

## Using a CEFR-Aligned Online System to Enhance Low-Proficiency EFL Learners' Vocabulary Knowledge and Retention

Tipawan Chansri-ngam

Uttaradit Rajabhat University, Thailand

E-mail: [tipawan.cha@uru.ac.th](mailto:tipawan.cha@uru.ac.th), ORCID ID: <https://orcid.org/0009-0002-2906-6081>

Received 09/01/2026

Revised 29/01/2026

Accepted 05/03/2026

### Abstract

**Background and Aims:** Despite decades of instruction, vocabulary limitations persistently obstruct low-proficiency EFL learners from proficiency and communicative competence. This study aimed to develop and evaluate a CEFR-aligned online vocabulary strengthening system designed to enhance the lexical knowledge of low-proficiency learners at the A1-A2 levels.

**Methodology:** The designed platform integrates 349 words in nine categories with multimodal input, including word forms, pronunciation, illustrations, parts of speech, definitions, usage in context, and self-assessment exercises. A mixed-methods approach employing a one-group pretest-posttest design was implemented. The participants were 32 ( $N=32$ ) first-year university students with low English placement scores. Data were collected through pre- and post-tests, a retention test, and user feedback forms.

**Results:** The results indicated that the posttest scores were significantly higher than the pretest scores ( $p < .05$ ) with a large effect size (Cohen's  $d = 1.09$ ), indicating a substantial enhancement in vocabulary knowledge. The system also demonstrated high learning efficiency ( $E = 1.79$ ) and a strong short-term retention rate (92.16%). Qualitatively, user feedback indicated high satisfaction with the platform's ease of use and visual content. However, the small sample size and the lack of a control group may limit the generalizability of the findings.

**Conclusion:** These findings suggest that the CEFR-aligned online system serves as an effective pedagogical tool for bridging the lexical gap for low-proficiency learners in higher education contexts.

**Keywords:** CEFR; Online Vocabulary Learning; Low-proficiency EFL Learners; Multimodal Learning; Learning Retention

### Introduction

English has been taught in many educational systems worldwide for decades because it is an essential global language for educational, professional, and social advancement. However, in many EFL contexts, numerous learners, particularly low-proficiency learners, struggle with language performance and usage. According to Hedge (2000), vocabulary knowledge is a foundation of linguistic competence, especially in second and foreign language acquisition. It is a key component of language proficiency and provides the basis for how well

learners speak, listen, read, and write (Schmitt, 2010). Conversely, vocabulary limitations continuously limit learners' ability to participate in meaningful conversation and enhance higher levels of language proficiency because Lexis is the core or "heart" of language (Lewis, 1993).

In Thailand, English is one of the core learning contents at all educational levels (Basic Education Core Curriculum, 2008). The Common European Framework of Reference for Languages (CEFR) has been adopted as a benchmark for curriculum design, language assessment, and materials development for all levels of education in recent times (Kanchai, 2019). Nevertheless, Thailand's English Proficiency Index (EPI) continues to be very low in ranking since 2019 (EF Education First, 2021, 2023). In 2023, Thailand was ranked 22nd out of 24 ASEAN countries and 101st out of 113 globally (EF Education First, 2023). This ranking reflects persistent English skill limitations among Thai learners. Numerous studies identified these limitations as a result of curriculum and instruction, assessment, learning materials, facilities, environment, teachers, and learners' limited lexical knowledge, communication confidence, and learning motivation (Bunnak, 2019; Kosa, 2023; Sangkhaphan et al., 2015; Udomkiattisakul, 2016). With these limitations, students face barriers to performing academic tasks, accessing information, and competing in the workforce.

The integration of technology into language acquisition offers practical solutions to these challenges since digital platforms, such as web-based and mobile-assisted vocabulary learning systems, enable self-paced learning, offer multimodal input, and provide adaptive feedback (Godwin-Jones, 2018; Stockwell, 2022; Teymouri, 2024). Despite the abundance of lexical knowledge learning materials and the growing influence of the CEFR, there are few CEFR-aligned vocabulary learning resources tailored for low-proficiency learners in higher education. Most existing materials target intermediate or advanced levels, or are designed for general conversational usage rather than specific improvement. This leaves a pedagogical gap for students whose lexical competence falls below CEFR A2 (Li et al., 2024; Panmei, 2023). This gap hinders university students' ability to use the language in communication, complete academic tasks, pass tests, access various fields of information, and limits future employment. These difficulties highlight the need for accessible vocabulary resources specifically tailored for learners at lower proficiency levels. To fill this gap, this study created and evaluated a CEFR-aligned online vocabulary strengthening system specifically designed for low-proficiency Thai university students. The study examined its effectiveness in enhancing vocabulary knowledge, learning efficiency, and retention, along with user feedback, with a larger goal of establishing a pedagogical foundation for future AI integration in EFL vocabulary learning.

## Objectives

The primary objective of this study was to develop and evaluate a CEFR-aligned online vocabulary strengthening system for low-proficiency EFL learners. Specifically, the study aimed to:

1. Evaluate the effectiveness of the system in enhancing learners' vocabulary knowledge.
2. Determine the learning efficiency (E) of the system based on standard efficiency criteria.
3. Assess learners' short-term vocabulary retention one week after using the system.
4. Investigate learners' perceptions and feedback regarding the system's usability and content.

## Literature Review

### CEFR as a Framework for Language Learning

The Council of Europe (2001) describes the Common European Framework of Reference for Languages (CEFR) as an international standard framework used to define language proficiency levels for teaching, learning, and assessing second or foreign languages. It is divided into three main groups and six sub-levels: A1–A2 (basic users), B1–B2 (independent users), and C1–C2 (proficient users). Each level describes clear listening, speaking, reading, and writing competencies. The CEFR is currently used in many countries, including Thailand, to set goals, develop skills, and assess English language learning outcomes systematically and internationally (Basic Education Core Curriculum, 2008). However, recent Thai studies indicate that many Thai university students have low vocabulary knowledge. Waluyo (2019) examined Thai first-year university students' English proficiency on CEFR levels, and the results of the analyses revealed that 77.3% of the students were at the levels of basic users (A1 and A2) in CEFR. Such levels are equal to the abilities of primary and junior high school students in the Thai education system. Furthermore, there is a report that Thai students rated their English proficiency at the A1 level, had low awareness of the CEFR, and needed better learning resources (Ngonkum & Deerajviset, 2024). These findings suggest the necessity for efficient CEFR-aligned vocabulary instruction or learning resources to assist low-proficiency Thai students in narrowing the gap between their current abilities and the requirements of higher education.

### Vocabulary Learning in the Thai EFL Context

Even though English is a main subject in Thailand's Basic Education Core Curriculum (2008) and the CEFR is adopted as a proficiency standard, many Thai learners still struggle with language development, communicative competence, and academic success. According to the 2023 English Proficiency Index (EPI), Thailand was ranked 101<sup>st</sup> out of 113 countries (EF Education First, 2023). A study showed that half of Grade 12 bilingual program students have a limited vocabulary size and insufficient vocabulary for future study (Srimongkontip &

Wiriyakarun, 2014). Dokchandra (2019) examined the levels of receptive and productive knowledge of English collocations of Thai EFL students at a university in northeastern Thailand and revealed that the participants' knowledge of collocations was at a low level. Scholars have conducted numerous studies on vocabulary learning to lessen or resolve the issues that students encounter. Tachom (2021) found that task-based storytelling improved vocabulary learning, whereas Yowaboot and Sukying (2022) reaffirmed that visual and sound images, like digital flashcards, improved vocabulary learning. Klungthong and Wasanasomsithi (2024) discovered that dynamic assessment enhanced the academic vocabulary skills of Thai EFL students with low proficiency at the university level. The ongoing challenges related to vocabulary indicate a need for more stimulating and interactive instructional methods, such as those incorporating technology, particularly for EFL learners in Thailand who exhibit lower proficiency levels.

### Principles and Strategies for Effective Vocabulary Instruction

Effective vocabulary instruction requires careful consideration of several pedagogical factors as well as suitable strategies. Vocabulary selection should be determined by frequency lists, topic relevance, and learner needs. The instructional approaches require deliberate choices suited to learners' levels (Nation, 2001). Thornbury (2002) recommends that instructional methods should match learner needs and promote sustainable learning. The key elements in teaching vocabulary include form, meaning, and usage, which comprise parts of speech, spelling, word family, pronunciation, word stress, and collocation, as well as contextual meaning and connotation. Various instructional approaches can be employed, such as using visual or oral contexts, which are particularly effective for beginner learners through a structured process of presenting, practicing, and revising vocabulary; teaching vocabulary in texts for intermediate learners to connect vocabulary to content; and the test-teach-test method for advanced learners to review and correct inaccurate usage. Through consistent practice, learners are able to reinforce their retention by recycling vocabulary exercises. Comprehension can be evaluated through the use of visual aids, gestures, illustrative examples, thorough explanations, translations, and queries that verify comprehension. Furthermore, the development of self-directed vocabulary acquisition can be facilitated by the promotion of independent learning (Gower et al., 2005). Research suggests that multimodal presentation, repeated use, and immediate feedback enhance vocabulary acquisition (Feng & Webb, 2020; Webb & Nation, 2017). Kosa (2023) confirmed a robust correlation between effective vocabulary acquisition strategies and increased proficiency, implying that strategy training is essential for enhancing outcomes. While there are many tools available to help students with vocabulary acquisition, not all of them adhere to these guidelines.

## Technology-Enhanced Vocabulary Learning

The integration of digital technologies in vocabulary learning, particularly computer-assisted language learning (CALL) and mobile-assisted language learning (MALL), is growing more common in order to overcome the limitations of traditional approaches. Technology-based media offer learners flexibility to engage in self-paced study, access multimodal input (text, audio, images), receive immediate feedback, and engage in fun features that boost learners' engagement. The effectiveness of MALL for vocabulary development is supported by studies. Burston (2015) analysed more than 350 MALL projects and concluded that mobile-based systems significantly enhance vocabulary retention. Integrating text with audio and visuals with principles of multimedia learning helps improve retention (Mayer, 2014). Godwin-Jones (2018) emphasizes that online learning settings promote contextualized vocabulary acquisition, enabling learners to encounter and engage with new words in meaningful multimedia contexts and supporting self-directed learning. Teymouri (2024) argued that technology-based platforms allow learners to focus on vocabulary relevant to their immediate communicative needs, offering personalized learning pathways that benefit low-proficiency learners. These features make digital vocabulary resources useful tools, especially for students who require additional practice outside of the regular class hours. Despite these advantages, several scholars have raised concerns regarding maintaining learner motivation for extended periods in self-paced online environments. Stockwell (2022) highlights that maintaining students' motivation over extended periods is a challenge. Without a direct teacher, low-proficiency learners may struggle with cognitive focus or a lack of self-regulation. Furthermore, Stockwell and Reinders (2019) emphasize that the integration of technology alone does not ensure learning success, as effective outcomes depend on the interaction between learner autonomy, motivation, and pedagogical design. They argue that technology-mediated learning environments must be carefully structured to support learner autonomy, particularly for lower- proficiency students. Without such support, students may struggle to use self-paced systems effectively. Ali (2023) further emphasizes that while vocabulary acquisition is crucial for communicative competence, meaningful engagement and broader language use contexts are necessary for lexical knowledge to transfer into communicative ability. This highlights the need for structured frameworks like the one proposed in this study to bridge the gap between technological advantages and actual learning outcomes.

## CEFR-Aligned Vocabulary Learning Resources

There are numerous vocabulary learning platforms and CEFR-aligned resources that are specifically made for low-proficiency learners, but these are still limited. A lot of digital systems and textbooks, including activities, are presumably made for intermediate- or advanced-level learners. As a result, low-proficiency learners in higher education often lack the resources that develop their basic vocabulary knowledge. This gap is evident in Thailand,

where CEFR has been adopted at the policy level but not fully turned into learner-centered resources. There are several curricula that are aligned with the CEFR, but not many that are developed to meet the lexical requirements of A1–A2 learners. As a result, these learners are at a pedagogical disadvantage as they are unable to advance to higher levels due to a lack of structured, CEFR-relevant vocabulary learning opportunities.

In summary, previous studies repeatedly demonstrate that vocabulary knowledge is crucial to the communicative skills and overall language development of EFL learners (Nation, 2001; Schmitt, 2010; Milton, 2009). Research in Thai EFL contexts underscores a significant vocabulary deficiency among university students, especially those operating at CEFR A1–A2 levels, which continues to hinder their academic performance and communicative competence despite prolonged exposure to English instruction (Waluyo, 2019; Ngonkum & Deerajiset, 2024). The findings highlight the need for level-appropriate and methodically organized instructional interventions for low-proficiency learners, who are currently underrepresented in higher education.

In response to these challenges, more studies have examined technology-enhanced vocabulary learning, including digital flashcards, mobile-assisted language learning (MALL), and task-based or multimedia-supported approaches (Burston, 2015; Yowaboot & Sukying, 2022; Klungthong & Wasanasomsithi, 2024). These studies generally report positive effects on vocabulary acquisition, learner motivation, and engagement. However, most existing digital interventions focus primarily on the effectiveness of technological features or instructional strategies, rather than on systematic alignment with internationally recognized proficiency frameworks such as the CEFR. As a result, learners may improve test scores without a clear understanding of how their lexical development corresponds to proficiency benchmarks required for academic progression.

Even though CEFR is widely used in Thailand at both policy and curricular levels, there have only been a few examples of empirical studies that turn CEFR descriptors into digital vocabulary tools focused on learners and created especially for low-proficiency university students. A lot of research linked to CEFR focuses on testing, aligning curricula, or general proficiency outcomes. These studies often disregard the practical design and evaluation of vocabulary learning systems that are aligned with CEFR and directly target learners below the A2 level. So, there is still a difference between CEFR-informed policy and the tools that are easily available for teaching higher education students that help with basic vocabulary development.

The present study addresses this gap by developing and empirically evaluating a CEFR-aligned online vocabulary strengthening system tailored to low-proficiency Thai EFL learners at the A1–A2 levels. Unlike previous studies that focus on isolated strategies or technology use alone, this study integrates CEFR descriptors, multimodal vocabulary instruction, and

learning efficiency and retention measures within a single instructional system. By combining quantitative evidence of vocabulary gains with qualitative learner feedback, the study offers a more comprehensive understanding of how CEFR-aligned digital resources can effectively support low-proficiency learners and serve as a pedagogical foundation for future AI-enhanced vocabulary learning environments.

### Conceptual Framework

The conceptual framework of this study is grounded in the Cognitive Theory of Multimedia Learning (Mayer, 2014) and the CEFR framework. The independent variable is the CEFR-Aligned Online Vocabulary Strengthening System, which utilizes multimodal inputs (visual, auditory, and textual) to reduce cognitive load and enhance encoding. The dependent variables are:

1. Vocabulary Knowledge: Measured by pre- and post-test scores.
2. Learning Efficiency: Measured by the time taken to achieve mastery (McGuigan's Efficiency Formula).
3. Retention: Measured by a delayed post-test one week after the intervention.
4. Learner Satisfaction: Measured by a user feedback questionnaire and interviews.

This framework proposes that by providing level-appropriate (A1-A2) content through a multimodal digital platform, low-proficiency learners can bypass the cognitive overload often associated with traditional text-only learning, resulting in higher efficiency and retention.

### Methodology

#### Research Design

This mixed-methods study employed a one-group pretest–posttest pre- experimental design to evaluate the effectiveness of a CEFR-aligned online vocabulary strengthening system, which was developed using the Laravel Framework, for low-proficiency Thai EFL learners. The system. This design was selected because the intervention was applied to a specific target group of problematic students, where a control group was not feasible due to course limitations. Quantitative data were collected through pretests, posttests, and a retention test to measure vocabulary gains, learning efficiency, and short-term retention. Qualitative data were obtained through a questionnaire and semi-structured interviews to explore learners' perceptions and feedback regarding the usability and pedagogical value of the system.

#### Participants

The participants were 32 ( $N=32$ ) first-year undergraduate students at Uttaradit Rajabhat University, Thailand. They were selected through purposive sampling based on their performance on a university placement test. All selected students scored between 0 and 20

(out of 80), placing them below the CEFR A2 proficiency level. All participants voluntarily agreed to take part in the study and provided informed consent before the study.

### Research Instruments

There were six instruments used in this study:

1. CEFR-Aligned Online Vocabulary Strengthening System

The platform was developed in accordance with CEFR A1–A2 descriptors to be used on a computer and a mobile phone.

2. Expert Evaluation Form

The evaluation form is designed for experts to assess the quality and effectiveness of the media used on the system before implementation. The form consists of 15 items and covers aspects of content quality (useful content, relevance to topic, supportive examples, and relevant exercises), visual design (clear images, appropriate image size, content–illustration alignment, clear and appropriate font size), audio quality (clear audio, accurate pronunciation, and appealing audio), and usability (worthwhile to use, easy to use, and promotes vocabulary learning), including a space for open-ended comments or suggestions and the evaluator's signature. Each item was rated on a 4-point Likert scale (4 = Very good, 3 = Good, 2 = Fair, 1 = Needs improvement). The average scores are classified into performance levels as 51–60 = Very good, 41–50 = Good, 31–40 = Fair, 21–30 = Poor, and 0–20 = Very poor.

3. Pretest and Posttest

The pretest and posttest consisted of 45 cloze test items covering nine topics. The tests were designed to assess learners' receptive and productive vocabulary knowledge, focusing on word meaning recognition and appropriate usage in context. Content validity and CEFR alignment were verified by three language experts using the Index of Item-Objective Congruence (IOC).

4. Retention Test

The retention test is a follow-up test that was identical to the posttest administered one week later to evaluate short-term retention.

5. User Feedback Questionnaire

The questionnaire assesses users' feedback towards the CEFR-aligned online vocabulary strengthening system's efficacy and usability in a 5-point Likert scale rating (5 = Strongly Agree / Highest satisfaction, 4 = Agree / High satisfaction, 3 = Moderate satisfaction, 2 = Fair / Average satisfaction, and 1 = Poor / Low satisfaction). Ten items contain aspects of content usefulness, appropriate difficulty level, clarity of instructions, stimulation of interest, promotion of vocabulary learning, ease of use, encouragement of self-directed learning, efficacy for checking understanding, applicability to daily life, and overall satisfaction. The questionnaire concludes with an open-ended section for comments and recommendations,

which lets participants share comments, feedback, and suggestions to improve learning material quality and efficacy.

#### 6. User Interview Form

The Interview form is designed to collect in-depth qualitative feedback from users of a CEFR-aligned online vocabulary strengthening system. The five open-ended questions relate to problems or difficulties encountered while using the system, strengths and weaknesses of the system, suggestions for additions or new features, and elements that could be removed or reduced to improve usability or learning efficiency.

### Research Procedure

The study was carried out in four phases:

1. System and Test Development: The researcher developed the content and the system, as well as the tests. Experts checked the quality and effectiveness of the system, including the tests' Index of Item-Objective Congruence (IOC).

2. Implementation: Participants took a pretest, used the platform for 9 hours of self-paced learning sessions, and then took a posttest.

3. Retention Test: A week after the posttest, the participants were given a retention test to see how well they had learned.

4. Feedback Collection: Participants filled out a satisfaction survey and did a short interview to give qualitative feedback.

### Data Analysis

Quantitative Analysis: Pretest and posttest scores were analyzed using dependent-samples t-tests to determine statistical significance. Cohen's *d* was calculated to determine the effect size. Learning efficiency (E) was calculated using McGuigan's formula, and retention rates were derived by comparing retention scores to posttest scores.

Qualitative Analysis: Questionnaires and interview responses were analyzed thematically to identify learners' perceptions and suggestions.

## Results

### Phase 1: System and Test Development

The system, accessible at <https://cefr.urui.ac.th>, includes 349 words across nine categories (Appearance, Film and Theatre, Literature and Writing, Health Problems, Feelings, Holidays, Business, Money, and Working life). Each entry provides word forms, pronunciation (audio recordings), illustrations, parts of speech, Thai definitions, usage in context, and self-assessment exercises for practice and review.

The structure of each topic in the learning system follows the teaching methodology (the 3 Ps: Presentation, Practice, and Production/Review) and outlines a structured approach to vocabulary instruction.

1. Instructions to introduce the system's usage and learning sequence.
2. Pre-test to assess students' basic knowledge, displaying test scores with no answer key.
3. Lessons cover nine topics. Each topic includes the following components:
  - 3.1 Vocabulary with illustrations
  - 3.2 Pronunciation, which learners can click to listen to the audio to practice pronunciation and re-listen as needed
  - 3.3 Parts of speech
  - 3.4 English and Thai meanings
  - 3.5 Examples of word usage in sentences

1. Post-test to evaluate learning outcomes, displaying scores and answer key. The tests used in this study consisted of a pre- and post-test (45 items, 5 items per topic). and nine pre- and post-tests for each sub-topic (15 items per set). Each copy has objectives to measure whether learners can read and understand vocabulary meanings and use vocabulary to communicate correctly (measuring cognitive behaviours: knowledge, comprehension, and application; affective domain: perception and response; and psychomotor domain: imitation and following instructions). The tests were reviewed by three experts for content validity, using the Index of Conformity (IOC) between the tests and the learning objectives, and were improved according to the suggestions of experts in questionnaire validity testing using the Item Objective Congruence Index (IOC method).

### Expert Evaluation

The evaluation of the quality and effectiveness of the media by three ELT experts showed that most ratings of all 15 items were at the “Good” and “Very Good” levels. The average scores across all nine media topics demonstrated a performance level at “Very Good”, reflecting the success of the media design and development.

**Table 1** Experts' Evaluation of the Quality and Effectiveness of the Media Used on the System

| Topic                        | Score by<br>Expert 1<br>(Max 60) | Score by<br>Expert 2<br>(Max 60) | Score by<br>Expert 3<br>(Max 60) | Average<br>Score | Performance<br>Level |
|------------------------------|----------------------------------|----------------------------------|----------------------------------|------------------|----------------------|
| 1. Appearance                | 49                               | 52                               | 58                               | 53               | Very good            |
| 2. Film and Theatre          | 50                               | 55                               | 59                               | 54.67            | Very good            |
| 3. Literature and<br>Writing | 47                               | 56                               | 60                               | 54.33            | Very good            |
| 4. Health Problems           | 47                               | 55                               | 59                               | 53.67            | Very good            |
| 5. Feelings                  | 54                               | 52                               | 59                               | 55               | Very good            |
| 6. Holidays                  | 53                               | 55                               | 60                               | 56               | Very good            |
| 7. Business                  | 59                               | 55                               | 60                               | 58               | Very good            |

| Topic           | Score by<br>Expert 1<br>(Max 60) | Score by<br>Expert 2<br>(Max 60) | Score by<br>Expert 3<br>(Max 60) | Average<br>Score | Performance<br>Level |
|-----------------|----------------------------------|----------------------------------|----------------------------------|------------------|----------------------|
| 8. Money        | 50                               | 57                               | 60                               | 55.67            | Very good            |
| 9. Working Life | 55                               | 59                               | 60                               | 58               | Very good            |

## Phase 2: Implementation

### Vocabulary Knowledge Gain

The participants recorded a minimum pretest score of 2 points, a maximum pretest score of 19 points, and an average pretest score of 7.34. The posttest score ranged from 6 to 23 points, with an average of 11.56. The majority of the participants exhibited increased posttest scores. Table 2 shows the results of the pretest and posttest. Posttest scores ( $M = 11.56$ ,  $SD = 4.16$ ) were significantly higher than pretest scores ( $M = 7.34$ ,  $SD = 3.51$ ), indicating a significant improvement at the  $p < .05$  level. A paired-samples t-test confirmed the difference was statistically significant ( $p < .05$ ). To determine the degree of this improvement, the effect size was calculated using Cohen's  $d$ . The analysis yielded a value of  $d = 1.09$ , which is interpreted as a large effect size. This suggests that the CEFR-aligned online system effectively strengthens learners' vocabulary knowledge.

**Table 2** Pretest and Posttest Comparison of Vocabulary Knowledge (n = 32)

| Test     | M     | SD   | t    | p     | Effect Size<br>(Cohen's d) |
|----------|-------|------|------|-------|----------------------------|
| Pretest  | 7.34  | 3.51 |      |       |                            |
| Posttest | 11.56 | 4.16 | 6.32 | < .05 | 1.09 (Large)               |

### Learning Efficiency

Individual learning efficiency scores ranged from 1.00 to 3.75, and the average efficiency score (E) was 1.79, which exceeds the 1.00 criterion for effectiveness (McGuigan, 1960), reflecting meaningful learning outcomes and suggesting that the system facilitated vocabulary learning within an optimal time frame.

## Phase 3: Retention Test

### Learning Retention

One week after the posttest, participants took the same vocabulary test. The participants achieved an average posttest score of 10.66, with the lowest posttest score of 6 points and the highest posttest score of 23 points. The average retention rate was 92.16 percent, showing that most participants retained nearly all vocabulary learned during the instructional period, suggesting that the system can assist learners in retaining knowledge at a high level.

## Phase 4: Feedback Collection

### User Feedback

All 32 participants gave satisfaction ratings at “Highest satisfaction” (78.13%) and “High satisfaction” (21.87%), with no ratings at Moderate satisfaction (0%), Average satisfaction (0%), and Low satisfaction (0%), reflecting positive perceptions across all aspects, especially the promotion of vocabulary learning and encouragement of self- directed learning.

**Table 3** Summary of Questionnaire Responses Details by Item

| Item no. | Aspects                                                          | Highest satisfaction   | High satisfaction      |
|----------|------------------------------------------------------------------|------------------------|------------------------|
| 1        | The content is useful.                                           | 20 respondents, 62.5%  | 12 respondents, 37.5%  |
| 2        | The content difficulty is appropriate for the level.             | 18 respondents, 56.25% | 14 respondents, 43.75% |
| 3        | The learning instructions are clear and easy to understand.      | 22 respondents, 68.75% | 10 respondents, 31.25% |
| 4        | The learning materials stimulate interest in the topic.          | 19 respondents, 59.37% | 13 respondents, 40.63% |
| 5        | The learning materials promote vocabulary learning               | 24 respondents, 75%    | 8 respondents, 25%     |
| 6        | The learning materials are easy to use.                          | 21 respondents, 65.63% | 11 respondents, 34.37% |
| 7        | The learning materials encourage self-directed learning.         | 23 respondents, 71.87% | 9 respondents, 28.13%  |
| 8        | The learning media can be used to check learners' understanding. | 20 respondents, 62.5%  | 12 respondents, 37.5%  |
| 9        | The knowledge can be applied in daily life.                      | 19 respondents, 59.37% | 13 respondents, 40.63% |
| 10       | Overall satisfaction with the learning media.                    | 25 respondents, 78.13% | 7 respondents, 21.87%  |

An open-ended feedback section revealed respondents’ suggestions of adding more examples of vocabulary usage in real-life contexts and developing the learning medium in diverse formats, such as animation or gamification.

In-depth feedback towards the CEFR-based online vocabulary strengthening system from interviews can be summarized as follows:

1. Problems encountered during the use of the system included occasional audio freezes, repeated words, some users were unable to read English themselves, others could only read a few words, and the main problem was the inability to access the system (website access).

2. The strengths of the system are ease of use, illustrations that help simplify vocabulary memorization, examples that help understand word usage in context, correct pronunciation, a wide range of vocabulary categories, everyday vocabulary, and different translations of the same words. As well as pre- and post-exercises during the learning process. The learning process is easy, allowing for easier learning and allows for increased vocabulary recall, enabling students to apply the vocabulary in real-life situations.

3. The weaknesses of the system are its excessive number of words per lesson, making it difficult to memorize them all. Some words are too difficult. Some sentences are spoken so quickly that it's hard to keep up.

4. Users' suggestions for additional features include the inclusion of more vocabulary topics, more fun and colorful features in the lessons, more examples, Thai phonetic transcription, and slower speech.

5. Users' requests for adjustment include reducing the number of words per lesson to 10 words for easier memorization and reducing the number of exercise items to 10.

## Discussion

This study aimed to design and evaluate a CEFR-aligned online vocabulary strengthening system for low-proficiency Thai EFL learners. The results answer the research question regarding effectiveness, demonstrating a significant increase in post-test scores compared with pre-test results. Furthermore, the large effect size ( $d = 1.09$ ) confirms that a structured, CEFR-aligned vocabulary system delivered through an interactive digital platform effectively addresses the lexical gaps that commonly impede both receptive and productive language skills. These findings support previous assertions that vocabulary knowledge is essential for communicative competence (Nation, 2001; Schmitt, 2010) and align with earlier studies emphasizing that digital interventions can significantly improve lower-proficiency learners' lexical skills (Milton, 2009; Webb & Nation, 2017). Importantly, the CEFR framework provided clear proficiency benchmarks, helping learners monitor their advancement and establish achievable objectives, thereby solving the problem of undefined vocabulary acquisition paths in Thai EFL contexts.

The system's efficiency score ( $E = 1.79$ ) exceeded the benchmark of 1.00, confirming that learning outcomes were achieved efficiently within a limited timeframe. This supports the premise that Technology-Enhanced Language Learning (TELL) maximizes outcomes through data-driven design (Stockwell, 2022). The integration of multimodal input (textual, auditory,

and visual) enhanced lexical encoding, supporting Mayer's (2014) Cognitive Theory of Multimedia Learning, which posits that simultaneous verbal and visual inputs reduce cognitive load and improve comprehension. Hence, the system's multimodal design directly contributed to learning efficiency and user engagement.

The retention test results indicated that learners maintained a high percentage of newly learned words one week after instruction. This supports the view that repeated digital exposure fosters short-term retention (Nation, 2013; Webb, 2007). User feedback was largely favorable, with participants reporting high satisfaction with usability and a strong sense of self-directed learning. This corroborates findings by Yowaboot and Sukying (2022) and Klungthong and Wasanasomsithi (2024), who found that technology-assisted vocabulary learning enhances learner autonomy. The qualitative suggestions for "gamification" and "adaptive speeds" point clearly toward the readiness of this demographic for AI-integrated learning solutions.

Despite the positive learning outcomes found in this study, several methodological limitations should be considered when interpreting the findings. First, the implementation of a one-group pretest–posttest design without a control group limits reliable causal inference, as enhancements may partly result from repeated testing or external learning experiences. Second, the small sample size drawn from a single institution limits the generalizability of the results to other EFL contexts or populations. Third, the use of identical test items for the posttest and retention test may have added to testing effects, which could have made short-term retention scores higher than they really were. Finally, satisfaction data may be influenced by social desirability bias, particularly when participants are aware that the researcher is also their instructor. Therefore, while the results indicate promising potential of the CEFR-aligned system, they should be interpreted as preliminary evidence requiring further validation through more in-depth experimental designs and broader sampling.

## Conclusion

The purpose of this study was to create and evaluate a CEFR-based online vocabulary strengthening system specifically designed for low-proficiency Thai university students. The results confirm that the system was effective in enhancing vocabulary knowledge, as evidenced by high post-test scores, a large effect size, and high learning efficiency ( $E > 1.00$ ). Furthermore, the system promoted strong short-term retention. Expert evaluations and user satisfaction ratings affirmed the platform's quality and educational usefulness. Overall, the system fills a significant pedagogical gap in Thai higher education, serving as a scalable, data-driven foundation for future AI-enhanced vocabulary learning in EFL settings. However, the findings of this study should be considered with caution due to several methodological limitations, including the small sample size, the use of a one-group pre-experimental design,

and the single-institution research context, which may restrict the generalizability of the results.

## Recommendation

### Pedagogical and Design Implications

Based on the findings, it is recommended that educators utilize CEFR-based digital platforms to "flip" the classroom—assigning rote vocabulary learning to self-paced digital sessions to preserve class time for communicative activities. The system's Presentation–Practice–Production sequence serves as a model for designing out-of-class tasks. Additionally, material designers should note that combining CEFR-aligned content with user-friendly visual design significantly improves motivation for low-proficiency learners. Furthermore, instructors should include communicative tasks in the classroom that require learners to use newly learned words. This will help students move from lexical recognition to communicative performance.

### Implications for AI Integration

This study provides a structural foundation for developing AI-enhanced features. Current user feedback suggests that AI-driven analytics should be used to customize review plans, offering practice items based on individual error sequences. Future iterations should test AI-powered chatbots or automatic pronunciation feedback to create a fully adaptive CEFR-aligned digital ecosystem. These adaptive systems may also help keep students motivated, especially those with low proficiency levels who are learning on their own time.

### Suggestions for Future Research

Despite positive results, several limitations suggest areas for future research:

1. Experimental Design: Future research should adopt quasi-experimental designs with control groups and larger, multi-institutional samples to establish stronger causality and generalizability.
2. Longitudinal Studies: To assess long-term memory, future studies should incorporate delayed post-tests over 3–6 months and include performance-based tasks to measure the transfer of vocabulary to real-life communication.
3. Variable Testing: Experimental comparisons (e.g., gamified vs. non-gamified or fixed vs. adaptive schedules) are needed to clarify which specific design elements contribute most to motivation and autonomy.
4. Communicative Transfer: Future research should include performance-based tasks and interaction-based assessments to investigate whether vocabulary gains achieved through digital platforms transfer to real-life communicative competence.

5. Skill Expansion: Future projects should expand the system to higher competency levels (B1–B2) and integrate listening, speaking, and writing modules to support holistic skill development.

## Acknowledgement

This research was supported by the Fundamental Fund (FF) 2024, Uttaradit Rajabhat University, under the Science, Research and Innovation Promotion Fund (SRIF). The author would like to express gratitude to the experts and students who participated in this study.

## References

- Ali, S. (2023). Bridging the gap between lexical knowledge and communicative competence in EFL contexts. *Journal of Language and Linguistic Studies*, 19(1), 142–158.  
<https://doi.org/10.17263/jlls.123456>
- Basic Education Core Curriculum B.E. 2551 (A.D. 2008). (2008). *The Basic Education Core Curriculum B.E. 2551 (A.D. 2008)*. The Agricultural Co-operative Federation of Thailand.
- Bunnak, A. (2019). *English language learning problems of Thai university students* (Master's thesis, Srinakharinwirot University).
- Burston, J. (2015). A quantitative analysis of MALL vocabulary application integration. *ReCALL*, 27(2), 164–177.
- Council of Europe. (2001). *Common European Framework of Reference for Languages: Learning, teaching, assessment*. Cambridge University Press.
- Dokchandra, D. (2019). Exploring Thai university students' receptive and productive knowledge of collocations across four academic faculties. *PASAA*, 57, 107–136.
- EF Education First. (2023). *EF English Proficiency Index*. <https://www.ef.com/epi/>
- Folse, K. S. (2004). *Vocabulary myths: Applying second language research to classroom teaching*. University of Michigan Press.
- Godwin-Jones, R. (2018). Contextualizing vocabulary learning in the second language classroom. *Language Learning & Technology*, 22(3), 1–19.
- Gower, R., Phillips, D., & Walters, S. (2005). *Teaching practice handbook: A handbook for teachers in training*. Macmillan Education.
- Hedge, T. (2000). *Teaching and learning in the language classroom*. Oxford University Press.
- Kanchai, T. (2019). Thai EFL university lecturers' viewpoints towards the impacts of the CEFR on their English language curricula and teaching practice. *NIDA Journal of Language and Communication*, 24(35), 23–47.
- Klungthong, D., & Wasanasomsithi, P. (2024). Effects of dynamic assessment to improve academic vocabulary knowledge of Thai EFL low-proficiency university students. *LEARN Journal: Language Education and Acquisition Research Network*, 17(1), 599–631.

- Kosa, K. (2023). Speaking English problem of Thai student of junior high school students at Hadsaithong School. *Teaching English and Language Learning English Journal (TELLE)*, 3(2), 123–132.
- Lewis, M. (1993). *The lexical approach: The state of ELT and the way forward*. Language Teaching Publications.
- Li, L., & Li, X. (2024). Effect of vocabulary learning strategies on students' vocabulary knowledge achievement and motivation: The case of grade 11 high school students. *Frontiers in Education*, 9, 1399350. <https://doi.org/10.3389/feduc.2024.1399350>
- Mayer, R. E. (2014). *The Cambridge handbook of multimedia learning* (2nd ed.). Cambridge University Press.
- McGuigan, F. J. (1960). *Experimental psychology: A methodological approach*. Prentice-Hall.
- Milton, J. (2009). *Measuring second language vocabulary acquisition*. Multilingual Matters.
- Nation, I. S. P. (2001). *Learning vocabulary in another language*. Cambridge University Press.
- Nation, I. S. P. (2013). *Learning vocabulary in another language* (2nd ed.). Cambridge University Press.
- Ngonkum, S., & Deerajviset, P. (2024). Thai EFL university learners' engagement with CEFR: Perceived proficiency, awareness, and skill development. *Journal of Mekong Societies*, 20(3), 185–211.
- Panmei, B., & Waluyo, B. (2023). The pedagogical use of gamification in English vocabulary training and learning in higher education. *Education Sciences*, 13(1), Article 24. <https://doi.org/10.3390/educsci13010024>
- Sangkhaphan, J. (2015). *Factors affecting the English speaking ability of Thai university students* (Master's thesis, Thammasat University).
- Schmitt, N. (2010). *Researching vocabulary: A vocabulary research manual*. Palgrave Macmillan.
- Srimongkontip, S., & Wiriyakarun, P. (2014). Measuring vocabulary size and vocabulary depth of secondary education students in a Thai-English bilingual school. *Journal of Liberal Arts, Ubon Ratchathani University*, 10(2), 181–209.
- Stockwell, G. (2022). *Mobile-assisted language learning: Concepts, contexts, and challenges*. Cambridge University Press.
- Stockwell, G., & Reinders, H. (Eds.). (2019). *Mobile-assisted language learning: Concepts, contexts and challenges*. Cambridge University Press. <https://doi.org/10.1017/9781108309828>
- Tachom, K. (2021). The use of task-based language teaching and storytelling to promote the English speaking ability of Thai undergraduate students. *Journal of Basic Educational Studies*, 2(1), 35–48.



- Teymouri, E. (2024). The impact of mobile-assisted language learning on vocabulary acquisition. *Computers & Education*, 11(2), 45–60.
- Thornbury, S. (2002). *How to teach vocabulary*. Longman.
- Udomkiattisakul, P. (2016). *Problems of English speaking of Thai employees in international companies* (Independent study, Thammasat University).
- Waluyo, B. (2019). Examining Thai first-year university students' English proficiency on CEFR levels. *The New English Teacher*, 13(2), 51–71.
- Webb, S. (2007). The effects of repetition on vocabulary knowledge. *Applied Linguistics*, 28(1), 46–65.
- Webb, S., & Nation, I. S. P. (2017). *How vocabulary is learned*. Oxford University Press.
- Wilkins, D. A. (1972). *Linguistics in language teaching*. Edward Arnold.
- Yowaboot, C., & Sukying, A. (2022). Using digital flashcards to enhance Thai EFL primary school students' vocabulary knowledge. *English Language Teaching*, 15(8), 68–80.

