words and the most frequently used academic words in English. Additionally, Laufer and Nation (2012) proposed that the selection of vocabulary for teaching should have been based on frequency, usefulness, and learnability/difficulty. High-frequency words were advantageous as they often appeared in various situations, such as speaking and writing, without context awareness (Nation, 2022). Therefore, these words should have been prioritized in language teaching, especially for beginners (Laufer, 2014; Nation & Webb, 2011; Nation, 2011, 2013a, 2013b; Promluan & Sukying, 2021). However, by understanding these words, students might have been able to comprehend and produce in their second language (Nation, 2022; Promluan & Sukying, 2021). The criteria for selecting the target words for the current study based on Promluan & Sukying (2021) followed five steps such as:

1. The target words were selected from the reading part in the New Say Hello 1 - 2 student textbook.
2. All the target words had to appear in the student textbook for the current study.
3. The list of the target words was piloted with a different group of students with similar circumstantial English skills.
4. Words rated as known by the pilot study were excluded from the target words.

The final list of target words assessed participants' vocabulary knowledge in the vocabulary knowledge scale test and teaching models. In this study, the target words were carefully chosen from the "New Say Hello 1-2" textbook used in the grade 1-2 introductory English course by Mac Education publishers. These words aligned with essential English language learning content in the current Thai primary education core curriculum, explicitly selected from chapters 1 to 6 of the book. To ensure that the chosen words were high-frequency and worth learning, they were cross-checked against the New General Service List (NGSL), which lists 2,818 essential high-frequency words for L2 learners (Browne et al., 2013). Words not found in the NGSL were eliminated from the study. A pilot English vocabulary checklist test was administered to participants to identify known and unknown words, with the known words subsequently eliminated. The list of target words was then reviewed by experts

in vocabulary teaching and the English language to ensure they were suitable for the participants' proficiency levels. This approach ensured that the selected words were relevant to the student's vocabulary knowledge level (Nation, 2022).

The study aimed to explore form-meaning links through multimodal learning, utilizing 40 randomly selected items from the target vocabulary to test students' understanding. To examine the impact of multimodal learning on students' receptive and productive vocabulary, the teacher implemented a series of vocabulary tests, including the form recognition test and the L1 translation test. These tests, conducted before and after the instruction, aimed to assess students' vocabulary knowledge in two main areas: form and meaning. In both tests, different vocabulary sets from the 40 target words selected were used, including twenty nouns, ten verbs, and ten adjectives. The development of these tests began with defining their objectives, followed by creating the tests and establishing the scoring rubrics. In summary, when selecting suitable vocabulary for students, the teacher considered the vocabulary size and the student's abilities, ensuring the vocabulary was accessible and simple enough and that the quantity was appropriate for effective teaching.

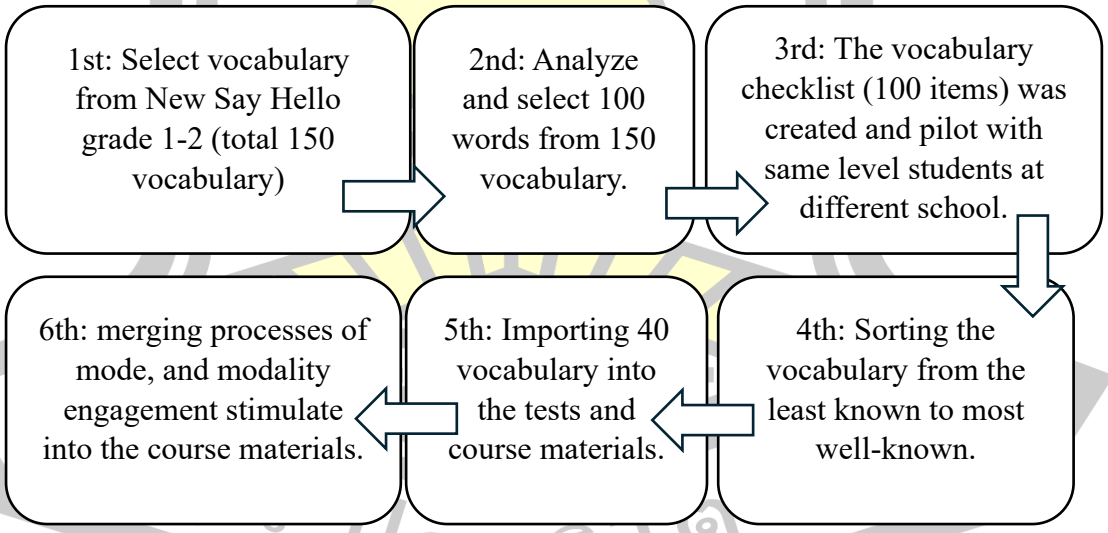


Figure 5: A summary of the process used to select and promote words into course materials.

3.4 Data Collection Procedure

The data collection process was conducted over two months during regular class hours to ensure minimal disruption to students' learning. A mixed-methods approach was employed, integrating both quantitative and qualitative data collection methods to assess the impact of multimodal learning on vocabulary acquisition among Thai primary school students.

In the pretest phase, two vocabulary knowledge tests were administered on separate days to minimize potential testing biases. The Form Recall Test (FRT) was conducted first, followed by the L2 Translation Test (L2TT). This sequence was chosen based on prior research (Laufer & Goldstein, 2004; Magnussen & Sukying, 2021; Webb, 2005), which suggests that form recall vocabulary knowledge can be transferred to other linguistic aspects. Administering the FRT first reduced the likelihood of students using cues from the L2TT to assist in spelling recall on the FRT, ensuring a more accurate assessment of their productive vocabulary knowledge.

Following the pretests, students participated in a 16-hour multimodal instructional program over eight weeks. Each week, they received an average of four hours of English instruction, with two hours dedicated to multimodal vocabulary learning. The multimodal instruction incorporated visual, auditory, and kinesthetic techniques, such as animations, videos, songs, and physical movements, to enhance vocabulary retention and engagement. These diverse strategies were designed to cater to different learning styles and create an interactive and immersive learning experience.

The table outlines vocabulary development in a 1-hour session. The objective is to introduce and reinforce five new English vocabulary words related to a given subject for the intervention

Table 2: Instructional Overview

Stage	Modality	Multimodal learning
Warm-up (5 minutes)	Auditory + Kinesthetic	- Students listen to and move along with an action song Head, Shoulders, Knees, and Toes. - As they sing and move, they naturally engage with different action words through gestures. - After the song, students are asked: "What actions did we just

		do?" to activate prior knowledge. - Introduce today's topic: "Today, we will learn more action words!"
Presentation (10 minutes)	Visual + Auditory	- Students watch a PowerPoint presentation where each slide displays an image, the vocabulary word form, its phonetic transcription, meaning, and pronunciation audio. - As they see each word, they listen to the correct pronunciation and repeat it aloud. - They hear the word from the teacher and the slide's audio, reinforcing auditory learning.
Practice (30 minutes)	Kinesthetic + Auditory +Visual	- Students immediately apply what they've learned by performing actions that match each word. - As they hear "Sleep!", they pretend to sleep; for "Write!", they mimic writing, etc. - The teacher encourages them by modeling each action and reinforcing correct pronunciation. - Students take turns leading the class by saying the word while others act it out. - Students hear an action sound and match it with the correct vocabulary word on the board, students point to the correct image or raise their hands when they recognize the sound.
Production (10 minutes)	Kinesthetic + Auditory +Visual	- Students work in pairs and receive two sets of cards: one with pictures and one with words. - They match the correct word with the corresponding picture and practice saying it aloud.
Wrap-up (5 minutes)		The teacher reviewed the five target words.

Vocabulary acquisition through multimodal learning, the study incorporated various engaging activities that targeted different learning styles. These activities included individual and collaborative learning experiences to enhance students' acquisition and understanding of new words.

The first activity introduced vocabulary through visually engaging slides displaying the target words, corresponding images, and Thai translations. This method leveraged

visual learning and auditory reinforcement, as students could also listen to the pronunciation of the words via an embedded audio feature.

Figure 6: Example of visual and auditory aids slide

One of activities implemented was the spelling game, where students were presented with an image of a target word and had to select the correct letters to form the complete word. This interactive activity encouraged students to recognize letter patterns, improve spelling accuracy, and strengthen their ability to recall word meanings through visual and auditory associations. Additionally, it enhanced phonological awareness and orthographic processing, helping students develop a deeper understanding of word structure engagingly and interactively.

Figure 7: Example of spelling game

Another activity designed to enhance pattern recognition was missing letters, in which students were given a partially completed word with missing letters (e.g., "_*r* _ _ e") and were required to identify and fill in the correct letters. This activity challenged students to use prior knowledge and logical reasoning to reconstruct the word correctly. It also reinforced spelling skills and supported the noticing hypothesis, suggesting that learners acquire new vocabulary more effectively when actively noticing and processing linguistic patterns.

Figure 8: Example of missing letters game

Matching games, another core activity, aimed to strengthen students' ability to associate words with their corresponding images. Students were tasked with pairing English words with the correct pictures individually or in pairs. This activity promoted multimodal association, enabling students to connect vocabulary to concrete visual representations and contextual understanding. Additionally, working in pairs encouraged social interaction and collaborative learning, as students engaged in discussions and supported each other in identifying the correct matches.

To further enhance vocabulary acquisition, the study also employed a group listening and word formation task, where students listened to an audio recording of a word while observing a corresponding image. They then worked collaboratively to arrange scrambled letters into the word's correct spelling. This peer-assisted learning activity facilitated discussion and teamwork, encouraging students to analyze and construct words. Additionally, it was based on the cognitive load theory, which suggests that presenting information through multiple modalities—such as images, sounds, and hands-on engagement—reduces cognitive overload and enhances memory retention.

All these activities were carefully designed to support the principles of multimodal learning, allowing students to engage with vocabulary in various ways and reinforcing their understanding through diverse sensory and cognitive experiences. Integrating multiple learning channels reduced the monotony of rote memorization, increased student engagement, and helped build their confidence in using English vocabulary in practical contexts.

The posttest phase occurred the day after the final lesson, during which students completed the same vocabulary knowledge tests (FRT and L2TT) under identical conditions as the pretests. This allowed for a direct comparison of vocabulary gains, thereby addressing Research Question 1 (RQ1) on the extent to which multimodal

learning enhances vocabulary knowledge. The consistency in test administration ensured the reliability of the results and provided a precise measure of the effectiveness of the multimodal approach.

To complement the quantitative findings, students participated in a focus group discussion in their L1 (Thai) to gather insights into their perceptions of multimodal learning. The focus group aimed to assess students' attitudes, engagement levels, and overall satisfaction with multimodal instruction. The qualitative data were analyzed to identify key themes regarding motivation, enjoyment, and learning challenges, thereby addressing Research Question 2 (RQ2) on students' perceptions of multimodal vocabulary learning.

By integrating both test scores and qualitative insights, the study provided a comprehensive evaluation of the effectiveness of multimodal instruction in EFL vocabulary acquisition among young learners. This methodological approach ensured a robust assessment of learning outcomes and captured students' emotional and cognitive engagement, offering valuable implications for EFL teaching practices.

3.5 Data Analysis

The data analysis process was designed to ensure validity, reliability, and methodological rigor, providing robust insights into the research questions. A mixed-methods approach was employed, integrating both quantitative and qualitative analyses to comprehensively assess the effects of multimodal learning on vocabulary acquisition

3.5.1 Quantitative Data Analysis

SPSS statistical software was used to analyze the pretest and posttest scores due to its ability to handle complex data sets and perform various statistical tests with high accuracy. Descriptive statistics, including means, standard deviations, and ranges, were calculated to provide an overall summary of the data distribution and central tendencies.

Normality tests (e.g., the Shapiro-Wilk test) were conducted to determine the appropriate statistical tests. If the data met normality assumptions, paired sample t-tests were used to compare pretest and posttest scores, assessing whether the observed

differences in vocabulary knowledge were statistically significant. If normality was violated, the Wilcoxon signed-rank test, a non-parametric alternative, was applied.

To assess the magnitude of the observed differences, effect sizes (e.g., Cohen's d) were calculated to measure the practical significance of the intervention. Additionally, reliability analysis was conducted using Cronbach's alpha to evaluate the internal consistency of the vocabulary tests, ensuring that the test items reliably measured the same underlying construct. A Cronbach's alpha value of 0.70 or higher was considered acceptable, indicating strong internal consistency.

3.5.2 Quantitative Data Analysis

Qualitative data were collected through focus group discussions to gain deeper insights into students' perceptions of multimodal learning and its effects on vocabulary acquisition. These discussions aimed to explore students' attitudes, learning experiences, and preferences regarding multimodal instruction.

The analysis followed a systematic thematic approach to ensure the accuracy and reliability of the findings. First, all focus group discussions were audio-recorded and transcribed verbatim to capture participants' responses in full detail. Next, the transcribed data were coded using thematic analysis, beginning with identifying initial codes that highlighted key aspects of students' experiences, engagement levels, and learning challenges. These codes were then refined and grouped into broader themes and patterns related to students' attitudes toward multimodal learning and preferred learning styles.

Multiple verification techniques were applied to enhance the validity and reliability of the qualitative analysis. Member checking was conducted by allowing participants to review the transcriptions and interpretations to ensure their responses were accurately represented. Additionally, peer debriefing involved discussions with fellow researchers and colleagues to review, refine, and validate the coding process and thematic analysis. This collaborative process minimized potential bias and strengthened the credibility of the findings.

By systematically analyzing students' perspectives, the study provided rich qualitative insights into how multimodal learning influences vocabulary acquisition, engagement,

and overall learning satisfaction. The integration of rigorous analytical techniques ensured that the qualitative findings complemented the quantitative results, offering a comprehensive and well-supported evaluation of the effectiveness of multimodal instruction in EFL vocabulary learning.

3.6 Summary

Figure 9 illustrates the research procedure for the study. It outlines the methodology, starting with creating and designing research instruments, including word selection criteria and data collection procedures. Participants completed two vocabulary tests before a 16-hour multimodal learning session. After the instruction, they retook the tests and participated in a focus group to assess their attitudes toward multimodal learning. The study employed a quasi-experimental design and utilized a quantitative method to evaluate the effectiveness of the instructional approach.

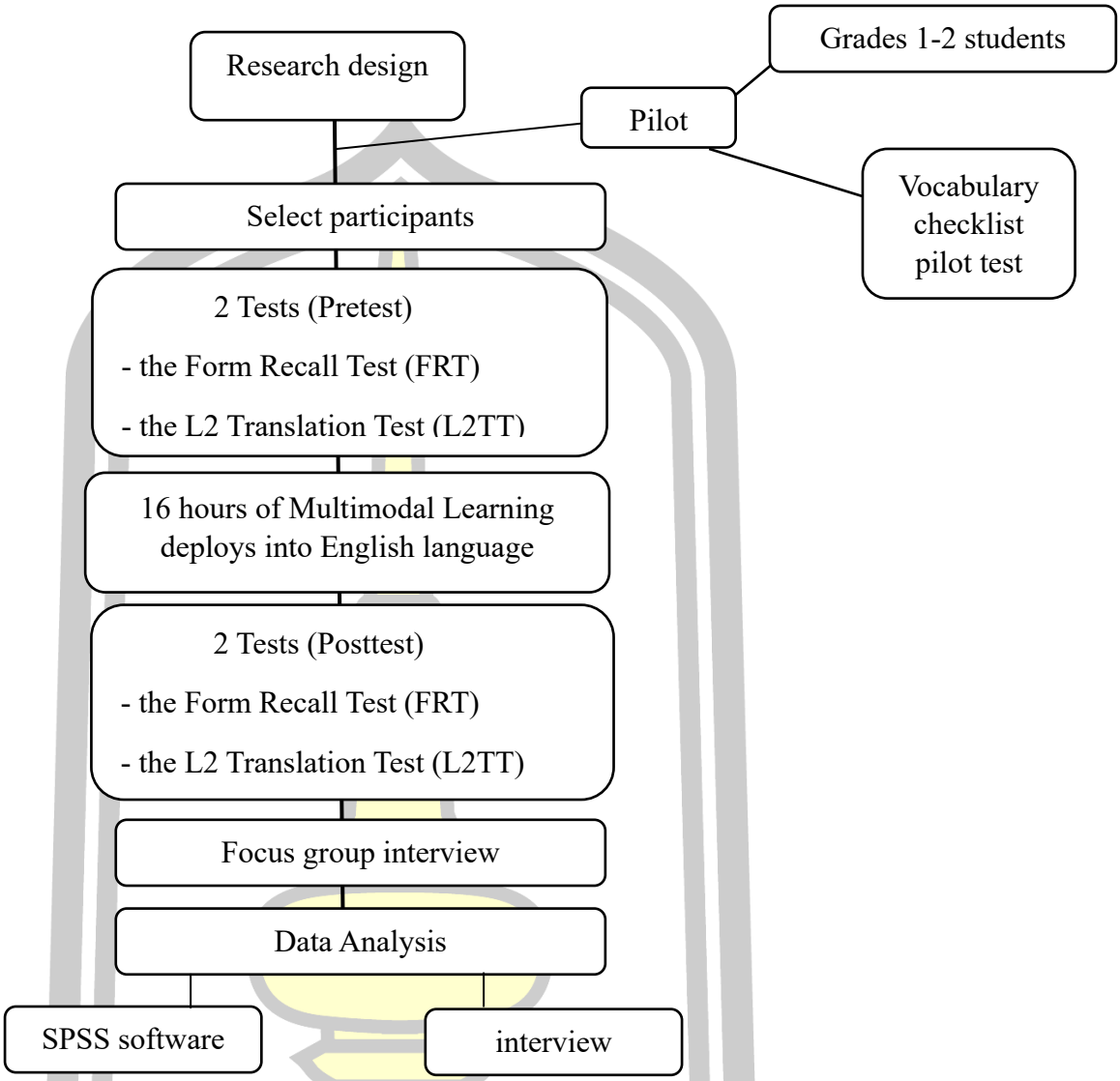


Figure 9: Research procedure of the study

CHAPTER IV
RESEARCH RESULTS

This chapter presents the findings of the current research study, which investigates the effect of multimodal learning on the vocabulary knowledge of primary school students in Thailand. It also includes qualitative insights into the participants' perceptions of multimodal learning interactions during vocabulary acquisition. The chapter begins with an overview of the results of receptive and productive tests and a summary of the overall quantitative data. The chapter also explores the students' perceptions of multimodal learning and provides further detailed descriptions of each section.

4.1 Effects of Multimodal Learning on vocabulary knowledge of Thai primary school learners

This quasi-experimental study examined the effects of multimodal learning on vocabulary acquisition among Thai primary school students. The primary objective was to determine how multimodal instructional methods could influence students' receptive and productive vocabulary knowledge. To measure this, two key assessments were employed: the L2 Translation Test (L2TT), which evaluated participants' receptive knowledge of form-meaning links, and the Form Recall Test (FRT), which measured their productive knowledge of written word forms, including spelling. Before the main study, both tests were developed and piloted to ensure they were reliable and suitable for use in this context. A focus group discussion was conducted after the intervention to gather qualitative insights into the students' learning experiences.

The results were analyzed using both descriptive and inferential statistics. Descriptive statistics, including the mean, standard deviation, and percentages, provided a comprehensive overview of the participants' performance on vocabulary knowledge before and after the intervention. The findings showed a clear improvement in vocabulary knowledge. Specifically, the pretests showed that participants achieved an average score of 6.87 (32.86%) on the L2TT and 12.50 (31.25%) on the FRT. However, the posttest results showed a notable increase, with average scores of 12.36 (61.79%) on the L2TT and 22.07 (55.18%) on the FRT. The standard deviation for the

L2TT pretest was 1.74, compared to 4.14 on the posttest, while the FRT pretest and posttest had standard deviations of 4.31 and 8.42, respectively. These results underscore the practical implications of multimodal learning, which can significantly impact the vocabulary knowledge of Thai primary students, particularly in terms of word meanings, as demonstrated by the improvement in raw scores.

A dependent samples *t*-test was conducted to determine if a statistically significant difference existed between the two time points for the same cohort. The analysis of test scores revealed significant differences, indicating a statistically significant improvement between pre-test and post-test scores for both the L2TT ($t = 5.81$, $p < 0.05$) and the FRT ($t = 5.29$, $p < 0.05$). This suggests that multimodal learning enhances the word knowledge of Thai primary school students. Therefore, multimodal learning is a valuable approach to vocabulary instruction and acquisition in an EFL context.

Table 3: A summary of students' performance on vocabulary knowledge tests

Tests	**Pretest**			**Posttest**			***t*-value**
	$\bar{x}$	**%**	**S.D.**	$\bar{x}$	**%**	**S.D.**	
L2TT (20 points)	6.57	32.86	1.77	12.36	61.79	4.14	5.81
FRT (40 points)	12.50	31.25	4.31	22.07	55.18	8.42	5.29

*Notes: *Significant at the 0.05 level ($p < 0.05$), N = 14*

To determine if there were statistically significant differences in pre-test and post-test scores between the two types of tests administered before and after the intervention, a pair-sample *t*-test was performed at a 0.05 significance level. Figure 5 demonstrates the overall performance of Thai primary school participants' vocabulary knowledge between two tests. The analysis revealed a significant difference between L2TT and FRT scores on pre-test performance ($t = 6.15$, $p < 0.05$), as well as a significant difference on the post-test ($t = 7.48$, $p < 0.05$). An independent sample *t*-test also identified significant differences between receptive (L2TT) and productive (FRT) vocabulary knowledge on both the pre-test and post-test. These findings suggest that receptive vocabulary is acquired earlier than productive knowledge. Together, these results indicate that different types of assessments require varying levels of cognitive

processing and highlight the effect of Multimodal Learning in enhancing both receptive and productive vocabulary.

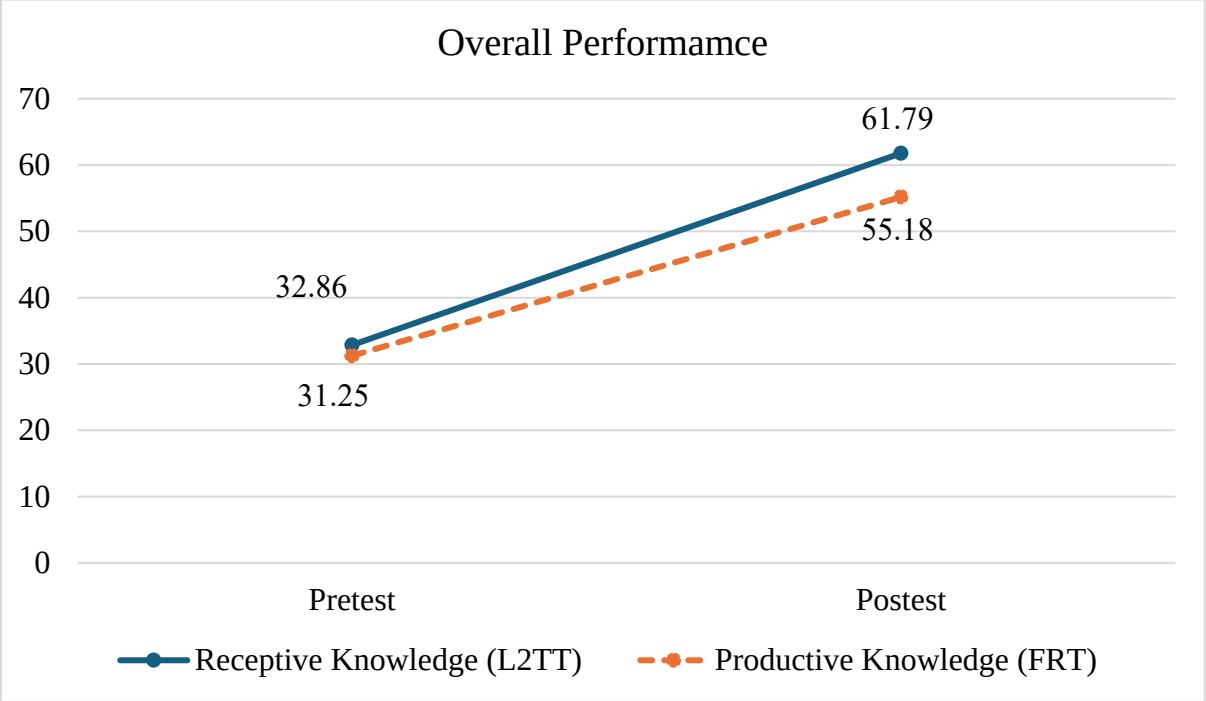


Figure 10: The summary results of pre and posttest score mean percentage of performance

4.2 Participants' perceptions of vocabulary acquisition through multimodal learning

This section explores participants' perceptions of learning vocabulary through multimodal methods derived from focus group interviews with 14 participants. These participants were categorized into three proficiency groups (high, medium, and low) based on their vocabulary knowledge test scores (L2TT and FRT). The thematic analysis of the data, guided by a conceptual framework of behavioral and affective engagement, revealed four key themes: group learning, individual learning, positive emotional responses, and negative emotional responses.

The conceptual framework for analyzing participants' perceptions of vocabulary learning is grounded in two key dimensions of learner engagement: behavioral and affective. Behavioral engagement encompasses the observable actions of students that reflect their commitment, participation, and enthusiasm in learning tasks. It includes

group collaboration, individual effort, and active involvement in multimodal vocabulary activities. On the other hand, affective engagement focuses on the emotional responses elicited during learning. Positive emotions, such as excitement, joy, and pride, play a critical role in motivating students and enhancing their learning experience. In contrast, negative emotions, such as anxiety and boredom, can impede participation and undermine confidence. Understanding both dimensions is essential for fostering effective learning environments and addressing potential emotional barriers to student success.

Behavioral Engagement

To better understand how students participated in vocabulary learning through multimodal methods, the following excerpt provides insights into their experiences.

Excerpt 1: Behavioral engagement interview

Teacher: Alright, what did you think about learning together? Did you like it? Or was there anything you didn't like?

Student 1: I liked working in a group because it wasn't scary. If I didn't know the answer, my friends helped me.

Student 4: I liked it because I wanted to raise my hand first for my group!

Student 2: It was fun listening to the song and dancing together.

Student 3: I didn't like answering questions, but it wasn't so bad in a group.

Teacher: That's interesting! It sounds like being in a group made you feel more comfortable. Why do you think that was?

Student 1: When I didn't know something, my friends helped me. It wasn't just me trying to answer.

Student 4: It was fun when we all tried to answer together. But sometimes I felt nervous because I wanted my group to win.

This excerpt highlights the role of group learning in fostering behavioral engagement. Many students expressed that learning with peers made them feel more comfortable and confident. They found it less intimidating, more enjoyable, and easier to participate in collaborative vocabulary tasks.

Group learning

Group activities were reported to foster a sense of security, motivation, and enjoyment among participants. Students emphasized the benefits of collaboration, peer support, and reduced anxiety during group work. Many found working with peers engaging and less stressful, allowing them to participate and learn together actively. The following excerpts are the participants' responses:

> L1: *"I did not like doing things alone. It was better to work in a group. It was not scary at all because there was always someone to help."*
>
> L4: *"I was so excited trying to raise my hand before anyone else, hoping our group would get to answer, even if I were not the one to respond myself."*
>
> L5: *"There was no need to worry about speaking incorrectly; if there was a mistake, others helped correct it."*
>
> M1: *"Being in a group with skilled friends made me want to participate more in playing the game."*
>
> M2: *"Doing activities with friends together was more fun than doing them alone."*
>
> H2: *"It was a lot of fun when my friends and I helped each other find the letters of the word as quickly as possible to earn points for that round."*
>
> H4: *"Collaborating with friends was more fun than doing it alone, and it helped me remember the vocabulary."*

The responses above illustrate how group learning promotes teamwork, reduces individual pressure, and enhances the learning experience. Participants across all proficiency levels valued the support and shared responsibility that group work provided, making the learning process more enjoyable and interactive.

Individual learning

Independent activities were highly appreciated for their ability to promote focus, autonomy, and personal challenge. Participants valued the freedom to explore different learning styles and concentrate on vocabulary tasks at their own pace. The participants' responses to individual learning are below:

L2: *"I liked listening to the song because I got to dance along with them and enjoyed singing."*

L4: *"When I acted out gestures, I laughed and could remember the words too."*

M1: *"I paid extra attention to the activity where we found the missing letters."*

M2: *"Finding word pairs was fun because I had to guess whether I could remember the word and how many I could remember."*

M3: *"I liked listening to the pronunciation of the words. I remembered better, and I had to focus when playing the game."*

H1: *"I wanted to challenge myself by being on my own and competing against friends in a group."*

H2: *"I liked learning this way because I could look at pictures, listen to sounds, and act simultaneously. I never felt bored."*

H4: *"I especially liked acting along with the sounds. It made me more focused."*

According to the excerpts above, independent learning enabled participants to focus on vocabulary tasks and challenge themselves, fostering deeper engagement and effective retention. Visual and auditory tasks were particularly effective, catering to individual learning preferences and enhancing vocabulary acquisition.

Affective Engagement

A focus group discussion was conducted to gain deeper insights into students' engagement with multimodal vocabulary learning. The discussion explored students' emotional responses and overall attitudes toward the learning experience. Affective engagement—which includes emotional reactions such as enjoyment, confidence, anxiety, and frustration—significantly shaped students' motivation and participation in vocabulary learning. The following excerpt shows how students first felt about learning vocabulary through multimodal learning.

Excerpt 2: Affective engagement interview

Teacher: How do you all feel about learning English this way? Was it fun? Challenging? A bit scary? Let's talk about it!

Student 1: I liked seeing pictures first. When I see the picture, I remember the word much better.

Student 2: I love playing matching games! Finding the right word and seeing if I remember it correctly is exciting.

Student 3: Listening to words is my favorite part! I focus a lot because I want to guess them right.

Student 4: I feel proud when I get the answer right. It makes me want to try harder next time.

Teacher: That's great to hear! But was there anything that made learning difficult or frustrating?

Student 5: At first, I didn't enjoy the game because I couldn't remember many words. It felt boring.

Student 4: Sometimes, I don't feel confident pronouncing words. I'm afraid I'll say them wrong.

Student 2: Yeah… Sometimes, I feel shy about answering, so I wait for someone else to say it first.

Teacher: I see. Feeling nervous is completely normal when learning something new. But remember, mistakes are part of learning! How do you feel when you finally get a word right?

Student 1: I feel so happy! When I answer correctly, it makes me want to keep learning.

Student 2: Yes! It's exciting when I remember a word correctly in a game.

These responses highlight the positive and negative emotions students experienced while learning vocabulary through multimodal activities. While many students enjoyed engaging with pictures, sounds, and games, some felt shy, nervous, or frustrated when they couldn't remember or pronounce words correctly.

The following section explores the positive emotional responses that enhanced students' motivation and engagement during vocabulary learning.

Positive emotional responses

Participants reported strong positive emotions during multimodal learning activities, which they found fun, exciting, and motivating. Interactive tasks involving pictures, sounds, and gestures enhanced enjoyment and helped with vocabulary retention. The

following statements are the participants' responses to positive emotions in learning vocabulary through multimodal learning techniques:

L2: *"I felt proud when I got the answer right."*

L4: *"I felt braver in answering and pronouncing words. It was okay if I got them wrong."*

L5: *"I did not feel pressured when learning because it was fun and exciting."*

M1: *"I liked learning by seeing pictures first because it made it easier for me to remember the words. I looked at the picture and could remember."*

M3: *"I liked listening to the sounds more than anything else because I had to concentrate."*

M4: *"I liked looking at pictures because they helped me remember the words easily."*

H1: *"I got excited whenever I knew we would learn English because it was so much fun."*

H2: *"It's easier than I thought. I can remember more vocabulary."*

H3: *"I got very eager when I had to listen to the pronunciation and guess the word because I loved listening to the sounds."*

H4: *"I loved the moment I got a card and had to find the matching vocabulary card, and it was my favorite part!"*

The responses demonstrate that multimodal learning fosters enthusiasm and a positive attitude toward vocabulary learning. By integrating visual, auditory, and kinesthetic elements, the approach engages students emotionally, enhancing both their motivation and learning outcomes.

Negative emotional responses

Some participants reported negative emotions, such as worry and nervousness, particularly in situations where they felt pressured to answer or struggled with pronunciation. The following excerpts are the participants' native emotional responses:

L3: *"Worried I would give the wrong answer, I chose not to answer and waited for my friend to answer first."*

M4: *"I am unconfident when I have to pronounce it because I am afraid of mispronouncing it."*

M5: *"I could not remember the vocabulary, so playing the game at first was boring."*

H3: *"I was very nervous about standing up and answering questions."*

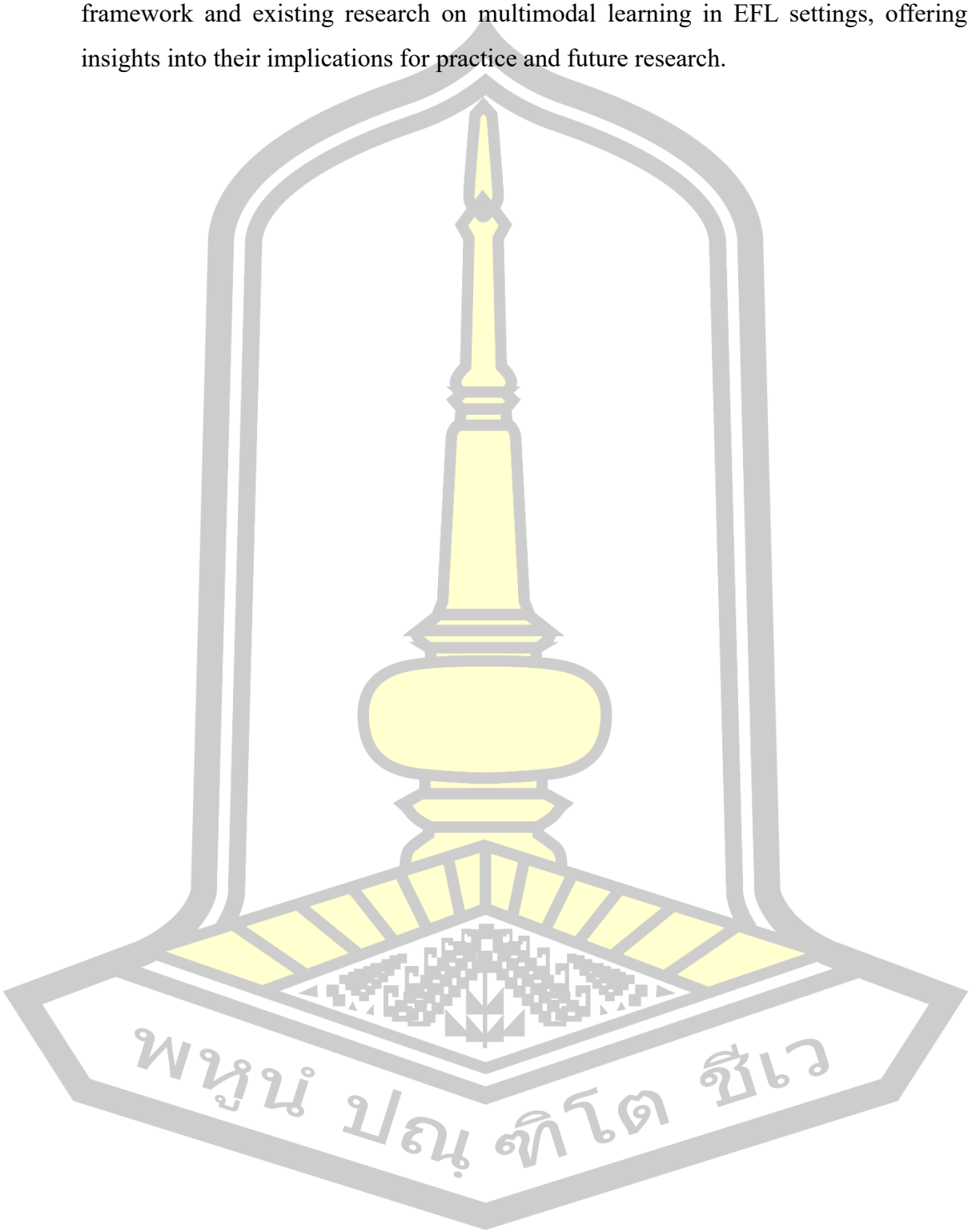
These negative emotions highlight the challenges faced by some participants, particularly those with lower confidence levels. To address these issues, educators can create a supportive environment that encourages risk-taking and provides scaffolding for students to feel more confident and engaged.

Together, the findings reveal that multimodal learning offers benefits by combining collaborative and independent learning opportunities. Group activities foster social interaction, peer support, and motivation, while individual tasks promote autonomy, focus, and self-challenge. Positive emotional engagement further enhances the learning experience, making vocabulary acquisition enjoyable and effective. However, addressing negative emotions, such as anxiety and lack of confidence, is crucial to ensuring that all students can fully benefit from the multimodal approach. Educators can create an engaging and inclusive learning environment by balancing collaborative and independent activities and providing emotional support.

4.3 Chapter Summary

This chapter presented a detailed overview of the findings from a study examining the impact of multimodal learning on vocabulary acquisition among Thai primary school students. Quantitative results from the L2 Translation Test (L2TT) and Form Recall Test (FRT) demonstrated significant improvements in both receptive and productive vocabulary knowledge following the intervention. Statistically significant differences confirmed the effectiveness of multimodal instructional methods in enhancing vocabulary development. In addition, complementing the quantitative data, qualitative insights from focus group interviews provided a deeper understanding of students' learning experiences.

The next chapter will discuss these results within the context of the study's theoretical framework and existing research on multimodal learning in EFL settings, offering insights into their implications for practice and future research.



CHAPTER V
DISCUSSION AND CONCLUSION

The previous chapter presented the study's findings through statistical and qualitative approaches to address the research purposes and questions. The current chapter interprets these results within the study's theoretical framework. This chapter delves deeper into interpreting the results and situating them within the context of prior research. The findings provide a deeper insight into the impact and effectiveness of multimodal learning in enhancing English vocabulary acquisition among L2 learners, particularly within the Thai EFL context. This chapter further explores the qualitative findings to understand learners' perceptions of using multimodal learning for vocabulary development better. Additionally, this chapter highlights the contributions of these results, discusses their implications for multimodal learning, and offers recommendations for future research.

5.1 The Effect of Multimodal Learning on Vocabulary Acquisition among primary school students.

This study examined the impact of multimodal learning, incorporating visual, auditory, and kinesthetic elements, on the acquisition of English vocabulary by Thai primary school students. To answer Research Question 1 (RQ1), two assessment tools were used: the L2 Translation Test (L2TT) to measure receptive vocabulary knowledge and the Form Recall Test (FRT) to assess productive vocabulary knowledge. The findings revealed significant improvements in both areas, with students demonstrating an almost 30% increase in receptive knowledge and a 24% improvement in productive knowledge. These results align with previous research (Cárcamo et al., 2016; Ding & Fan, 2022; Xiuzhi, 2023), which also found that multimodal learning enhances vocabulary acquisition through sensory-rich instructional methods.

In this study, Grade 1-2 students in Thailand learned new English vocabulary through multimodal learning activities. For example, they used images representing vocabulary words, such as a picture of a dog and the pronunciation of "bear" (learning through visual and auditory channels). Additionally, students engaged in activities

where they had to act out or move according to the vocabulary, such as mimicking running for the word “run” (using the kinesthetic channel).

This approach enabled students to link new vocabulary with images they saw, sounds they heard, and movements they performed, which stimulated cognitive processing across multiple channels. By connecting these forms of information, students could better remember the vocabulary and use it effectively in communication.

The study results showed that students taught using multimodal learning demonstrated significant improvements in receptive and productive vocabulary. Multimodal learning, which integrates images, sounds, and movements, helps students process information in various ways. This is consistent with the Cognitive theory principles, which emphasize linking new information with the mental structures already existing in the learner's brain. This type of learning helps students better retain vocabulary and apply it effectively in daily life.

The significant gains observed in this study can be explained through Mayer’s (2009) cognitive theory of multimodal learning, which suggests that learners learn more effectively when information is presented through multiple modalities rather than a single mode. This theory posits that learning is optimized when both verbal (spoken or written words) and non-verbal (images, gestures, or actions) inputs are integrated, activating multiple cognitive pathways. In this study, students encountered vocabulary through visual aids, such as flashcards pairing images with words, auditory input, including pronunciation practice and listening activities, and kinesthetic activities, such as gestures corresponding to word meanings. For example, when learning the word *jump*, students saw an image, heard the pronunciation and physically acted. This multimodal approach facilitated deeper cognitive processing, allowing students to develop stronger form-meaning associations and enhancing long-term retention of vocabulary.

The findings also support Schmidt’s (1990) noticing hypothesis, which emphasizes the role of conscious attention in language acquisition. According to this hypothesis, learners must first *notice* specific linguistic features so that they can be processed and internalized. The multimodal learning approach in this study increased students’ vocabulary awareness by drawing their attention to word meanings, pronunciations,

and usage in an engaging and interactive manner. Many students reported that visual elements helped them associate words with concrete representations, auditory input reinforced correct pronunciation, and kinesthetic activities made learning more engaging and memorable. By integrating multiple sensory inputs, the intervention encouraged active noticing, increasing the likelihood of successful vocabulary acquisition.

By integrating multiple sensory inputs, this study reinforced the concept of active noticing, allowing students to focus on and internalize vocabulary more effectively. The results further demonstrated that when learners were exposed to words through multiple channels simultaneously, they became more aware of linguistic patterns and meanings, increasing their ability to retain and retrieve vocabulary in meaningful contexts. This finding is particularly significant in the Thai EFL, where traditional rote memorization methods often fail to engage students effectively. As supported by the noticing hypothesis, multimodal learning provides a more effective alternative by actively directing learners' attention to key vocabulary features in ways that align with natural cognitive processing mechanisms.

Furthermore, the study's results resonate with Krashen's (1982) affective filter hypothesis, which suggests that emotional factors such as motivation, anxiety, and self-confidence significantly influence language learning. When learners experience high anxiety, their ability to absorb and retain new language input is diminished. Conversely, when they feel motivated and comfortable, their affective filter is lowered, allowing them to process and acquire language more effectively. In this study, multimodal learning played a crucial role in creating an engaging and supportive learning environment. Students frequently reported enjoyment, excitement, and confidence during vocabulary learning activities, which contribute to their overall progress. Interactive games, scaffolded tasks, and positive reinforcement from teachers and peers helped reduce anxiety and sustain motivation. This positive emotional engagement further facilitated learning, enabling students to focus more effectively on the linguistic input.

In the context of this study, multimodal learning played a critical role in creating a positive and supportive learning environment that helped students feel more confident

and less anxious while learning vocabulary. Many students reported that activities incorporating visuals, auditory input, and kinesthetic engagement made learning more enjoyable and reduced the fear of making mistakes. For instance, interactive games such as word-matching activities allowed students to practice new words in a fun and stress-free setting, encouraging active participation without the fear of failure.

Moreover, scaffolded learning tasks, such as progressive vocabulary exercises where students first observed words in images, then listened to correct pronunciations, and later practiced using them in structured group discussions, contributed to a gradual increase in confidence. This step-by-step exposure allowed students to interact with vocabulary at different cognitive levels, reinforcing learning without the pressure of immediate recall. Additionally, positive reinforcement from teachers and peer encouragement in group-based activities helped alleviate anxiety and sustain motivation. For example, students who initially felt hesitant to speak in English reported that working in small cooperative groups gave them a sense of security, making them more willing to take linguistic risks.

This positive emotional engagement directly facilitated vocabulary acquisition, as students could focus more effectively on linguistic input without being overwhelmed by anxiety. The results suggest that in the Thai EFL classroom, where many students experience apprehension in using English, integrating Multimodal Learning strategies can be a powerful tool to lower the affective filter, making vocabulary learning a more engaging and effective process.

The findings provide strong empirical evidence that multimodal learning enhances vocabulary acquisition by engaging multiple cognitive and sensory pathways while fostering a supportive emotional environment. By integrating visual, auditory, and kinesthetic techniques, students not only improved their vocabulary retention but also experienced greater motivation and reduced anxiety. These results highlight the potential of multimodal learning as an effective instructional strategy in EFL classrooms. The following section will explore students' experiences and perceptions of learning vocabulary through multimodal approaches based on qualitative data from focus group discussions.

5.2 Students' Perceptions of Using Multimodal Learning for Vocabulary Learning

To explore Research Question 2 (RQ2), qualitative data were collected through focus group discussions with students categorized into three groups based on their vocabulary size: small, medium, and large. Fourteen students, purposefully selected based on their post-test scores from the L2 Translation Test (L2TT) and Form Recall Test (FRT), participated in these discussions. This selection ensured a diverse representation of students with different engagement levels in multimodal learning. The thematic analysis of the data revealed four key themes: group learning, individual learning, positive emotional responses, and negative emotional responses. These themes provided valuable insights into students' experiences, highlighting both the benefits and challenges of multimodal learning in vocabulary instruction.

Many students reported that working in groups improved vocabulary learning through multimodal approaches. Collaborative activities helped reduce anxiety and foster motivation, making students feel more comfortable participating in classroom tasks. L1 student shared, *"It was better to work in a group because I was not scared of making mistakes—someone was always there to help."* This statement suggests that group settings offer a safety net for students, allowing them to take risks without fear of failure. Additionally, peer interaction created a sense of responsibility and engagement, as seen in the L4 student's remark: *"I was excited to raise my hand for my group because I wanted us to win."* This reflects how friendly competition can drive motivation and increase participation in vocabulary activities.

The findings align with multimodal learning theory (Jewitt, 2008), which emphasizes that collaborative and interactive activities enhance students' engagement and reinforce learning through social interaction. Vocabulary games, group challenges, and cooperative problem-solving tasks encouraged active participation, reinforcing vocabulary retention. By creating a socially supportive environment, multimodal group tasks helped students feel more confident using new words, demonstrating the effectiveness of peer-assisted learning in EFL classrooms.

While group activities were beneficial, individual learning also played a crucial role in vocabulary acquisition. Many students appreciated having the opportunity to

engage with learning tasks at their own pace, allowing them to focus on areas of personal difficulty. M3 student noted, *"I liked listening to the pronunciation of words. It helped me concentrate and remember better."* Another M2 student emphasized the role of visual cues: *"When I looked at the pictures and listened to the sounds, I could remember the words more easily."* These responses highlight the importance of self-paced, multimodal resources in vocabulary learning.

The findings support Mayer's (2009) cognitive theory of multimedia learning, which posits that combining verbal and visual inputs enhances cognitive processing and memory retention. Individual activities, such as matching words to images, performing gestures, or listening to recorded pronunciations, allowed students to engage with multiple sensory modes in ways that suited their learning preferences. This personalization fostered deeper engagement, demonstrating that multimodal learning effectively accommodates diverse learning styles; that is, visual learners benefited from images, auditory learners from sounds, and kinesthetic learners from physical actions.

A significant factor in the success of multimodal learning was its ability to create an engaging and enjoyable learning experience. Many students described their vocabulary learning as fun, interactive, and exciting, which increased their motivation to participate. An M3 student shared, *"I loved acting along with sounds—it made me focus and never feel bored."* An L1 noted, *"I felt proud when I got the answer right, even if it was difficult."* These statements highlight how multimodal learning fosters intrinsic motivation and builds students' confidence in language learning.

The positive emotional responses align with Krashen's (1982) affective filter hypothesis, which suggests that lowering anxiety and fostering positive emotions facilitates language acquisition. Students reported being more willing to take risks, such as answering questions or experimenting with new vocabulary, when the learning environment was engaging and non-threatening. This finding emphasizes the importance of designing multimodal activities that evoke positive emotions, such as interactive storytelling, role-playing, and gamified vocabulary exercises.

Despite the overall positive reception, some students reported experiencing anxiety and nervousness, particularly when they felt pressured to respond or struggled with

pronunciation. An L3 student admitted, *"I worried about giving the wrong answer, so I waited for my friend to answer first."* One H3 student expressed discomfort with speaking activities, stating, *"I felt nervous about pronouncing the words because I did not want to get them wrong."* These responses suggest that while multimodal learning can enhance engagement, some students may still experience affective barriers that hinder their participation.

This theme highlights the need for emotional scaffolding in multimodal learning environments. Teachers must create a low-stress, supportive classroom atmosphere by implementing strategies such as gradual exposure to speaking tasks, positive reinforcement, and differentiated instruction to accommodate students with varying confidence levels. By addressing emotional barriers, educators can ensure that all students benefit fully from multimodal vocabulary learning.

The findings of this study emphasize the multifaceted benefits of multimodal learning in enhancing vocabulary acquisition among Thai primary school students. Group activities promote social interaction, reduce anxiety, and encourage peer-supported learning, while individual learning allows for personalized engagement, catering to diverse learning preferences. Integrating visual, auditory, and kinesthetic elements fosters both cognitive and emotional engagement, reinforcing vocabulary retention through multiple sensory pathways.

However, the presence of negative emotions, such as anxiety, highlights the importance of addressing students' affective needs to create an inclusive learning environment. Educators should balance collaborative and individual learning, implement emotionally supportive strategies, and adapt activities to suit students' varying proficiency levels. By leveraging these insights, teachers can refine multimodal learning approaches to maximize student engagement, enhance motivation, and improve EFL classrooms' vocabulary acquisition.

In conclusion, the qualitative analysis reinforces the transformative potential of multimodal learning in vocabulary instruction. Fostering a low-anxiety, engaging environment and addressing both cognitive and affective dimensions of learning can empower students to actively engage with new vocabulary and achieve long-term

retention. These findings provide valuable pedagogical insights for educators aiming to create inclusive, dynamic, and effective EFL learning environments.

5.3 Conclusion of the Study

This study investigated the effect of multimodal learning in enhancing vocabulary acquisition among Thai primary school learners. The quantitative findings demonstrated significant improvements in students' vocabulary acquisition, as evidenced by increased L2 Translation Test (L2TT) scores for receptive knowledge and Form Recall Test (FRT) scores for productive knowledge. The statistical significance of these gains, confirmed through dependent samples *t*-tests, underscores the impact of multimodal strategies in EFL instruction for young learners.

Beyond numerical improvements, qualitative findings offered valuable insights into students' perceptions and experiences with multimodal learning. Participants expressed enthusiasm and engagement, particularly in interactive, sensory-rich activities such as gestures, images, and sounds. Group-based learning fostered collaboration and reduced learning anxiety through peer support, while individualized tasks enabled students to process vocabulary at their own pace. Although some students experienced nervousness, particularly regarding pronunciation, the overall affective response was overwhelmingly positive, highlighting the motivational advantages of multimodal instruction.

5.4 Implications of the Study

The findings of this study have significant implications for vocabulary instruction, particularly in Thai primary school contexts. Multimodal learning has proven to be a highly effect approach that engages visual, auditory, and kinesthetic modalities and caters to diverse learning styles. This sensory-rich instruction supports memory retention and makes vocabulary learning more interactive and engaging. For example, combining visual aids (e.g., images, flashcards) with auditory inputs (e.g., vocabulary songs, audio) strengthens cognitive associations, facilitating the transition of new words from short-term to long-term memory.

Beyond cognitive benefits, multimodal learning fosters emotional engagement, reduces learner anxiety, and enhances motivation. The affective filter hypothesis highlights the role of emotional states in language acquisition, suggesting that a

supportive, interactive classroom environment can boost students' confidence and encourage active participation. By integrating collaborative activities and multimodal strategies, teachers can create an inclusive space where students feel comfortable experimenting with new vocabulary, reinforcing receptive and productive knowledge. For students, the results indicate that Multimodal Learning enhances vocabulary retention by integrating visual, auditory, and kinesthetic elements. Students could recall words more effectively when learning through images, videos, and interactive activities. This approach boosts confidence and reduces anxiety, especially among students who previously felt uncomfortable speaking English. For instance, interactive vocabulary games and group discussions encouraged students to actively engage in learning without fear of making mistakes. Additionally, multimodal learning, such as matching words with pictures, listening to pronunciation drills, and performing gestures, helped students develop stronger connections between form and meaning. This suggests that multimodal learning is particularly beneficial for young learners who need engaging and meaningful ways to build their vocabulary.

The pedagogical implications of this study emphasize the necessity of diversified instructional strategies that leverage multisensory learning. Empirical evidence confirms that stimulating multiple sensory channels, sight, sound, and movement deepens comprehension and enhances retention. To maximize these benefits, educators should blend structured group work with self-paced learning opportunities, allowing students to engage with vocabulary in multiple ways. For instance, role-playing can reinforce kinesthetic learning, while visual and auditory resources provide contextual cues that make abstract words more concrete and memorable. Additionally, this study offers practical insights for EFL educators seeking to optimize multimodal instruction. Effective implementation requires integrating diverse sensory inputs, fostering collaboration, and embedding task-oriented learning into lessons. These interactive techniques enhance vocabulary acquisition and transform traditional rote learning into an engaging, student-centered experience. This study highlights the need for a diversified teaching approach incorporating multimodal strategies. Traditional methods that rely solely on rote memorization may not be effective in fostering long-term vocabulary retention. Teachers should consider integrating visuals, audio, and kinesthetic activities to accommodate learning styles. For example, visual learners

benefit from flashcards and infographics; auditory learners improve through listening to vocabulary songs or interactive pronunciation exercises. In contrast, kinesthetic learners engage better through role-playing, action-based activities, or vocabulary relay games. Moreover, group-based activities can foster a collaborative learning environment, which not only improves vocabulary acquisition but also helps students overcome their fear of speaking English. Additionally, technology can be used to enhance interactive learning experiences. To further reduce learning anxiety, teachers can implement peer-assisted learning techniques, where students practice speaking and writing in pairs or small groups before performing tasks individually.

Finally, this research contributes to the broader field of language learning pedagogy by demonstrating the cognitive and affective benefits of multimodal learning in EFL contexts. By reducing learning anxiety, fostering enthusiasm, and reinforcing long-term retention, multimodal learning offers a dynamic, inclusive framework for vocabulary instruction. This approach empowers students and provides educators with innovative tools to make vocabulary teaching more effective, engaging, and meaningful.

5.5 Limitations and Recommendations for Future Studies

While this study provides valuable insights into the usefulness of multimodal learning for vocabulary acquisition, this study has some limitations to guide future research. First, the small sample size (N=14) restricts the generalizability of the findings to a broader population. Future studies should include larger and more diverse participant groups to enhance the reliability and applicability of the results. Second, the study's relatively short duration (eight weeks) may not fully capture the long-term retention of vocabulary knowledge. Conducting longitudinal studies would provide a deeper understanding of how multimodal learning influences vocabulary retention. Future studies should also consider increasing the sample size and extending the intervention period. Additionally, incorporating a control group alongside the experimental group would improve the study design, allowing for a more precise comparison between multimodal and traditional teaching methods. Researchers may also explore the impact of multimodal learning on other aspects of vocabulary knowledge, such as

pronunciation, word associations, and contextual usage, to develop a more comprehensive framework for vocabulary instruction.

Furthermore, integrating technology-based multimodal tools, such as interactive apps, digital storytelling, and augmented reality, could enhance student engagement and learning outcomes. Investigating how different technological tools support multimodal learning in EFL contexts would offer valuable insights for educators seeking to optimize vocabulary instruction. Future studies should also examine how individual learner differences, such as learning styles, motivation, and cognitive abilities, interact with multimodal learning strategies to tailor instruction more effectively.

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APPENDICES

Appendix A: English Vocabulary Checklist

Instructions: Please mark (✓) if you know the word and write down its meaning or mark a cross (✖) if you do not know the word.

Word	Known word	Unknown word	Meaning
Face			
Ear			
Eye			
Nose			
Dad			
Mum			
She			
He			
Hot			
Open			
Close			
Book			
Bag			
Desk			
Chair			
Knee			
Toe			
Chin			
Leg			
Hand			
Body			
Big			
Small			
Neck			
Red			
Black			
Blue			
Yellow			
Pink			
White			
Purple			
Grey			
Brown			
Orange			
Green			
Color			
This			
That			
Hello			
Hi			

What			
Name			
Alarm			
Lamp			
Are			
Sorry			
Hey			
His			
Her			
You			
We			
They			
Ant			
Bat			
Bear			
chicken			
Cow			
Duck			
Dog			
Horse			
Monkey			
Apple			
Banana			
Coconut			
Angry			
Cry			
Mad			
Happy			
Sad			
School			
House			
One			
Two			
Three			
Dish			
Plate			
Sink			
Pot			
Cup			
Egg			
At			
Between			
In			
On			
Behind			
Under			

Near			
Far			
Above			
Before			
After			
Across			
Around			
Beside			
Out			
Run			
Buy			
Walk			
Hit			
Eat			
Sleep			
Swim			
Put			
Take			
Drive			
Help			
Look			
Taste			
Can			
Jump			
Skip			
Sit			
Map			
Note			
Paper			
Elephant			
Fish			
Fast			
Ride			
Kick			
Play			
Read			
Sing			
Walk			
Write			
Arm			
Hair			
Hand			
Head			
Leg			
Rabbit			
Shirt			

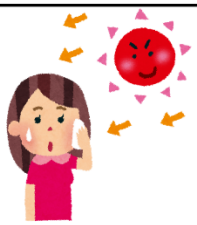
Shoes			
Short			
Long			
Old			
Boy			
Girl			
Door			
No			
Tree			
Teacher			
Student			
Sister			
Car			
Bye			
Good			
Like			
Window			
Touch			

Appendix B: The form recall test

The Form Recall Test

instructions: Please use the given letters to spell the word in the blank to match the image given.

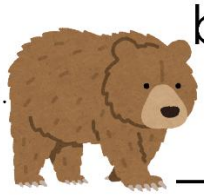
คำสั่ง: ให้นักเรียนใช้ตัวอักษรที่กำหนดให้ นำมาเขียนลงในช่องว่างเพื่อให้มีความหมายตามภาพที่กำหนด

ตัวอย่าง  y e e e y e	 a r y n g a n g r y
1.  r a m _ _ _	6.  a e r _ _ _
2.  o h t _ _ _	7  n u r _ _ _
3.  k o b o _ _ _ _	8.  d e b _ _ _
4.  a d d _ _ _	9.  s o e h _ _ _ _
5.  g r l i _ _ _ _	10.  i s t _ _ _

The Form Recall Test

instructions: Please use the given letters to spell the word in the blank to match the image given.

คำสั่ง: ให้นักเรียนใช้ตัวอักษรที่กำหนดให้ นำมาเขียนลงในช่องว่างเพื่อให้มีความหมายตามภาพที่กำหนด

11.  b a r e _ _ _ _	16.  e o n _ _ _
12.  g b a _ _ _	17.  t a e _ _ _
13.  s g i n _ _ _ _	18.  l d o _ _ _
14.  b u l e _ _ _ _	19.  h i a r _ _ _ _
15.  j m u p _ _ _ _	20.  g e n e _ _ _ _

Appendix C: The L2 translation test

The L1 to L2 Translation Test

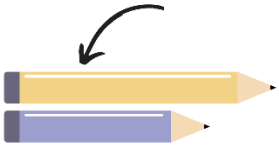
instructions: Look at the choices and choose the choice that is the correct meaning of the word in Thai.

คำสั่ง: ให้นักเรียนดูตัวเลือก และเลือกคำตอบที่มีความหมายตรงกับคำในภาษาไทย

ตัวอย่าง **ตา**  a. egg b. ear c. eye d. end	ตัวอย่าง **โกรธ**  a. ask b. angry c. answer d. act
บ้าน 1.  a. hat b. house c. horse d. hand	**เร็ว** 6.  a. funny b. fat c. fast d. full
ประตู 2.  a. duck b. doll c. door d. desk	**เด็กผู้ชาย** 7.  a. big b. bat c. bus d. boy
ไข่ 3.  a. egg b. ear c. earth d. eye	**ปาก** 8.  a. mouth b. man c. map d. moon
นอน 4.  a. sit b. sleep c. swim d. sing	**เขียน** 9.  a. wave b. walk c. write d. wash
เก้าอี้ 5.  a. car b. cake c. cat d. chair	**เชิ้ต** 10.  a. ship b. shirt c. shop d. shoe

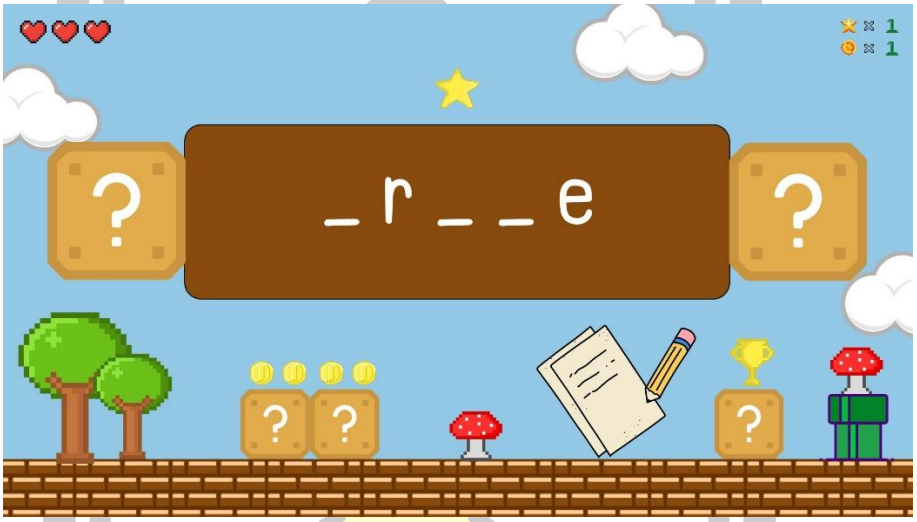
The L1 to L2 Translation Test

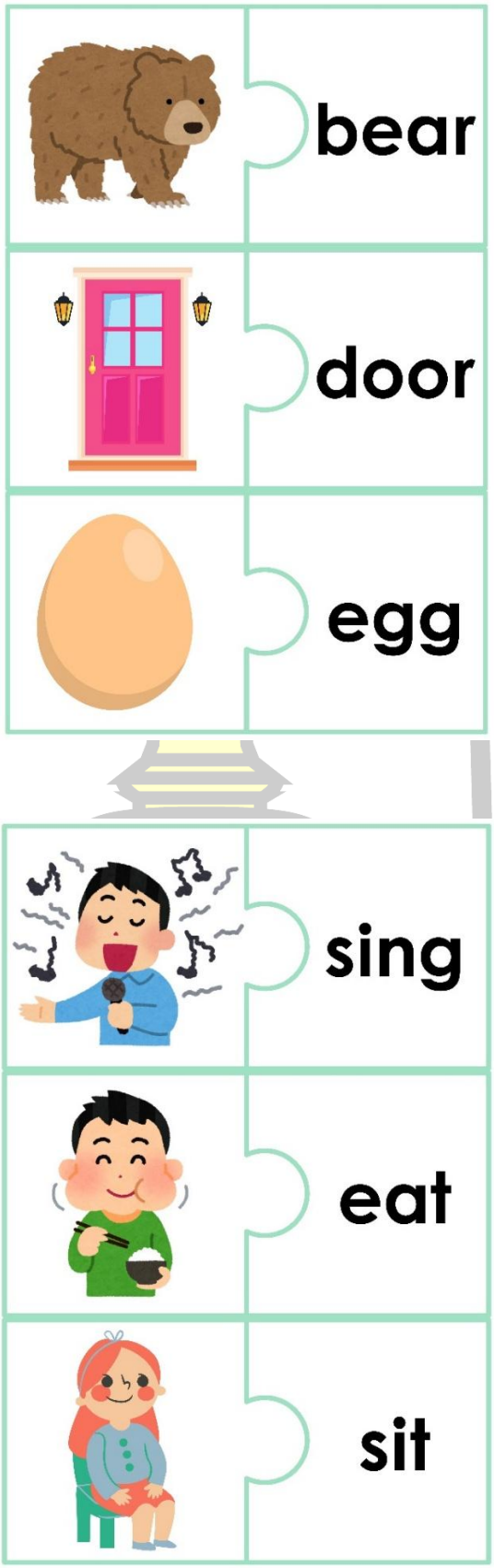
instructions: Look at the choices and choose the choice that is the correct meaning of the word in Thai.
คำสั่ง: ให้นักเรียนดูตัวเลือก และเลือกคำตอบที่มีความหมายตรงกับคำในภาษาไทย

โรงเรียน 11.  a. sky b. school c. star d. sea	**สีขาว** 16.  a. warm b. white c. weak d. wet
ต้นไม้ 12.  a. toy b. tree c. tiger d. table	**ไม่** 17.  a. nice b. no c. new d. near
หัว 13.  a. hat b. hen c. hand d. head	**ยาว** 18.  a. loud b. lasy c. large d. long
มอง 14.  a. listen b. love c. look d. learn	**ขี่** 19.  a. roll b. Raise c. rain d. ride
ข้างล่าง 15.  a. ugly b. usefull c. uncle d. under	**อ่าน** 20.  a. Rest b. read c. reach d. run

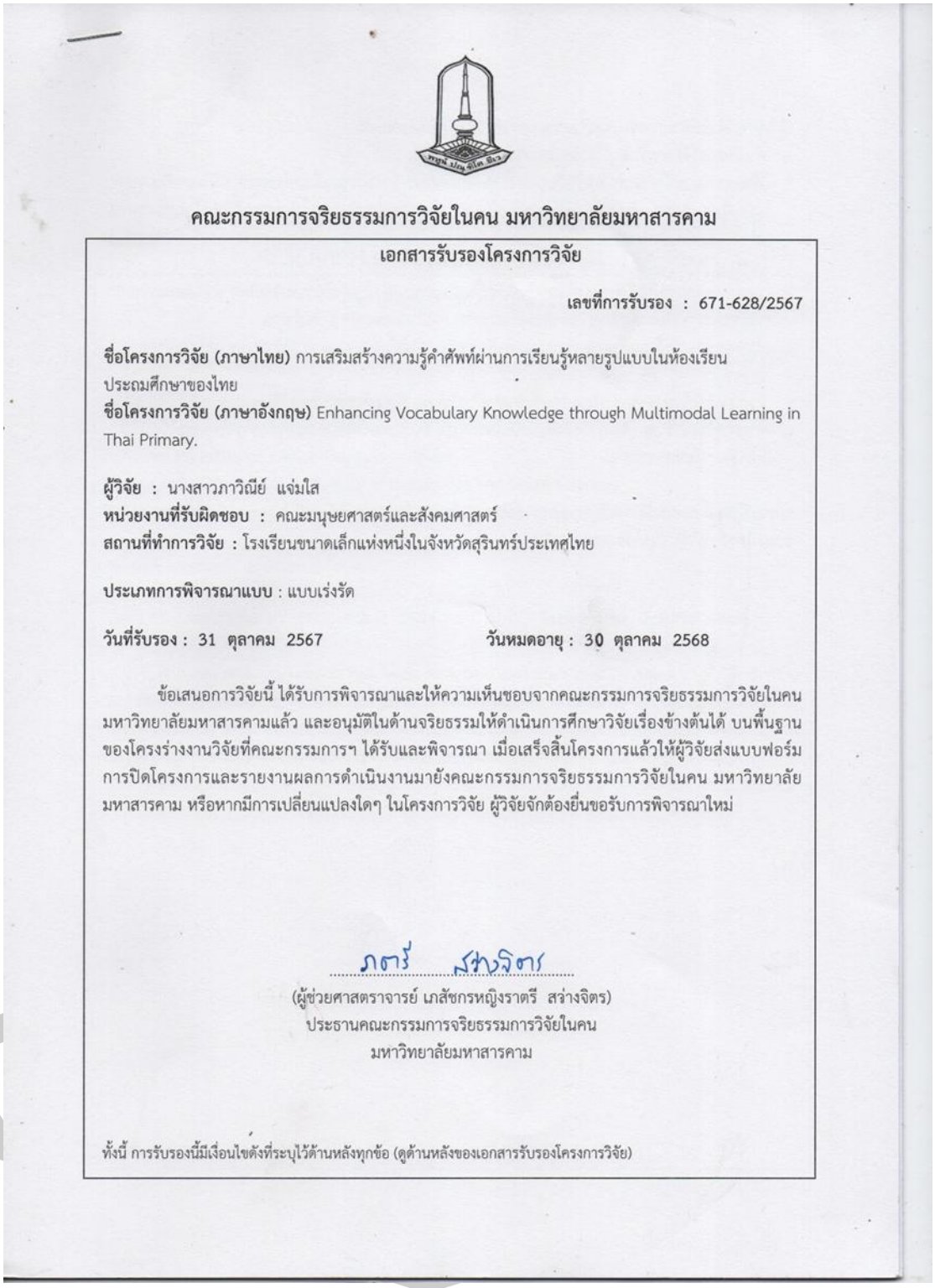
Appendix D: Visual and audio aid slides

Appendix E: Games and activities




bear
door
egg
sing
eat
sit

Appendix F: Ethical consideration



คณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยมหาสารคาม

เอกสารรับรองโครงการวิจัย

เลขที่การรับรอง : 671-628/2567

ชื่อโครงการวิจัย (ภาษาไทย) การเสริมสร้างความรู้คำศัพท์ผ่านการเรียนรู้หลายรูปแบบในห้องเรียนประถมศึกษาของไทย

ชื่อโครงการวิจัย (ภาษาอังกฤษ) Enhancing Vocabulary Knowledge through Multimodal Learning in Thai Primary.

ผู้วิจัย : นางสาวภาวิณีย์ แจ่มใส

หน่วยงานที่รับผิดชอบ : คณะมนุษยศาสตร์และสังคมศาสตร์

สถานที่ทำการวิจัย : โรงเรียนขนาดเล็กแห่งหนึ่งในจังหวัดสุรินทร์ประเทศไทย

ประเภทการพิจารณาแบบ : แบบเร่งรัด

วันที่รับรอง : 31 ตุลาคม 2567 **วันหมดอายุ** : 30 ตุลาคม 2568

ข้อเสนอการวิจัยนี้ ได้รับการพิจารณาและให้ความเห็นชอบจากคณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยมหาสารคามแล้ว และอนุมัติในด้านจริยธรรมให้ดำเนินการศึกษาวิจัยเรื่องข้างต้นได้ บนพื้นฐานของโครงร่างงานวิจัยที่คณะกรรมการฯ ได้รับและพิจารณา เมื่อเสร็จสิ้นโครงการแล้วให้ผู้วิจัยส่งแบบฟอร์มการปิดโครงการและรายงานผลการดำเนินงานมายังคณะกรรมการจริยธรรมการวิจัยในคน มหาวิทยาลัยมหาสารคาม หรือหากมีการเปลี่ยนแปลงใดๆ ในโครงการวิจัย ผู้วิจัยจักต้องยื่นขอรับการพิจารณาใหม่

(ผู้ช่วยศาสตราจารย์ เภสัชกรหญิงราตรี สว่างจิตร)
ประธานคณะกรรมการจริยธรรมการวิจัยในคน
มหาวิทยาลัยมหาสารคาม

ทั้งนี้ การรับรองนี้มีเงื่อนไขดังที่ระบุไว้ด้านหลังทุกข้อ (ดูด้านหลังของเอกสารรับรองโครงการวิจัย)

MAHASARAKHAM UNIVERSITY ETHICS COMMITTEE FOR
RESEARCH INVOLVING HUMAN SUBJECTS

Certificate of Approval

Approval number: 671-628/2024

Title : Enhancing Vocabulary Knowledge through Multimodal Learning in Thai Primary.

Principal Investigator : Miss. Pawinee Jaemsai
Responsible Department : Faculty of Humanities and Social sciences
Research site : A small school in Surin Province, Thailand

Review Method : Expedited Review

Date of Manufacture : 31 October 2024 **Expire : 30 October 2025**

This research application has been reviewed and approved by the Ethics Committee for Research Involving Human Subjects, Mahasarakham University, Thailand. Approval is dependent on local ethical approval having been received. Any subsequent changes to the consent form must be re-submitted to the Committee.

Ratree S.
.....

(Assistant Professor Ratree Sawangjit)
Chairman

Approval is granted subject to the following conditions: (see back of this Certificate)

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