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Using Drawing Games to Enhance Second Language Vocabulary Knowledge in Thai EFL Learners

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Abstract—**This study examines the effects of drawing games on L2 vocabulary knowledge among Thai EFL learners. The study used a quasi-experimental design with 40 ninth-grade students from two intact classes assigned to an experimental group (drawing game activities) and a control group (traditional instruction). Vocabulary knowledge was assessed with four test types: passive recognition, active recognition, passive recall, and active recall. Pre-, post- and delayed post-test results were used to assess the acquisition and retention of vocabulary knowledge. The findings indicated that the experimental group significantly outperformed the control group in all test types, with the greatest improvements in recognition-based tasks. Post-hoc analyses confirmed a difficulty hierarchy for the four types of vocabulary knowledge: active recall, passive recall, active recognition, and passive recognition. Additionally, the delayed post-test results further indicated better long-term retention of drawing in the experimental group, confirming the lasting effect of drawing-based training. Additionally, student feedback revealed positive perceptions of drawing games, particularly regarding engagement, enjoyment, and effectiveness in form-meaning mapping. Together, the present study supplies empirical support for the use of drawing games as a pedagogical instrument for vocabulary learning in EFL settings. The results support the use of visual, interactive tasks in language education to enhance learners' vocabulary performance, motivation, and long-term retention.**

Index Terms—**vocabulary knowledge, drawing games, retention, Thai EFL secondary school students**

I. Introduction

Vocabulary is a key element in learning language and helps learners understand spoken and written passages and explain their ideas effectively (Afzal, 2019; Schmitt, 2010). Vocabulary is not isolated but functionally integrated with other language elements; hence, it is an integral part of second language learning. Vocabulary may involve three dimensions: form, meaning, and use, and can be divided into receptive vocabulary (listening and reading) and productive vocabulary (speaking and writing) (Nation, 2022). The relationship between form and meaning is noteworthy, as it is likely the first building block in the vocabulary learning process (Laufer & Goldstein, 2004; Min & Sukying, 2024). Studies indicate that the form and meaning of words are generally learned before learners can actually use the vocabulary productively, whereas repeated exposure and retrieval help learners retain the vocabulary (González-Fernández & Schmitt, 2020; Sukying, 2018, 2023; Zhong, 2018). Such a strong bond between form and meaning contributes to the development of language on a comprehensive scale, as well as to reading comprehension, aural comprehension, and language proficiency (Sukying, 2023; Webb, 2009).

However, vocabulary learning carries difficulty for EFL learners. It is challenging for many Thai students, particularly at the secondary level, to encounter spelling, pronunciation, and word recognition difficulties (Afzal, 2019). While the Thai Basic Education Core Curriculum (BEC) aims to have ninth graders learn 2,100–2,250 words (Sumalee & Sukying, 2024), most students are unable to achieve this objective due to a deficient vocabulary that negatively impacts reading comprehension and language use. Despite regular classroom exposure, learners often lack the necessary vocabulary skills to achieve academic success (Saengpakdeekit, 2014; Sukying, 2023).

Conventional vocabulary teaching in Thailand focuses on rote memorisation, memorising translations, and isolated word lists, which makes learners feel bored and retain little (Methaneethorn et al., 2021; Ratsamee, 2020; Tanago, 2017). Thus, there is an urgent call for more interaction and context-activating pedagogical methods that promote meaningful learning and facilitate the long-term retention of vocabulary (Alqahtani, 2015; Matwangsaeng & Sukying, 2023).

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Teaching should focus on the relationship between form and meaning, which is central to reading, listening, and language acquisition.

Research has also highlighted the shortcomings of conventional vocabulary instruction, such as rote learning and translation, in failing to foster an understanding and sustained retention of word meanings (Lu et al., 2023; Matwangsaeng & Sukying, 2023). Instead, vocabulary teaching should occur through motivating and interactive practices with rich contexts that challenge the learner in all aspects of word knowledge. Effective instruction should help map form and meaning and develop communication strategies for real-world language use: building up communicative competence for language use and preparing the learner for actual communicative circumstances (Milton, 2021; Schmitt, 2019; Sukying, 2018).

A promising alternative is a drawing-based education. This approach combines visual and kinesthetic learning styles to help students learn to spell, pronounce, and retain words more effectively (Campbell et al., 2013). Drawing has been reported to increase orthographic and phonological representations of words and facilitate deeper cognitive processing by integrating verbal and visual information (Dongsanniwas & Sukying, 2024; Wammes et al., 2015). However, when words are put in varied, meaningful contexts, the drawing may reinforce the semantic encoding of vocabulary words (Greenfield & Bruner, 1966; Piaget, 1952).

However, research on drawing-based vocabulary learning remains limited, especially among junior high school students in Northeastern Thailand, where traditional instructional practices persist and English exposure is minimal. Therefore, this study explores the effectiveness of drawing games as a vocabulary learning tool among Thai secondary school EFL learners. It aims to strengthen students' form-meaning connections, improve vocabulary retention, and examine learners' perceptions of drawing games as a language learning strategy. Given the linguistic and contextual challenges faced by Thai EFL learners, this research investigates the potential of drawing games to enhance vocabulary acquisition, retention, and learner perceptions. By integrating a student-centred, interactive learning approach, this study seeks to offer pedagogically innovative strategies for vocabulary instruction in Thai EFL classrooms. As such, the study is guided by the following research questions:

1. What are the effects of drawing games on Thai secondary school EFL students' L2 vocabulary acquisition?
2. What are the effects of drawing games on Thai secondary school EFL students' L2 vocabulary retention?
3. What are Thai secondary school EFL students' perceptions of using drawing games for L2 vocabulary learning?

II. Literature Review

A. Vocabulary Knowledge

Vocabulary knowledge is a pivotal building block of language proficiency and is crucial to understanding both dominant and non-dominant skills (listening and reading) as well as productive skills (speaking and writing) (Afzal, 2019; Schmitt, 2010). As Lessard-Clouston (2021) points out, vocabulary includes single words, multiwords, and expressions or chunks that function as meaning-bearing lexical units. These are collocations, idioms and phrasal verbs, which are essential in fluent language use.

Nation (2022) states that vocabulary consists of three dimensions, namely form, meaning, and use, and each dimension can be divided into two parts: receptive and productive. Form refers to the oral and written forms of words and morphemic factors such as prefixes and suffixes. Meaning implicates knowledge of form-meaning correspondences, concepts and referents, and word associations. Use refers to grammatical functions, collocations, and limitations on use, such as register and frequency. Proficiency in these components enables students to select, interpret, and use vocabulary in various communicative contexts.

Vocabulary development is by gradual accumulation. Learners usually learn various aspects of a word multiple times (González-Fernández & Schmitt, 2020; Nation, 2022; Nontasee & Sukying, 2021, 2023). Such knowledge should be a combination of vocabulary breadth, that is, the number of words known, and vocabulary depth, that is, the richness of knowledge a learner has about each word, how to use the word, what nuances it has, and what collocational patterns it forms (Min & Sukying, 2024; Schmitt, 2014; Sukying, 2023). These two dimensions are both indispensable for the development of language.

Laufer and Goldstein (2004) distinguish between passive and active vocabulary knowledge. Passive knowledge is the ability to hear and sound out words in listening and reading, while active knowledge is the ability to use words appropriately in speaking and writing. This difference has important implications for vocabulary testing and teaching, as it highlights the importance of training in both the recognition and production of words.

To conclude, vocabulary is a multidimensional and dynamic element of language that serves as a basis for language ability. Teaching form, meaning, and use of vocabulary at all levels in an integrated manner and developing both receptive and productive vocabulary is necessary for preparing the learners with the required lexical resources for academic and real-life communication.

B. Conditions for Vocabulary Learning

Nation (2022) suggests that the five fundamental conditions for supporting the learning of words are motivation, noticing, retrieval, creative use, and instantiation. These principles become the basis for the design of vocabulary instruction that not only facilitates lexical growth but also leads to meaningful use and retention. As for drawing games,

they are closely related to each of the aforementioned circumstances in this study, showcasing practical utility in EFL classes.

Motivation is perhaps key to learning vocabulary in the first step. If students do not have genuine motivation to learn the language, they will not truly absorb and remember new words. By nature, drawing games foster motivation through creativity, novelty, and student-centred interaction. The fun of the exercise eases the anxiety that usually accompanies the learning of new words and creates a non-threatening environment in which students are more likely to become involved and persist (Kickmeier-Rust et al., 2011; Noemí & Máximo, 2014).

Following Schmidt (1990), noticing refers to the learner's conscious awareness of a linguistic form. In drawing games, vocabulary retrieval is activated when students are asked to look up a word and use it to create a sketch. Rather than passively receiving input, learners can process input in meaning-based output work, promoting attention to form-meaning relationships. Retrieval is another key factor for fostering lexical knowledge. Learning is not accomplished merely by recognising words; memory consolidation is reinforced by the repeated recall and review of vocabulary items in various situations. Drawing games facilitate this process by requiring learners to recall and use vocabulary repeatedly throughout multiple stages of communicative interaction, using their vocabulary to describe images, guess peer-produced language, or reflect on their own work (Nation, 2022). Creative use is the use of vocabulary in new, varied, or appropriate contexts. Drawing games are suitable for such a use, as they involve interpreting and creating various visual and written outputs. This process promotes a deeper level of lexical processing and supports transfer between communicative domains. In these exchanges, vocabulary is employed flexibly and purposefully. Instantiation, or the process of linking vocabulary to relevant personal experiences and contexts, is demonstrated through drawing game tasks. Learners associate vocabulary items with concrete, personalised, and meaningful experiences by creating and interpreting visual representations of target words.

C. Theoretical Frameworks

The theoretical foundation for this study comprises three interrelated theories that explain the effect of drawing games on vocabulary learning and retention of secondary school EFL students: dual coding theory, cognitive load theory, and constructivist theory. One framework is the dual coding theory (Paivio, 1971), which claims that information is processed through two interconnected channels: verbal and non-verbal (visual). As students pair words with pictures, they make manifold representations in memory, reinforcing retrieval and retention. This principle is applied in drawing games, where students form mental images of the meaning of a word as they draw, combined with speaking, thereby reinforcing the meaning of the words and facilitating long-term retention. Thus, following Sweller's (1994) cognitive load theory, if teachers provide instruction that minimises cognitive overload while at the same time encouraging genuine processing of knowledge (meaningful learning), they maximise learning potential. Drawing games offer the brain rich, hands-on tasks, including creating and matching pictures and words. Hence, this interactive task minimises irrelevant cognitive loads that prevent the students from processing vocabulary. Constructivist theory (Piaget, 1952; Vygotsky, 1978) focuses on how the learner is actively engaged when constructing knowledge through real-world and social interactions. Since language teaching today leans heavily on constructivist concepts, drawing games align well with this approach by engaging students with new words, altering their expressions of meaning through visuals, and facilitating effortless collaboration with their classmates in a dynamic and engaging environment.

(a). Dual Coding Theory

Information processing in dual coding theory (DCT) occurs in both verbal and non-verbal systems (Paivio, 1971). Using both systems is an essential aspect of effective L2 vocabulary learning, as it facilitates better mental representation and retention (Jiang, 2000). Drawing pictures related to new words activates both verbal and visual routes for learners, which helps reinforce memory. Research supports the efficacy of DCT in enhancing vocabulary learning. For example, Paivio and Csapo (1973) found that learners who received additional input of imagery for the tested words performed better than students who received only verbal input. Mayer and Anderson (1991) also noted that learning through both auditory and visual modes of the brain leads to better comprehension and recall. There is also a higher retrieval of words with visuals for memory and associations, which, in turn, helps learners build their vocabulary effectively.

(b). Cognitive Load Theory

Cognitive load theory (Sweller, 2011) highlights the management of cognitive loads so as not to overload working memory. Drawing games facilitate the reduction of the L2 phenomenon of vocabulary learning, which is a highly complex process, into easily manageable visual representations, thereby diminishing cognitive load and increasing processing efficiency. Simplified graphics can reduce cognitive load (Chandler & Sweller, 1991). When students compared two representational formats as the basis of a learning problem, learning with stimuli that included simpler graphics resulted in lower cognitive load and better problem-solving performance. Deconstructing the word into visual elements enables learners to focus on the informative parts with less information, supporting one aspect of cognitive load theory: decreasing extraneous cognitive load. Leahy and Sweller (2011) found that when instructional materials were presented pictorially, learners performed significantly better than their participants in terms of retention and comprehension measures. Visual processing facilitates the transfer of information from long-term memory and retrieval when needed, enabling vocabulary to be retained, so that you can teach your students to learn more effectively.

(c). Constructivist Theory

The constructivist theory (Piaget, 1970) posits that learners use prior knowledge to actively construct and create new knowledge. Learning is a process through which students explore, question, and reflect, rather than simply receiving information (Piaget, 1952). Furthermore, peer and teacher social interaction is an essential aspect of cognitive development since they collaborate in constructing new knowledge (Piaget, 1985). This approach aligns with using drawing games in vocabulary acquisition, as drawing games engage students by having them create their own visualisations of words. Through visualisation, interpretation, and synthesis, key cognitive processes that integrate new knowledge into existing mental structures (Piaget, 1970) guide learners in learning new vocabulary. This helps students develop and recall their vocabulary by enabling them to link words with visual and contextual representations. Additionally, drawing games are collaborative in nature, as students share and describe their pictures, resulting in increased social interaction and opportunities for meaningful input (Piaget, 1985). This peer interaction is essential for learning vocabulary since it facilitates student-to-student talks and promotes comprehension and recall of the knowledge.

III. Research Methods

A. Research Design

The research philosophy adopted for this study was based on pragmatism, and a mixed-methods research design was employed. Central to this constructivist approach is the focus on applied research for practice, the recognition of learners' active role in knowledge construction, and the advocacy for integrating both quantitative and qualitative methods to provide a richer understanding of complex educational realities. This philosophical proposition enabled the study to investigate the multidimensional aspects of drawing games from vocabulary learnt from outcome- and processor-oriented perspectives. It was also attuned to the aim of the investigation to improve vocabulary teaching and learning by context-based and innovative pedagogies and had practical implications for language education. This pragmatic design of mixed methods for evaluation is exemplified in the work of Creswell and Creswell (2018) and Johnson et al. (2007), underscoring the need for pluralism of methods to adequately address real-life educational problems.

B. Participants and Setting

Participants included 40 ninth-grade students from a secondary school in northeastern Thailand. All students who regularly attended the classroom were selected for this study to ensure they were exposed to the instructional activities throughout the study. Individuals reported to have emotional and behavioural problems were excluded to maintain a productive and collaborative learning atmosphere. The participants were teens who had studied EFL for 8-9 years in the school environment. They had little mental engagement with the English language outside of school settings and the classroom, which is generally very common among them and may contribute to their vocabulary learning problems or difficulties in maintaining exemplified vocabulary items. Two intact EFL classes were chosen using convenience sampling and assigned to the experimental (n = 20) or control (n = 20) group. The experimental group received two hours of regular instruction and one hour of vocabulary game-based drawing activities per week. The control group, however, received three hours of traditional vocabulary instruction each week. The intervention was performed over 14 weeks, and for 8 weeks (a total of 24 hours), drawing games were embedded in the exercise program of the experimental group. This study intended to examine the different effects of drawings on vocabulary learning compared to no drawings.

C. Instruments

Four vocabulary knowledge tests, including passive recognition, active recognition, passive recall, and active recall tests, were used to evaluate students' vocabulary knowledge before and after the intervention. A questionnaire was also used to investigate the participants' perceptions of using drawing games for vocabulary learning. The following sections contain detailed information on the instruments.

(a). Passive Recognition Test

Adapted from Laufer and Goldstein (2004), the passive recognition test assessed the participant's ability to recognise the L1 meaning of an L2 word. Participants selected the correct meaning from four topic-related options, including three L1 distractors. The 25-item test was timed for 20 minutes, with one point awarded per correct answer and zero points for incorrect responses. For example:

1. จงบอกความหมายของของคำว่า "school" (Select the best meaning of the word "school")

1. บ้าน 2. โรงเรียน
3. โรงพยาบาล 4. ร้านอาหาร

(b). Active Recognition Test

The active recognition test, adapted from Laufer and Goldstein (2004), assessed participants' ability to recognise the L2 form of an L1 word. Participants selected the correct L2 word from four topic-related options, including three L2 distractors. The test consisted of 25 items with a 20-minute time limit. Each correct answer earned one point, while incorrect choices received zero points. For instance:

1. จงบอกคำแปลของของคำว่า “โรงพยาบาล” (Select the English word for “โรงพยาบาล”)

A. coffee shop B. house
C. hospital D. store

(c). Passive Recall Test

The passive recall test assessed participants' ability to recall the L1 meaning of an L2 word by writing its meaning. The 20-item test was timed for 20 minutes, allowing more time per item than the recognition tests. Participants earned one point for a correct L1 equivalent, even with minor spelling or synonym errors, but received zero points if the meaning was incorrect or not sufficiently close to the given L2 word. For example:

1. _____ **(mall)**

As shown in the example, participants received a score if they could supply any L1 translations of the given L2 word. For instance, if the answer were either “ห้าง” or “ห้างสรรพสินค้า”, the students would receive one point. Spelling mistakes were acceptable as long as the given answer was understandable.

(d). Active Recall Test

The active recall test required participants to recall the L2 form of an L1 word by completing the given partial L2 word to ensure accuracy. The test included 20 items with a 20-minute time limit. Participants earned one point for providing the correct L2 word, even with minor spelling or synonym errors, but received zero points if their response differed significantly from the target word.

1. s_____ **(ร้านค้า)**

In this test, students earned a score if they provided any L2 equivalent of the given L1 word, which, in the example, could be either “*shop”* or “*store”,* since they could be translated into the word “ร้านค้า”. Errors in spelling were also compromised if the given answer was comprehensible. Nevertheless, the students did not receive a score if the L2 form of their response differed from the provided L1 word.

(e). Questionnaire

A five-point Likert scale questionnaire, adapted from Sukying's (2020) study, was used to examine primary school EFL students' perceptions of learning form-meaning link knowledge through drawing games. The questionnaire focused on students' understanding of form-meaning connections developed during the intervention, both in productive and receptive aspects. Responses were rated on a 5-point scale, ranging from “strongly disagree” (1) to “strongly agree” (5). To ensure clarity and accuracy, the questionnaire was administered in Thai, allowing participants to fully comprehend the questions.

D. Data Collection

This study employed a four-step data collection process to systematically assess vocabulary acquisition and retention. At the end of the first week (Stage 1), students took a pre-test to measure their baseline vocabulary ability before the intervention. The study used four types of vocabulary assessments to evaluate passive and active vocabulary knowledge. In Stage 2, which lasted from weeks two through nine, students engaged in one hour of drawing games after two hours of traditional instruction on a specific topic. Interactive learning techniques were incorporated into this stage of sustained engagement with the vocabulary. In week ten, Stage 3 took place, during which students took a post-test using the same three vocabulary tests. A questionnaire was conducted to capture students' perceptions about the intervention and their experiences with drawing games as a pedagogical tool. Finally, in the fourteenth week, a delayed post-test was administered for Stage 4 to investigate vocabulary retention over time and to determine whether the knowledge gained in the immediate post-test was maintained. The tests were intended to be completed within 60 minutes each, with equal time allocated for each test type. Accordingly, the number of items and the relative difficulty did not disadvantage any student. This tiered format facilitated a thorough analysis of the efficacy of the intervention in improving vocabulary acquisition, retention, and learner engagement.

E. Teaching Procedure for Drawing Games

In this study, drawing games were used as an additional teaching approach to the traditional vocabulary instruction. In other words, drawing activities were implemented after each vocabulary topic had been entirely taught using traditional teaching techniques, such as memorisation, repetition, or translation. During the activities, students were divided into small groups. Each group was assigned to illustrate the meanings of the words they learned through drawings without using letters or symbols. After completing the drawings, the pictures were exchanged with other groups. Each group then attempted to guess the original words by interpreting the drawings and writing the words on paper. Finally, each group revealed the intended vocabulary words and checked whether the other groups interpreted them correctly.

F. Data Analysis

Descriptive and inferential statistics were conducted to determine the effects of drawing games on Thai EFL students' vocabulary knowledge (RQ1) and to gain a comprehensive evaluation of the effectiveness of the intervention. To investigate whether significant vocabulary gains were made, differences on average between pre-test and post-test scores

within a group were examined over time using a dependent samples *t*-test. Furthermore, an independent-samples *t*-test was conducted to investigate the variation between the post-test scores of the experimental groups and the control groups, determining the extent to which drawing games influenced vocabulary enhancement compared with conventional teaching. Additionally, a repeated measures ANOVA was conducted to analyse whether differences between passive and active vocabulary tests (i.e., from recognition to recall) and differences in vocabulary knowledge at different learning times increased and improved for both groups. Moreover, post-hoc analyses were applied to reveal differences between specific test conditions and provide a more detailed interpretation of learning effects.

To measure vocabulary retention (RQ2), the pre-test, post-test, and delayed post-test scores were analysed using repeated measures ANOVA. This statistical model enabled us to determine whether the vocabulary gains endured over time and whether the effects of the drawing game persisted beyond the initial learning sessions. Post hoc analyses were performed to determine the differences between the pairs of tests as an outcome of the intervention and the long-term effect of the intervention on vocabulary retention. All statistical analyses were performed to guarantee statistical validity and reproducibility.

Regarding student perceptions of the drawing games (RQ3), the descriptive statistics (means, standard deviations, percentages) were calculated for the data from the five-point Likert-scale questionnaire. This type of analysis also contributed to evaluating the students' overall attitude towards, level of engagement in, and perceived benefits of playing drawing games as a vocabulary learning tool. This reaffirmed the motivational and interactive nature of learning through the drawing games employed in the study.

IV. Results

A. The Effects of Drawing Games on Vocabulary Knowledge of Form-Meaning Connections

The impacts of the intervention on students' vocabulary knowledge of form-meaning connections are illustrated in the following section. Four types of vocabulary tests were administered to measure the effectiveness of drawing games in vocabulary acquisition: passive recognition, active recognition, passive recall, and active recall. These assessments were conducted with all 40 participants.

(a). Passive Recognition Test Results

The within-group results from the passive recognition test are shown in Table 1. The mean score for the experimental group increased from 10.45 (S.D. = 3.50) on the pre-test to 19.35 (S.D. = 2.81) on the post-test, compared to a smaller change in the control group, which had mean scores of 10.05 (S.D. = 6.01) and 13.75 (S.D. = 6.24) on the pre-test and post-test respectively. The *t*-value of 10.45 and a *p*-value less than 0.05, indicating a significance level of less than 0.05, suggest that the intervention had a statistically significant effect on the experimental group's ability to recognise target vocabulary passively. This finding suggests that drawing games may enhance vocabulary recognition.

Table 1
Participants' Scores on the Passive Recognition Test Within Groups

Groups	Pre-test Mean (%)	S.D.	Post-test Mean (%)	S.D.	*t* (within)	*p* (within)
Experimental (n = 20)	10.45 (41.8%)	3.50	19.35 (77.4%)	2.81	10.45	0.05*
Control (n = 20)	10.05 (40.2%)	6.01	13.75 (55%)	6.24	5.73	0.05*

***Note:** the total score = 25; $p < .05$

Regarding the between-group comparison (See Table 2), in the pre-test, the experimental group (M = 10.45) and the control group (M = 10.05) had similar scores (t = 0.28, p = 0.78), indicating no significant difference ($p > 0.05$). This suggests that both groups had comparable levels of vocabulary recognition knowledge before the intervention.

In the post-test, the experimental group (M = 19.35) outperformed the control group (M = 13.5) with a t-value of 3.3 and a p-value of less than 0.05, demonstrating a statistically significant improvement ($p < 0.05$). These results indicate that the drawing games intervention positively impacted vocabulary recognition, as the experimental group showed greater gains than the control group.

Table 2
Participants' Scores on the Passive Recognition Test Between Groups

Test	Experimental Group	S.D.	Control Group	S.D.	*t* (between)	*p* (between)
Pre-test	10.45 (41.8%)	3.50	10.05 (40.2%)	6.01	0.28	0.78
Post-test	19.35 (77.4%)	2.81	13.75 (55%)	6.24	3.31	0.05*

***Note:** the total score = 25; $p < .05$

(b). Active Recognition Test Results

Table 3 presents the results of the within-group comparison of the active recognition test. The experimental group again showed a significant improvement, with mean scores rising from 9.85 (S.D. = 4.04) to 17.15 (S.D. = 3.38). The

control group, however, demonstrated minimal change, with mean scores of 8.25 (S.D. = 5.26) and 10.9 (S.D. = 4.92). The calculated *t*-value of 7.93 and *p*-value smaller than 0.05 significance level indicate a statistically significant difference between the pre-test and post-test. These results imply that drawing games can effectively promote the recognition of word forms.

TABLE 3
PARTICIPANTS' SCORES ON THE ACTIVE RECOGNITION TEST WITHIN GROUPS

Groups	Pre-test Mean (%)	S.D.	Post-test Mean (%)	S.D.	*t* (within)	*p* (within)
Experimental (*n* = 20)	9.85 (36.4%)	4.04	17.15 (68.6%)	5.26	7.93	0.05*
Control (*n* = 20)	8.25 (33%)	5.26	10.9 (43.6%)	4.92	5.98	0.05*

***Note:** the total score = 25; $p < .05$

Table 4 compares the scores of the experimental and control groups. In the pre-test, the experimental group (M = 9.85) and the control group (M = 8.25) showed no significant difference ($t = 1.05$, $p = 0.30$), indicating similar vocabulary knowledge prior to the intervention.

In the post-test, the experimental group (M = 17.15) significantly outperformed the control group (M = 10.9) ($t = 4.77$, $p < 0.05$). This suggests that drawing games have a strong impact on students' ability to actively recall and produce vocabulary.

TABLE 4
PARTICIPANTS' SCORES ON THE ACTIVE RECOGNITION TEST BETWEEN GROUPS

Test	Experimental Group	S.D.	Control Group	S.D.	*t* (between)	*p* (between)
Pre-test	9.85 (36.4%)	4.04	8.25 (33%)	5.26	1.05	0.30
Post-test	17.15 (68.6%)	5.26	10.9 (43.6%)	4.92	4.77	0.05*

***Note:** the total score = 25; $p < .05$

(c). Passive Recall Test Results

The passive recall test measured students' ability to recall word meanings. The experimental group showed a significant improvement, with mean scores increasing from 2.19 (S.D. = 3.11) to 4.38 (S.D. = 2.58) (See Table 5). In contrast, the control group's scores remained unchanged at 3.56. The t-values of 2.97 and $p < 0.05$ indicate a statistically significant difference, suggesting that drawing games enhance vocabulary recall more effectively than traditional instruction.

TABLE 5
PARTICIPANTS' SCORES ON THE PASSIVE RECALL TEST WITHIN GROUPS

Groups	Pre-test Mean (%)	S.D.	Post-test Mean (%)	S.D.	*t* (within)	*p* (within)
Experimental (*n* = 20)	2.19 (8.76)	3.11	4.38 (17.52%)	2.58	2.97	0.05*
Control (*n* = 20)	3.56 (14.24%)	3.77	3.56 (14.24%)	4.00	0	1

***Note:** the total score = 25; $p < .05$

Table 6 compares the passive recall scores between the two groups. In the pre-test, the experimental group (M = 2.19) and control group (M = 3.56) showed no significant difference ($t = -1.17$, $p = 0.26$), indicating comparable passive recall ability before the intervention.

In the post-test, the experimental group (M = 4.38) showed slight improvement, while the control group remained at 3.56. However, the difference was not statistically significant ($t = 0.80$, $p = 0.43$), suggesting that drawing games did not significantly enhance passive recall ability compared to traditional instruction. Despite no significant differences between the groups, the within-group comparison revealed that the experimental group experienced a significant improvement in their passive recall scores from 2.19 to 4.38. This increase suggests that the drawing games intervention positively impacted the experimental group's performance, although it did not outperform the control group in the post-test.

TABLE 6
PARTICIPANTS' SCORES ON THE PASSIVE RECALL TEST BETWEEN GROUPS

Test	Experimental Group	S.D.	Control Group	S.D.	*t* (between)	*p* (between)
Pre-test	2.19 (8.76%)	3.11	3.56 (14.24%)	3.77	-1.17	0.26
Post-test	4.38 (17.52%)	2.58	3.56 (14.24%)	4.00	0.80	0.43

***Note:** the total score = 25; $p < .05$

(d). Active Recall Test Results

The results of the active recall test, which is the most challenging as it requires students to produce the target word, also showed a clear benefit from the intervention (See Table 7). The experimental group's mean scores increased from 1.25 (S.D. = 2.22) to 2.44 (S.D. = 2.16), whereas the control group maintained identical scores in both the pre-test and post-test, with an average score of 3.56 in both tests. With a *t*-value of 2.17 and a *p*-value of 0.04, the results indicate a significant effect of the drawing games on students' ability to actively recall the form of the target words.

TABLE 7
PARTICIPANTS' SCORES ON THE ACTIVE RECALL TEST WITHIN GROUPS

Groups	Pre-test Mean (%)	S.D.	Post-test Mean (%)	S.D.	*t* (within)	*p* (within)
Experimental (n = 20)	1.25 (5%)	2.22	2.44 (9.76%)	2.16	2.17	0.05*
Control (n = 20)	1.69 (6.76%)	2.82	2 (8%)	3.13	1.56	0.14

***Note:** the total score = 25; $p < .05$

Table 8 compares active recall scores between the two groups. There was no statistically significant difference between the experimental and control groups in both the pre-test ($p = 0.64$) and post-test ($p = 0.63$). However, the within-group analysis revealed that the experimental group's improvement (from 1.25 to 2.44) was significant, whereas the control group's change (from 1.69 to 2.00) was not. This suggests that while drawing games positively impacted active recall performance, the control group saw little improvement.

TABLE 8
PARTICIPANTS' SCORES ON THE ACTIVE RECALL TEST BETWEEN GROUPS

Test	Experimental Group	S.D.	Control Group	S.D.	*t* (between)	*p* (between)
Pre-test	1.25 (5%)	2.22	1.69 (6.76%)	2.82	-0.48	0.64
Post-test	2.44 (9.76%)	2.16	2 (8%)	3.13	0.49	0.63

***Note:** the total score = 25; $p < .05$

(e). Differences Between the Four Types of Tests

Table 9 presents the pre-test and post-test scores across the four types of vocabulary tests for both the experimental and control groups. In the experimental group, post-hoc analysis indicated that passive recognition scores were significantly higher than active recognition ($t = 3.09$, $p < 0.05$). Similarly, active recognition was significantly easier than passive recall ($t = 9.88$, $p < 0.05$), and passive recall remained significantly easier than active recall ($t = 3.60$, $p < 0.05$). A similar pattern was also observed in the control group. Post-hoc analysis showed that passive recognition was significantly easier than active recognition ($t = 2.14$, $p = 0.04$). Moreover, active recognition was significantly easier than passive recall ($t = 5.04$, $p < 0.05$), and passive recall was significantly easier than active recall ($t = 4.80$, $p < 0.05$), confirming a clear hierarchy of difficulty.

TABLE 9
DIFFERENCES BETWEEN THE FOUR TYPES OF TESTS AMONG PRE-TESTS AND POST-TESTS

Groups	Test Types	Pre-test	*f*	*p*	Post-test	*f*	*p*
Experimental (n = 20)	P-Recognition	10.45 (41.80%)	109.31	0.05*	19.35 (77.40%)	463.30	0.05*
	A-Recognition	9.85 (39.40%)			17.15 (68.60%)		
	P-Recall	2.19 (8.76%)			4.38 (17.52%)		
	A-Recall	1.25 (5%)			2.44 (9.76%)		
Control (n = 20)	P-Recognition	10.05 (40.20%)	39.10	0.05*	13.75 (55%)	95.92	0.05*
	A-Recognition	8.25 (33%)			10.90 (43.60%)		
	P-Recall	3.56 (14.24%)			3.56 (14.24%)		
	A-Recall	1.69 (6.76%)			2.00 (8%)		

***Note:** the total score = 25; $p < .05$

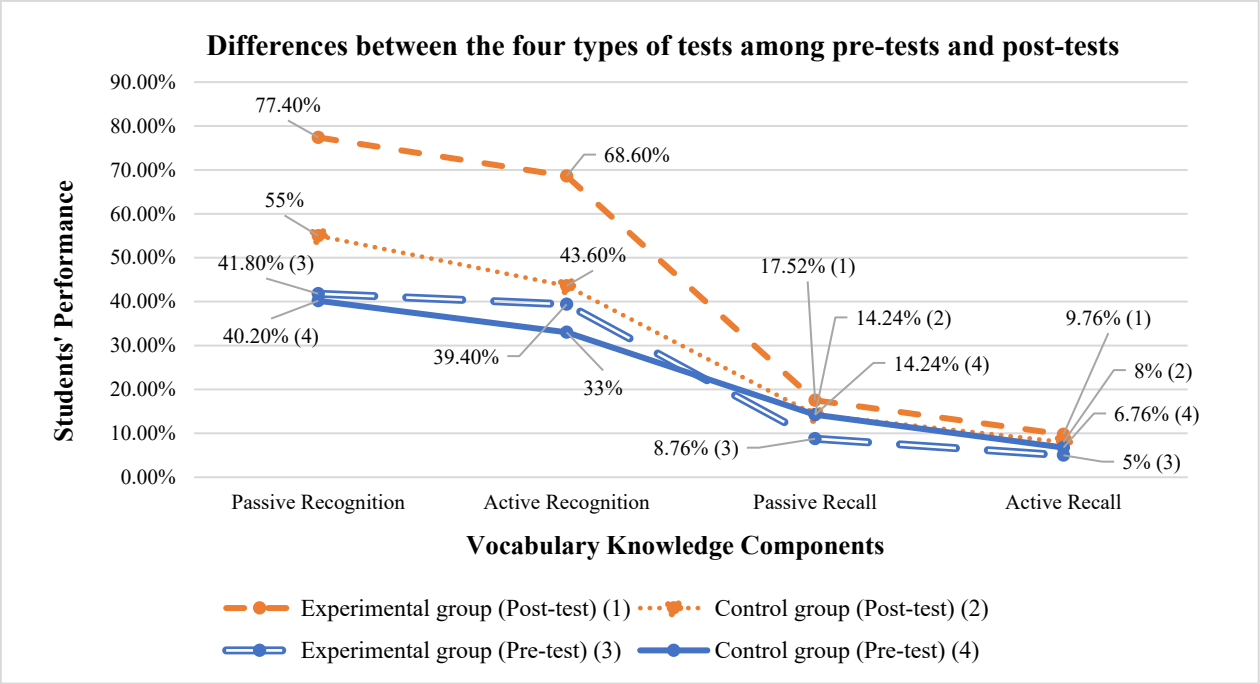

Figure 1. Differences Between the Four Types of Tests Among Pre-Tests and Post-Tests

B. The Effects of Drawing Games on Vocabulary Retention

Table 10 presents a summary of the overall scores before and after the intervention within each group. The repeated measures ANOVA (f=192.93, p < 0.05) indicated that scores across the three time points of the experimental group were statistically significant. Post-hoc analysis revealed that the difference between the pre-test and post-test was statistically significant ($p < 0.05$), as was the difference between the pre-test and delayed post-test ($p < 0.05$). Moreover, the difference between the post-test and delayed post-test ($p < 0.05$) also indicated a slight decline in scores, but still demonstrated retention.

For the control group, the repeated measures ANOVA ($f = 37.29$, $p < 0.05$) suggested significant differences in scores over time. Post-hoc comparisons indicated a statistically significant improvement from the pre-test to the post-test ($p <$ 0.05). However, the difference between the pre-test and delayed post-test was insignificant ($p = 0.22$), suggesting that the initial gains were not retained. Moreover, the difference between the post-test and delayed post-test was significant ($p =$ 0.05), indicating a decline in scores over time.

TABLE 10
A SUMMARY OF THE OVERALL PARTICIPANTS' SCORES WITHIN GROUPS

Groups	Pre-test	S.D.	Post-test	S.D.	Delayed post-test	S.D.	*f* (within)	*p* (within)
Experimental	23.74	10.97	43.31	9.16	39.71	8.86	192.93	0.05*
Control	23.55	15.81	30.21	16.59	22.16	15.19	37.29	0.05*

***Note:** the total score = 100; $p < .05$

However, there was a difference between the mean scores of the two groups. As shown in Table 11, the delayed post-test results revealed that the experimental group maintained a higher level of vocabulary knowledge ($\bar{x} = 39.71$) than the control group ($\bar{x} = 22.16$). The difference between the groups was statistically significant, with a t-value of 4.38 and a p-value less than 0.05. This suggests that the experimental group improved their vocabulary knowledge and significantly outperformed the control group in terms of retention.

TABLE 11
A SUMMARY OF THE OVERALL PARTICIPANTS' SCORES BETWEEN GROUPS

Tests	Experimental	S.D.	Control	S.D.	*t* (between)	*p* (between)
Pre-test	23.74	10.97	23.55	15.81	0.04	0.97
Post-test	43.31	9.16	30.21	16.59	3.03	0.05*
Delayed post-test	39.71	8.86	22.16	15.19	4.38	0.05*

***Note:** the total score = 100; $p < .05$

C. The Effects of Drawing Games on Students' Perceptions of Vocabulary Learning

The questionnaire, adapted from Sukying's (2020) perception questionnaire of word knowledge, evaluated various aspects of engagement and effectiveness. The results, summarised in Table 12, highlight students' positive perceptions

of this teaching technique.

TABLE 12
STUDENTS' PERCEPTIONS OF DRAWING GAMES IN VOCABULARY LEARNING

	Items	Mean	S.D.	%	Meaning
1	I enjoy studying English through the use of drawing games.	4.50	0.61	90%	Very high
2	I think drawing games help me remember vocabulary.	4.15	0.67	83%	Very high
3	I think I am more encouraged to learn vocabulary using drawing games.	4.15	0.59	83%	Very high
4	I think drawing games help me learn new vocabulary better.	4.45	0.69	89%	Very high
5	I think drawing games help me get familiar with vocabulary.	4.30	0.73	86%	Very high
6	I think drawing games help me learn vocabulary that suits my proficiency level.	4.10	0.85	82%	Very high
7	I can remember the L2 form of vocabulary better.	4.35	0.81	87%	Very high
8	I want to learn more often through drawing games.	4.35	0.81	87%	Very high
9	I think drawing games help me learn vocabulary better than memorisation	4.25	0.79	85%	Very high
10	I think the instructions for drawing games are easy to understand	4.40	0.60	88%	Very high
Total		**4.30**	**0.71**	**86%**	**Very high**

The overall mean score for all questionnaire items was 4.30 (S.D. = 0.71), indicating a very high level of positive perception (86%). The findings demonstrate that students perceive drawing games as a highly engaging, enjoyable, and effective tool for vocabulary learning. High ratings across most items underscore the value of this approach in promoting motivation, improving retention, and fostering familiarity with vocabulary.

V. DISCUSSION

The results of this study indicate that drawing games have a significant effect on Thai EFL ninth-grade students' vocabulary development in terms of form-meaning association. Performance gains in recognition, recall, and retention tasks from pre-test to post-test to delayed post-test show that drawing games are an enriching extension to conventional vocabulary teaching. These results are reinforced by several theoretical frameworks that stress the academic and cognitive benefits of a mix of visual and interactive learning.

From the perspective of dual coding theory (Paivio, 1971), the advantage of drawing games may be that they engage verbal and visual processing concurrently. When students visualise words like "hospital" or "grocery," they trigger not only verbal labels but also picture memory pathways, strengthening semantic representations via multimodal encoding. These visual images serve as concrete referents, which enhance the connection between word forms and meanings, leading to better recall and retention over the long term —a benefit evident in the mirror post-test and delayed post-test scores.

Cognitive load theory (Sweller, 1994) also encourages drawing games, arguing that they lower extraneous load and encourage germane processing levels. Isolated word memorisation as an approach to vocabulary learning may burden learners. Yet, drawing games spread that cognitive load among bite-sized, contextually relevant tasks. For instance, sketching a situation related to the word "grocery" drives more engagement and relevant vocabulary use, which in turn maximises mental resources and results in better understanding.

Furthermore, constructivist theory (Piaget, 1978) underscores the importance of active and socially mediated learning. Games like drawing exemplify this principle, where players participate in the construction of meaning. Learners not only create and interpret visual images, but they also reflect on one another's considerations. This fosters an interactive classroom environment, cultivates a zeal for creative and critical thinking, and reduces language anxiety, a key factor in learning vocabulary. These results are consistent with Baddeley's (1997) memory model, which emphasises the role of retrieval cues in long-term maintenance. Visual processing through drawing serves as a strong retrieval cue to help students remember vocabulary outside of classroom practices. Previous research (Feryok & Pryde, 2012; Marzano, 2007; Taheri, 2014; Wammes et al., 2015) has shown that multimodal learning, including drawing, enhances memory consolidation and vocabulary retention.

Notably, the findings align with Nation's (2022) vocabulary learning conditions, highlighting the significance of motivation, noticing, retrieval, and generative use. In the drawing games, students were required to intentionally perceive the vocabulary and be motivated to comprehend what they read (active noticing), then repeatedly recall the vocabulary contents in various forms and create with them (form repetition and utilisation), which was necessary for vocabulary learning.

This study further supports Laufer and Goldstein's (2004) vocabulary difficulty hierarchy, which ranks vocabulary knowledge in the following order of difficulty: active recall, passive recall, active recognition, and, finally, passive recognition. This model is supported by the significant differences between all four types of tests. However, the current findings add something new by demonstrating that passive recall was more difficult than active recognition, contrary to previous assumptions (Laufer & Goldstein, 2004) that both types of formats required similar levels of difficulty. The discrepancy implies that both instructional context and task format influence the cognitive demands of vocabulary retrieval (Min & Sukying, 2024).

These findings also support the emerging consensus that vocabulary testing should include task types in mixed modalities to account for both recognition and productive aspects of knowledge (Nation & Webb, 2011; Sukying, 2023;

Nontasee & Sukying, 2021, 2023). By comparing the learners' performance on recognition and recall sets, this study corroborates the pedagogical significance of discrepancy-reductive testing principles that accommodate both a multidimensional account of vocabulary depth and an individual student's cognitive behaviours.

As important as the discoveries about the effect of drawing games on vocabulary learning are, the results concerning learners' attitudes towards drawing games for vocabulary learning are also noteworthy. The questionnaire results were overwhelmingly positive, with most students saying that the drawing games helped them understand and remember the target words. These observations point to a pedagogically grounded approach that enhances language teaching by combining visual and kinesthetic components. Drawing activities inspired intrinsic curiosity and paid attention, which made vocabulary learning fun and easy, as opposed to reciting and memorising word lists.

The results provide further evidence for Paivio's (1971) dual coding theory and Sweller's (1994) cognitive load theory. The visual-verbal pairing in the drawing tasks resulted in elaborate mental representations of the material to be learned, which facilitated comprehension and retrieval and minimised cognitive overload. Therefore, students could memorise and use new vocabulary. Drawing also provides a route to the more cognitive elaboration process, which helps promote form-meaning connections and subsequent longer-term vocabulary retention.

In summary, this research provides strong empirical support for the perspective that drawing games constitute an effective, enjoyable, and theoretically justified pedagogical practice for teaching vocabulary in EFL settings. By stimulating cognitive (thinking), behavioural (doing), and emotional (feeling) engagement, drawing games focus on attention, increase memory retention, and promote a learner-centred learning environment. These results provide evidence for the use of interactive multimodal approaches in vocabulary instruction, which has implications for both vocabulary teaching and assessment.

VI. Conclusion

This study demonstrates that drawing games significantly enhance EFL learners' vocabulary acquisition by reinforcing form-meaning connections through multimodal engagement. Grounded in dual coding theory, cognitive load theory, and constructivist principles, the findings show improved vocabulary knowledge and retention across recognition and recall tasks. Notably, passive recall proved more cognitively demanding than active recognition, underscoring the importance of task design and differentiated assessment. Students reported high motivation, deeper understanding, and positive learning experiences, aligning with Nation's (2022) vocabulary learning conditions. These results support drawing games as an effective, learner-centred strategy for vocabulary development in communicative EFL classroom settings.

This study offers practical implications for vocabulary instruction in EFL classrooms. Drawing games significantly enhanced vocabulary acquisition by promoting cognitive engagement, reducing learning anxiety, and fostering deeper form-meaning connections. These activities support learner motivation and cater to diverse learning styles, particularly for visual and kinesthetic learners. To maximise their effectiveness, teachers should adapt the complexity of drawing tasks to learners' proficiency levels and allow sufficient time for meaningful participation and reflection.

Concerning research, this study contributes to the growing interest in multimodal and student-centred vocabulary instruction. Future studies should investigate the long-term effects of drawing games on vocabulary retention and explore their impact on other language skills, such as speaking and writing. Comparative studies involving other active learning methods could offer further insights into instructional effectiveness.

However, the study has limitations. The small, context-specific sample limits generalizability and the focus on form-meaning tests does not address broader aspects of vocabulary knowledge or language use. Future research should include diverse learner populations, assess lexical depth and usage, and examine how drawing games influence comprehensive language development. These directions would provide a more complete understanding of the pedagogical value of drawing-based vocabulary instruction.

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