Research Article

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Exploring prompt iteration process through generative AI image creation in EFL vocabulary learning

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Abstract: Amid the growing use of GenAI in second language education and its emerging multimodality, this study investigated how Korean undergraduates studying EFL enacted prompt iteration with a text-to-image generator to support multimodal vocabulary learning. Participants read etymology-rich word stories, sketched visualizations, and iteratively refined prompts until the images aligned with their intentions. Data included AI-generated artworks, reflective papers documenting the process, and a vocabulary learning strategies survey. Overall, learners reported high use of strategies after the task. Analysis of artworks and reflections revealed a metacognitive–strategic cycle: learners monitored and evaluated outputs, then strategically varied contextual features to negotiate meaning and achieve nuanced imagery. Framed as both a prompt-engineering technique and a literacy practice involving planning, monitoring, and evaluation, prompt iteration emerged as central to GenAI-mediated vocabulary learning, highlighting learners' agency in exploring word meanings.

Keywords: artificial intelligence literacy; generative artificial intelligence; prompt iteration; vocabulary learning strategies

1 Introduction

In second language (L2) learning, the effective acquisition of vocabulary serves as a basic foundation and stepping stone to achieving a high level of language proficiency (Meara 1996; Zareva et al. 2005). However, learning nuanced word meanings in

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different languages, particularly those with complex historical or sociocultural backgrounds (Hossain 2024), can be challenging for L2 learners, including those learning English as a foreign language (EFL). To address this challenge, incorporating multimodal learning resources into vocabulary instruction can be an effective approach; specifically, visual representations have long been recognized as powerful supports because they facilitate mental imagery, support dual processing, and improve memory retention (Mayer 2009; Paivio 1986). Nevertheless, identifying images that accurately reflect the sociocultural or historical meaning of a given word is difficult. Recent developments in generative AI (GenAI) have provided new opportunities to overcome this limitation by helping learners and teachers visualize nuanced word meanings simply by creating prompts.

In this study, we explored how EFL learners use GenAI (i.e., text-to-image creator) to create personalized visual representations of English words using prompts and how such engagement supports their understanding of word meanings and their sociocultural backgrounds. Moving beyond the technological approaches of creating a perfect prompt in one attempt, we focused on its iterative process: a revision process in which the desired result is achieved through a cycle of attempting, reviewing the outcome, revising, and retrying. After reading the story of word origins and sociocultural meanings in the course textbook, the learners first sketched imaginary scenes of abstract word meanings either by hand or using digital (non-AI) tools. They then engaged in interactions with an AI image generator to transform their imagination into a visual creation. For the prompt iteration process and practice, rather than receiving direct instruction on prompt design, learners refined their prompts through multiple revisions until they achieved a visual output that appropriately represented their initial sketch. The research questions guiding this study were as follows:

(1) How are EFL students' perceptions of vocabulary learning strategies shaped by the GenAI-mediated image-creation task?
(2) How are these strategies enacted and experienced by EFL students, as revealed through their prompt iteration processes?

2 Background

2.1 Integrating GenAI into visual strategies for L2 vocabulary learning

One of the most widely practiced approaches for introducing and teaching new vocabulary to L2 learners is the use of visual aids connected to the target vocabulary (Gersten and Baker 2000; Rousseau et al. 1993). In the L2 domain, the effectiveness of

visual support, particularly pictures, has been largely examined through research on multimedia glossing (Al-Seghayer 2001; Kost et al. 1999; Yanguas 2009). These results support the use of pictures for L2 vocabulary acquisition, thereby confirming their pedagogical value. Notably, the use of visuals has also been considered an important part of L2 vocabulary learning strategies (Gu and Johnson 1996; Schmitt 1997; Zhang and Lu 2015) and has been suggested to help L2 learners expand their vocabulary knowledge in independent studies.

Two traditional theories of human cognition support the use of visual aids to teach L2 vocabulary: the dual-coding theory (Paivio 1986, 2010) and Mayer's (2009, 2024) cognitive theory of multimedia learning (CTML). The dual-coding theory suggests that humans have two separate but interconnected systems for processing and representing information: the verbal and visual systems. This theory predicts that human cognition is likely to process and retrieve target information better when presented in verbal and visual formats. By contrast, the CTML emphasizes the importance of including multimedia components (e.g., pictures) in instructional materials to enhance learning by engaging learners in different cognitive processes. The dual-coding theory focuses more on the cognitive processing of information, whereas the CTML pays more attention to building effective instructional materials. However, both theories highlight the importance of presenting information verbally and visually for effective vocabulary processing and acquisition.

Despite the theoretical support for visual aids in L2 vocabulary learning, this approach has certain limitations. For example, teacher-provided materials may not enable learners to successfully encode and retrieve information related to the target vocabulary, especially if these images are beyond the learners' cognitive scope (Cohen 1987; Paivio and Desrochers 1981). Learner-generated images may facilitate vocabulary learning better, but having learners produce their own images for the target vocabulary may be less effective if they have limited drawing abilities or lack digital skills. This is particularly true when attempting to visually represent the nuanced meanings of words from different sociocultural backgrounds.

However, these limitations can be overcome by employing a text-to-image generator, with which learners can instantly create images representing word meanings by creating and revising prompts. In this regard, the use of GenAI can enhance learner agency in L2 vocabulary learning, allowing students to co-construct meaning through iterative dialogue with GenAI, thereby fostering autonomy and personalized input selection. In other words, when applied to L2 vocabulary learning, prompt iteration can be an effective learning strategy that integrates learners' metacognitive regulation such as planning, monitoring, and evaluating their interactions with AI. This learning process aligns with Bruner's (1983) raditional theory of cognitive development, which emphasizes the mode of

representation in cognitive knowledge acquisition in the enactive, iconic, and symbolic stages, as discussed below.

Just as young children acquire experiential knowledge in the enactive stage, learners with GenAI (i.e., text-to-image generator) can explore a word's historical origins or sociocultural association by visualizing these concepts as images, a process that aligns with effective vocabulary learning strategies (Alshatti 2023; Gu and Johnson 1996; Schmitt 1997). This stage also includes several activities in which learners modify their prompts to achieve the desired results. This iterative adjustment closely resembles the enactive approach, as learners intuitively grasp meaning through the linguistic actions of their prompts. According to Bruner (1983), this enactive representation aligns with the manipulative representation of past events. Those proficient in prompt iteration can experience different outcomes based on the iterations of their previous actions by attempting, reviewing the outcome, revising prompts, and retrying. From an applied linguistics perspective, these actions resemble negotiated interactions in second language acquisition (SLA) (Long 1996), in which learners receive feedback (here, via AI responses) and respond by modifying their linguistic output. This facilitates a modified comprehensible input and pushed output. Moreover, such prompt iteration resembles metacognition and self-regulation strategies in L2 learning (Zhang and Zhang 2019), supporting learners' abilities to monitor and adjust their language use in interactions with AI.

The iconic representation stage involves creating internal visual imagery to concretely represent results that align closely with one's objectives and engage in the implied meaning of the word. In a traditional learning environment, even if students cannot physically see the object, they should be able to visualize it; in the taxonomy of vocabulary learning strategies, this could be considered a strategy involving pictures and imagery (Schmitt 1997). However, as mentioned earlier, this approach limits students' imaginations to tangible outcomes. In this context, AI image generators assist students in creating visual content for abstract and culturally nuanced concepts. Therefore, learning L2 vocabulary by creating images using GenAI can produce iconic representations that facilitate students' cognitive development.

Finally, according to Bruner's original theory (1983), symbolic representation sheds new light on the interplay between language and images. Throughout the prompt iteration process, learners go beyond merely understanding the meanings of the words or images and gain an abstract understanding of how different prompts lead to different outputs. This process allows learners to formalize the structure and templates of prompts as a symbolic system by creating and refining the prompts necessary to achieve their desired results.

In summary, the L2 vocabulary learning task based on GenAI-mediated image creation can be situated within traditional theoretical frameworks, such as the dual-coding theory, CTML, and Bruner's three modes of representation in cognitive

development. While previous studies have consistently argued that visual aids and understanding the etymologies of words can support L2 vocabulary learning and acquisition (Alshatti 2023; Gu and Johnson 1996; Schmitt 1997; Zhang and Lu 2015), there are limitations to teacher-provided or self-drawn images. In light of this, AI image generators have the potential to overcome such limitations by representing abstract or sociocultural meanings of the target words. In addition, when viewed through Bruner's enactive, iconic, and symbolic stages, prompt iteration emerges as a process that engages metacognitive regulation, facilitates negotiated meaning making, and fosters the development of multimodal representations. These theoretical perspectives provide a foundation for examining how GenAI-mediated image creation can function as a vocabulary learning strategy and a component of broader digital and AI literacies, framing the focus of the present study.

2.2 Integrating technical and interactional dimensions through prompt iteration

Recently, several researchers have viewed prompting not merely as a technical writing skill but as an interactional literacy practice grounded in critical interpretation, meaning negotiation, and iterative revision in the context of AI-human interaction (Hwang and Lee 2025; Jiang and Chun 2025). Traditionally, literacy has been related to reading and writing skills, and its application has been primarily confined to paper and books (Hull and Moje 2012). However, with technological development, according to Jewitt (2008), "there is a need for further investigation of literacy practices as an intertextual web of contexts and media rather than isolated sets of skills and competences" (p. 255). Literacy now serves as a means of communicative interaction with other texts, people, and technologies, with meaning being co-constructed through individual-context interactions (Johns 1997). From this perspective, prompting has emerged as a new literacy concept within the broader traditions of digital or AI literacy and multiliteracy frameworks (Hwang and Lee 2025). Working with AI image generators engages learners in the design of meaning across verbal and visual modes, thus expanding their literacy practices beyond plain text. In addition, learners with GenAI try to create effective prompts, critically interpret AI outputs, and refine their approaches based on AI results and/or feedback. This expanded view of literacy naturally invites a reconsideration of how prompting fit within the broader theoretical traditions of new literacy studies, which examine the influence of new technologies on literacy practices, including digital communication and online platforms.

Within prompt literacy, prompt engineering takes a more technical and procedural space, focusing on the construction of effective prompts to generate the

desired outputs (Cain 2024; Moorhouse et al. 2025; Oppenlaender 2022). Several engineering models and frameworks have been developed and implemented. For example, Lo (2023) introduced a novel framework for guiding effective engineering. This approach incorporates the principles of CLEAR (conciseness, logic, explicitness, adaptability, and reflectiveness) to enhance prompt construction. Another example is the CAST model (Jacobs and Fisher 2023), which focuses on clarity, audience, structure, and tone. Incorporating these models into education provides a structured approach to support students in constructing prompts. These models enhance learners' abilities to create prompts that generate contextually appropriate outputs. However, these studies do not specifically address how learners revise and refine their prompts or make iterative adjustments to meet specific learning goals and objectives.

Prompt iteration is situated at the intersection of these two domains and is a subprocess within prompt engineering that functions as one of the core operational dimensions of prompt literacy. In this study, prompt iteration, as a central feature of prompt engineering, is defined as the cyclical process of revision: attempting, reviewing, refining, and retrying. Simultaneously, prompt iteration serves as a fundamental dimension of prompt literacy as it operationalizes critical interpretation, adaptive decision-making, negotiated meaning making, and strategic adaptation to contextual goals in light of human-AI interaction. In other words, while prompt literacy provides an overarching framework that integrates technical, critical, and ethical competencies, prompt iteration functions as a key practice through which learners enact these competencies in the revision process. This positioning highlights prompt iterations as a bridge and point of intersection between the procedural focus of prompt engineering and the broader socially situated orientation of prompt literacy.

Empirical research that directly examines prompt iterations is limited, but recent studies (Pei et al. 2025; Ryan et al. 2025) have suggested its pedagogical potential. These studies investigated the integration of ChatGPT into language instruction and examined how students interact with the technology through prompt iteration to enhance their linguistic skills. Pei et al. (2025) studied Cantonese-speaking EFL secondary students in Hong Kong and compared a treatment group equipped with ChatGPT with a control group using more conventional media. The treatment group engaged in prompt iteration to acquire topical and linguistic knowledge related to the target writing task. The results showed that the treatment group outperformed the control group in writing performance. Pei et al. (2025) further argued that engaging students in prompting with ChatGPT could make writing instruction less teacher-centered by giving learners greater autonomy to access this dynamic GenAI resource to obtain task-relevant information. In a qualitative case study conducted in an honors English class, Ryan et al. (2025) investigated

undergraduate students' writing processes with GenAI as well as their perceptions of co-authorship and prompt use. Acknowledging the shifting notion of writing in GenAI-mediated education, participants suggested that successful prompting depends on a clear understanding of the respective roles and strengths of humans and GenAI in the co-writing process. Moreover, Ryan et al. (2025) emphasized that students should receive instructions on how to prompt effectively when interacting with GenAI, as this may represent a core skill in GenAI-supported writing instruction.

While previous research has emphasized the importance of prompt iteration when engaging in interactions with GenAI, they are predominantly focused on prompting in text-based contexts (Emerson 2024; Maloy and Gattupalli 2024; Moorhouse et al. 2025; Ryan et al. 2025). To fill this research gap, our study examined prompt iteration in multimodal image creation with L2 vocabulary, examining how EFL learners iteratively refine prompts to produce images that capture the historical and sociocultural meanings of target words and how this process contributes to vocabulary learning strategies. In doing so, we positioned prompt iteration as a technical adjustment process and meaning-making practice that integrates SLA interaction principles, metacognitive regulation, and multimodal literacy development.

3 Methods

3.1 Participants and research context

This study was conducted during the Spring semester of 2023 and documented the experiences of 30 college students who engaged in GenAI-based image creation. They majored in English language and literature at a private university in South Korea and participated in a course titled "Digital Literacy and Humanities." Participation was voluntary, and 30 of the 33 students agreed to participate. Informed consent was obtained from all participants included in this study. The participants were recruited from the course for efficiency as they were readily accessible to the research team. Moreover, their disciplinary background was closely aligned with the focus of the study. English majors in South Korea represent one of the most active groups in adopting AI-based educational tools, and the development of multimodal materials is directly relevant to their field (Hwang et al. 2023; Hwang et al. 2025). The research team comprised three faculty members with expertise in EFL education, AI technology, and digital literacy. The course instructor (i.e., the first author) provided insights into student learning challenges, whereas the other two members specializing in AI technology in EFL education contributed to the analysis of GenAI

interactions. To minimize the potential bias that might arise from the dual role of the teacher–researcher, several strategies were adopted. First, the instructor's primary role in the research process was limited to instructional delivery and descriptive reporting in the classroom context. Data coding and interpretation were conducted collaboratively by the other two members. These coresearchers independently reviewed and verified the data analysis to ensure interrater reliability.

The course adopted an interdisciplinary approach, exploring the intersection of GenAI and humanities and underscoring the progressive interaction between humans and AI. Specifically, the students gained insights into the evolution of prompt literacy by tracing its development from traditional literacy through digital literacy to AI literacy. For the vocabulary image-creation project, the participants studied 120 English words included in a coursebook titled "Story of English Words" (Cho 2020). This text discussed the sociocultural influences and historical origins of these words and their current meanings and uses. After reading the explanations for all the words, the participants were asked to choose three words and visualize them using GenAI.

The overall procedure was as follows. The participants first confirmed their understanding of the meanings of the selected words using ChatGPT. They then collected additional information and summarized their findings. They sketched an image, either by hand or using digital tools. Subsequently, they drafted a prompt for a GenAI-produced image and input it into the Bing Image Creator (Microsoft 2023) powered by DALL-E 2 model to produce an image. Bing Image Creator was selected for its cost-free availability to participants at the time and user-friendly interface, which made it suitable for novice users in an educational setting. Importantly, the prompt input and image-generation processes were not limited to a single attempt; the participants revised the prompt until the AI-generated image closely matched their initial sketches and imagination. For example, as seen in Figure 1, one participant chose the word "text." She first learned about its origin from "Story of English

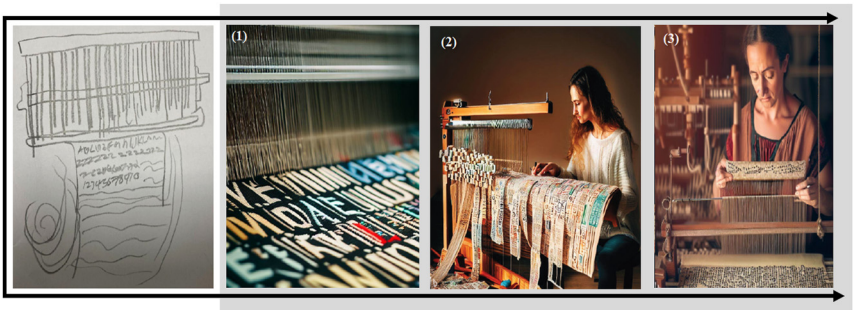


Figure 1: Sample images associated with "text".

Words," discovering that the word "text" originates from the ancient Greek and Roman appreciation of the delicacy of women. She further probed for information by reading the course textbook, learning a fabric was called a "textile" because making clothes was an essential skill for women during Roman times. Teachers of that era encouraged male students to learn from the delicacy of women, leading to the word "textile" evolving into "text." The participant then sketched an image depicting the process of generating text, similar to using a loom to create clothing made of words. The first prompt that she entered in the Bing Image Creator was (1) "'Fabric' being woven using 'a loom with letters' from all over the world woven into the fabric." She was satisfied with the initial image, but to emphasize the depiction in the book where a woman uses a loom to create something delicate, she modified the prompt accordingly: (2) "'Woman using a loom' to weave fabric with letters from all over the world and then the 'fabric turning into a book'." She then realized that the resulting image did not resemble a woman from ancient Greece and made adjustments to her prompt according to the woman's appearance: (3) "'Woman in ancient Rome' used a loom to weave fabric with letters from all over the world, and then the fabric turned into a book." In general, the image-generation process was highly iterative and involved several revisions to the original prompts.

3.2 Data collection and analysis

This study employed a mixed-methods design to explore the participants' engagement with GenAI in a vocabulary image-creation project. This research incorporated three types of data: (1) artworks generated by participants in collaboration with GenAI, (2) written reflection papers on their experiences with GenAI, and (3) survey responses on vocabulary learning strategies. This approach was chosen to capture both quantitative insights into self-perceived vocabulary learning strategies and qualitative perspectives on the participants' experiences.

Qualitative data, including the participants' AI-generated images and reflection papers, provided insights into the practical application of prompt iteration and the strategies employed in vocabulary visualization. The quantitative data collected through a structured survey focused on participants' self-assessed development of vocabulary learning strategies (Table 1). The survey was adapted from the Vocabulary Learning Questionnaire (Gu and Johnson 1996). This questionnaire was chosen because it aligns with our focus on vocabulary learning strategies and has demonstrated high reliability coefficients, supported by numerous studies (Fan 2003; Gu 2018). The original study used a 7-point Likert scale to capture subtle variations in participants' self-perceptions of vocabulary learning strategies. This study also used

Table 1: Survey questions.

Category	Strategies	Constructs	Questions
Encoding	Visual encoding	Visualization	1. After participating in the vocabulary image-creation project with generative AI, I visualize related images when learning new words.
	Use of word structure	Hidden meaning	2. I think participating in the vocabulary image-creation project with generative AI helped me grasp the hidden meanings of English words.
		Prefix and suffix	3. After participating in the vocabulary image-creation project with generative AI, I now consider prefixes, suffixes, and etymologies when learning new words.
		Word root	4. After participating in the vocabulary image-creation project with generative AI, I now intentionally think about the origin of words.
	Contextual encoding	Use in context	5. After participating in the vocabulary image-creation project with generative AI, I feel I would want to understand the context in which the word is used.
		Use in sentence	6. While preparing for the vocabulary image-creation project with generative AI, I was able to think of expressions or sentences containing the word.
		Use in situation	7. While preparing for the vocabulary image-creation project with generative AI, I was able to imagine real-life situations where the word is used.
Activation	Activation	Imagination	8. After participating in the vocabulary image-creation project with generative AI, I now try to use newly learned words in imaginary situations.

a 7-point scale to examine distinctions in participants' levels of agreement, supporting a more nuanced analysis of their experiences.

For the data analysis, we examined both the artworks generated by the participants and their reflection papers to analyze how they conceptualized and operationalized their prompt iteration in the target task. The reflection papers provided detailed accounts of the specific prompts that the participants created and revised, which allowed us to link the visual outcomes to the learners' reflective narratives. We first analyzed how the generated results changed depending on prompt iteration process and then thematized the strategies by the participants to achieve their desired images.

The coding process followed an iterative multistep procedure. First, two researchers jointly developed a preliminary codebook based on a subset of the data. They then independently applied the codes to the entire dataset and compared the

coded segments. To ensure interrater reliability, we adopted a consensus-based approach; in cases of disagreement, the researchers engaged in discussions to reach a consensus, and when necessary, a third author provided an external check to increase objectivity. This process enhanced the credibility and consistency of the final coding scheme.

In the post-project survey, descriptive statistics were calculated to assess the participants' self-perceived development of vocabulary learning strategies via the target project. We summarized the central tendencies and variability in the responses using measures such as the mean and standard deviation to capture the overall trends among participants using the statistical software Jamovi (version 2.4.8) (The Jamovi Project 2023).

4 Results and discussion

4.1 Survey findings and students' reflections on vocabulary learning strategy use

This section presents the findings, including the participants' survey responses and reflections, related to their self-perceived development of vocabulary learning strategies via the AI-mediated vocabulary image-creation project (Table 2).

Overall, the participants reported high levels of vocabulary learning strategies achieved by the target task. Among the "use of word structure" strategies, the "hidden meaning" construct obtained the highest average score (M = 6.47, SD = 0.82). The participants frequently described how working with GenAI for image creation helped them discover the hidden meanings or historical background of the target

Table 2: Participants' self-perceived development of vocabulary learning strategies via the target project (N = 30).

Strategies	Constructs	*M* (SD)
Visual encoding	Q1 Visualization	6.13 (1.04)
Use of word structure	Q2 Hidden meaning	6.47 (0.82)
	Q3 Prefix and suffix	5.73 (1.31)
	Q4 Word root	5.93 (1.26)
Contextual encoding	Q5 Use in context	6.23 (1.46)
	Q6 Use in sentence	6.13 (1.14)
	Q7 Use in situation	6.43 (0.86)
Activation	Q8 Imagination	6.03 (1.23)

word. For example, one participant (#6) reflected, "I've memorized a lot of words before, but knowing their original meaning was always difficult. With the images GenAI provided me, it's like I can see the history of the words in my head." This reflection shows how the participants experienced the meaning of words with the help of GenAI. Interestingly, the relatively low score for "prefix and suffix" (M = 5.73, SD = 1.31) and "word root" (M = 5.93, SD = 1.26) suggests that participants focused more on creating the stories surrounding the words rather than analyzing their syntactic or morphological structure.

Other constructs within contextual encoding also received high scores: "use in situation" (M = 6.43, SD = 0.86), "use in context" (M = 6.23, SD = 1.46), and "use in sentence" (M = 6.13, SD = 1.14). Many participants emphasized that locating a word in a specific and socioculturally meaningful context helped them understand its meaning. For example, one student (#7) explained, "I really liked that the images GenAI created showed me the overall context of the word, which made it much easier for me to understand how the word's meaning is shaped and changed." Another student (#4) noted that "Using GenAI helped me add a background and relationships between characters, so that I could see the word's meaning beyond a single object." These reflections aligned with the high score for "use in situation," as participants felt that imagining real-life scenarios where a word is actually being used helped their understanding. These comments illustrated that contextual encoding with GenAI evokes a vivid sense of place and context, making vocabulary learning more meaningful and engaging.

Finally, "visualization" and "imagination" also received a relatively high mean score (M = 6.13, SD = 1.04; M = 6.03, SD = 1.23, respectively). These results suggest that the participants engaged imaginatively by creating images of the target words. One participant (#15) noted, "When I could actually picture the word with the help of GenAI, it stayed with me much longer than when I only memorized its definition." Another participant (#11) mentioned, "Working with GenAI was helpful in increasing my imagination, making vocabulary learning less boring and more like playing with meaning." These reflections suggest that GenAI not only facilitated visual support but also encouraged learners to engage in imaginative tasks that personalized their learning process.

4.2 Qualitative analysis of learners' engagement in AI-mediated vocabulary learning

The qualitative analysis of participants' engagement in the AI-mediated vocabulary image-creation project revealed an important theme of prompt iteration: metacognitive-strategic engagement. This theme captured how learners

simultaneously monitored the relationship between their prompts and AI-generated outputs and strategically experimented with prompt variations to refine meaning and nuance.

4.2.1 Monitoring and evaluation

Participants frequently mentioned in their reflection papers that the process of prompt iteration helped them carefully monitor whether their intended meaning was delivered and conveyed, enabling them to revisit their word choices and linguistic nuances and try to change the images. In Figure 2, for example, one participant (#7) learned that the term "kitsch" originally meant "trash" but also referred to a style in which an outdated fashion, once considered tacky, gained a sense of coolness. To illustrate this story, the participant created the first prompt: (1) "Draw a man in anime style wearing a checkered coat, donning a fedora, with a red necktie, and holding a silver cane." However, finding the plain white background too bland and desiring a more realistic depiction, she realized that she needed to add context: (2) "in



Figure 2: Sample images associated with "kitsch".

a space with a brick-textured wall and wooden flooring." She then requested the drawing be in a "realistic style." Although the generated image was satisfactory, it did not capture the affluent vibe she had initially envisioned, so she added detail to the character to complete the final image: (3) "counting money." She later reflected, "With AI-images, I could immediately see what parts I needed to revise in my prompt, so that I could get better results." This reflection is a good example of monitoring and evaluation in prompt iteration, as the participants consciously monitored and evaluated the effects of linguistic changes on the semantic and visual quality of the output.

Another example is provided in Figure 3. One participant (#11) chose the word "justice." After learning that promises and justice were highly valued during Roman times, to the extent that a king would execute his own son for breaking the law, he decided to visualize this concept. To do this, the first prompt requested (1) "A drawing of a king looking solemn on his way to reluctantly kill his precious son." After monitoring, although the initial result was satisfactory, the participant wanted the



Figure 3: Sample images associated with "justice".

image to depict the act of the son being stabbed with a sword more literally, so he revised the prompt to include the action of the king (2) "stabbing his son with a sword." After monitoring the second image, which felt too cruel, he requested that the son be (3) "turned around" and "lying face down," leading to the final image. In his report, he wrote, "When I saw the first image, I thought it was too brutal, so I thought I needed to change the prompt. This process was challenging but fun." This prompt iteration highlighted how participants actively monitored and adjusted their prompts in response to the output.

In addition, Figure 4 shows how another participant (#24) engaged in the monitoring and evaluation process. After learning that the word "California" was derived from Queen Calaphia, ruler of a treasure-filled island inhabited solely by female warriors, the participant requested a prompt for (1) "the mysterious treasure-filled island where the queen lived." However, when the generated image did not



Figure 4: Sample images associated with "California".

accurately depict the actual inhabitants of the island, she decided to emphasize (2) "the female warriors in the mysterious treasure-filled island." The following image portrayed the warriors inside the island better, but she realized that the background did not capture California's bright essence. She then connected the word to the sensory and emotional impression of liveliness. The prompt was adjusted to highlight (3) "the female warriors in the mysterious treasure-filled island with the lush vegetation in the background." She later reflected, "By analyzing the images that the AI provided, I could think about how to bring out the brightness and energy I associated with California by revising the prompts." Similarly, prompt iteration helped the participants carefully monitor, evaluate, and progressively revise the image according to their intended meaning.

4.2.2 Strategic experimentation

Besides monitoring, learners engaged in deliberate experimentation with prompt variations, testing how subtle changes could change the AI output. Unlike simple trial-and-error, this process involved purposeful adjustments aimed at testing alternative interpretations, refining nuances, and achieving a closer match between the intended meaning and AI-generated images. For instance, one participant (#5) selected the word "siren" (Figure 5). This student first drew a ship in the sea, accompanied by a mermaid, to visualize this word. Subsequently, she crafted an initial prompt: (1) "Draw a European ship sailing in the heart of the sea, with a mermaid close by, singing to entice the ship's crew." However, the illustration showed the mermaid positioned directly beside the ship, which differed from her original idea. She then rephrased the prompt to have the mermaid singing from the shore, watching the distant ship: (2) "Draw a European ship sailing in the heart of the sea, with a mermaid on the shore, singing to entice the ship's crew." Surprisingly, the new illustration featured an additional ship on the shore. To address this and further specify her vision, the participant adjusted the prompt once again to clarify the mermaid's location and provide more details about the ship and sea: (3) "Draw a huge European ship sailing in the heart of the blue ocean with its crew atop the deck, while a mermaid serenades from the rocks along the coastline."

Another example is shown in Figure 6. One participant (#10) studied how the word "client" originated from "a person who bows down," indicating a subordinate in ancient Rome, but the meaning has now changed to imply a high position as in the phrase "the customer is king." Initially, the participant asked for an image in which (1) "many people were serving a client and bowing down, as if they were highly revered leaders." However, when the image described people turned away from the client, in the second attempt, she highlighted the action (2) "people facing forward." In this image, the client was facing forward, but it did not convey the exact sense that

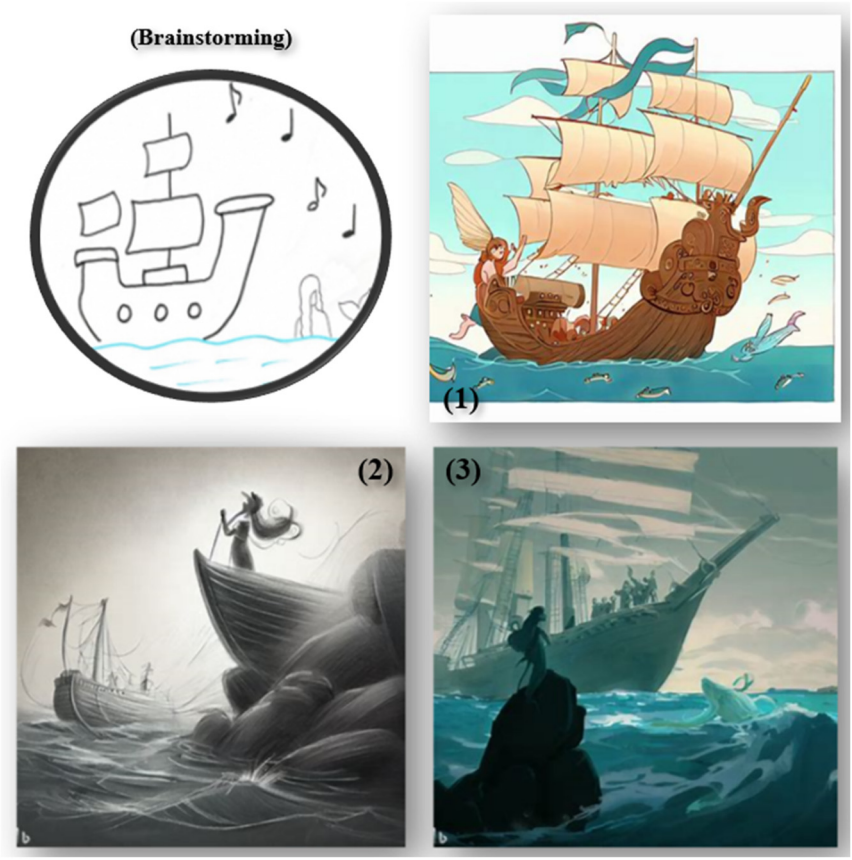


Figure 5: Sample images associated with “siren”.

they were in a higher position than the other clients in the background. Therefore, in the third attempt, she added the prepositional phrase (3) “on the higher position” to generate an image that showed the client possessing a higher status. This prompt iteration illustrated how learners strategically experimented with the descriptive elements of their prompts until they achieved their intended and desired outcome.

Another participant (#29) chose the word “barbarian” and depicted a brave warrior figure (Figure 7). His initial prompt (1) “a brave barbarian warrior” produced an image that mostly satisfied him, but he noticed that the figure was not holding a weapon as he had originally intended in his sketch. He then added the detail (2) “holding a spear.” However, to create a more imposing and masculine appearance, he decided to change the spear to (3) “an axe” in the prompt. This small but

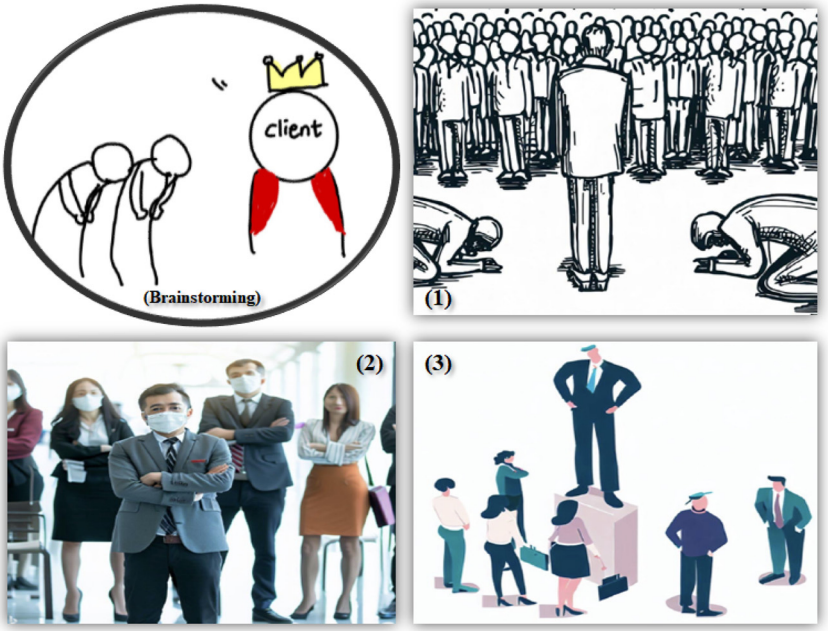


Figure 6: Sample images associated with “client”.

intentional modification in prompt iteration changed the image’s details and atmosphere, placing more emphasis on the warrior’s strength and aggression. The participant explained, “It was interesting to see that the weapon really changed the impression. With a spear, he looked like a soldier, but with an axe, he looked like a true barbarian.” Similarly, some examples underscored how strategic experimentation in prompt iteration helped participants explore how subtle lexical shifts can shape different images and interpretations.

5 Discussion

Given the recently emerging multimodality of GenAI and its integration into education (Chu et al. 2025; Oppenlaender 2022; Vartiainen and Tedre 2023; Wei et al. 2025), the present study examined how Korean EFL undergraduates enacted prompt iteration with a text-to-image generator to support multimodal vocabulary learning. This section discusses the findings, pedagogical implications, and limitations of the study.



Figure 7: Sample images associated with “barbarian”.

5.1 Students’ perception of vocabulary learning strategy use

The survey and reflection data revealed that the participants perceived a high level of vocabulary learning strategies after engaging in the target multimodal task using GenAI. Given the existing findings from the structural model indicating that strategic vocabulary learning involvement positively influences the mastery of vocabulary learning tactics and development of vocabulary knowledge (Tseng and Schmitt 2008), we believe that learners’ engagement in producing images of English words using GenAI can enhance their use of relevant vocabulary learning strategies and expand their vocabulary knowledge. Additionally, upon observing the participants consistently revisiting and refining their prompts, we believe that their prompt iterations can aid in visualizing a word’s historical origin and sociocultural meaning. Thus, we suggest that in the era of AI-assisted language learning, such skills should be

considered an integral part of vocabulary learning strategies (Barcroft 2009; Schmitt 1997), promoting learners' engagement in the development of L2 vocabulary knowledge.

The findings are also consistent with well-established cognitive theories such as the dual-coding theory (Paivio 1986, 2010) and CTML (Mayer 2009, 2024), both of which highlight the importance of delivering information through verbal and visual channels to improve understanding and retention. Prompt iterations make this advantage accessible and comprehensive. Additionally, fine-tuning prompts can assist learners in incidental language learning by facilitating task-induced engagement (Laufer and Hulstijn 2001). When learners actively engage in prompt iteration, they become more deeply immersed in the language-learning process. This heightened engagement is expected to enhance their grasp of specific vocabulary and contributes to a more immersive and effective language learning experience as well as self-regulating learning in the longer term.

5.2 Metacognitive–strategic engagement in AI-mediated vocabulary image-creation project

The aforementioned examples of metacognitive-strategic engagement were frequently found in a recursive cycle of monitoring, evaluating, and experimenting, which worked together to deepen students' understanding of vocabulary. Specifically, learners carefully monitored and evaluated AI-generated images, which immediately informed them of new strategic experiments for prompt revision. In addition, experimentation with alternative prompts helped to further monitor the processing of linguistic and/or semantic meanings and nuances of the images. This interconnected relationship in prompt iteration indicates that the AI-mediated vocabulary learning process involved a continuous interplay of reflection and experimentation, which enabled learners to refine their language use and conceptual understanding. In other words, learning with an image creator provided immediate visual feedback provided by the AI rather than by human teachers; however, the cognitive mechanism was similar as students monitored their outcomes, evaluated mismatches, and revised their prompts accordingly. Thus, prompt iteration functioned as a form of metalinguistic practice, making GenAI an interactive partner in reflective learning.

These findings can also be interpreted within the framework of self-regulated learning and metacognitive strategy use (Zhang and Zhang 2019). Rather than functioning solely as a creative exercise, the AI-mediated image-generation task served as a process in which learners actively monitored their linguistic choices, evaluated the adequacy of their prompts, and made necessary adjustments. In this

sense, prompt iteration supported learners' abilities to regulate their own learning by engaging in cycles of planning, monitoring, and revising, thereby reinforcing vocabulary acquisition through metacognitive engagement. This cyclical process resonates with Tseng and Schmitt's (2008) model of motivated vocabulary learning, which emphasizes the interaction of self-regulatory capacity and the use of strategies, leading to vocabulary learning. Thus, the iterative refinement of prompts used in this study can be viewed as a practical instantiation of motivated vocabulary learning through metacognitive engagement.

Furthermore, the prompt iteration examined in this study can be considered not as a simple trial-and-error process but as a form of negotiating meaning (Long 1996). By responding to GenAI's output (i.e., generated images), learners adjusted their linguistic choices, and in doing so, they potentially experienced pushed output and modified input. This process closely resembles the interactional dynamics in SLA, in which meaning is clarified and refined through iterative exchanges (Ellis et al. 1994). Therefore, the findings suggest that AI-mediated interactions functioned as a form of negotiated engagement, supporting vocabulary learning through opportunities for learners to refine their output and deepen their understanding of target word meanings. In other words, learners demonstrated agency in negotiating meaning with GenAI. They developed lexical knowledge and broader digital, AI, and/or prompt literacies. Therefore, prompt iteration bridged technical skills with the emergent creativity necessary in the GenAI era (Jiang and Chun 2025; Loivaranta et al. 2025; Reddy 2022; Ringvold et al. 2024), making vocabulary learning an iterative design process.

5.3 Pedagogical implications

Based on these results, we suggest that the examined GenAI-mediated vocabulary image-creation project is ideal for achieving two pedagogical goals: the development of prompt iteration skills and vocabulary learning strategies. First, the simultaneous development of both components is expected to contribute positively to the cyclical L2 vocabulary learning process (Tseng and Schmitt 2008). Prompt iteration can facilitate one's vocabulary learning process and the development of vocabulary learning strategies, would eventually contributing to learners' self-regulated vocabulary development and L2 learning motivation. Therefore, English teachers can use this project once they adapt to target learners' linguistic needs and cognitive maturity. For learners with relatively lower levels of English proficiency, instructors are encouraged to provide sample prompts and associated AI-generated images and to carefully demonstrate the entire process of AI-powered image generation. Second, once the students become familiar with the image-creation process, instructors can

extend this project to create English stories around the target word (see Hwang et al. 2023; Hwang et al. 2025 for the integration of GenAI into story creation in EFL lessons), which may lead to the further development and sophistication of students' prompt creation. Finally, instructors can use AI-powered image generation as a pedagogical resource to explain a target word's multiple meanings and uses in varying contexts (Nation 2001), in addition to providing verbal explanations. Thus, L2 classroom practice can cultivate prompt iteration as a design-based learning process, enabling students to experiment with multiple interpretations rather than memorizing static definitions. Therefore, GenAI is not only a support tool for vocabulary learning but also a scaffold for critical and creative literacy practices.

5.4 Limitations of the study

This study had some limitations. First, given the participants' majors (English linguistics and literature), their development of vocabulary learning strategies and successful engagement in the target task through prompt iteration with GenAI might have been partly influenced by their relatively high English proficiency. Therefore, it remains unclear whether similar results would be observed among students with lower proficiency levels. Second, at the time of data collection (Spring semester of 2023), image generators were limited to producing similar images despite identical or slightly modified prompts, making it difficult for participants to generate the intended output. While other Large Language Model programs (e.g., GPT-5, Gemini, and Claude) now allow consistent image generation and support conversational iteration processes to modify only parts of an image, the free and old version used in this study lacked such features. Consequently, the iterations demonstrated by the participants may not be regarded as fully interactive in prompt iteration. Future research should examine the potential of more interactive iterations (i.e., dialogue-based image editing) for prompt creation and literacy development. Third, although this study offers valuable insights into the development of vocabulary learning strategies and the use of prompts in multimodal vocabulary-related projects, its findings are based entirely on students' self-reported data. Such data may be subjective as students can overestimate or underestimate their experiences. Future studies should incorporate more diverse methods and instruments to triangulate evidence. Importantly, the aim of this study was not to claim prompt literacy as a distinct literacy requiring specialized pedagogy but to highlight how, in a particular classroom context, learners' iterative modification of prompts can be understood as one dimension of literacy practice. This perspective underscores the situated and emergent nature of prompt use as a part of students' engagement with GenAI tools. Simultaneously, future research should move beyond image generation to include a

wider range of contexts (e.g., text composition, conversational interaction, and video creation) to capture the broader definition of prompt literacy and its pedagogical potential and implications.

6 Conclusions

This study demonstrated that integrating GenAI-mediated image creation into EFL vocabulary learning fosters cognitive and metacognitive engagement by enabling learners to iteratively refine their understanding of word meanings and sociocultural contexts. The results from surveys and reflection data indicated that prompt iteration enhances a range of vocabulary learning strategies while deepening learners' ability to negotiate meaning, monitor linguistic nuances, and actively experiment with alternative representations. Moreover, the findings underscored that prompt iteration is more than a technical skill and constitutes a meaning-making practice that bridges the interactional principles of SLA with new, emergent forms of literacy.

The study also offers important pedagogical implications and avenues for future research. By situating prompt iteration at the intersection of prompt engineering and literacy, this study illustrates how GenAI can serve as a partner in co-constructing knowledge, offering learners opportunities to engage in iterative cycles of monitoring, evaluating, and experimenting. Given the limitations noted in Section 5.4, future studies should incorporate triangulated data sources to examine how GenAI-mediated vocabulary learning can be scaffolded across varying proficiency levels. Finally, this study provides a foundation for reshaping vocabulary instruction in the era of GenAI, suggesting that GenAI-supported prompt iteration has the potential to enrich vocabulary learning and broader multiliteracy development in L2 education.

Abbreviations

CTML:	cognitive theory of multimedia learning
EFL:	English as a foreign language
GenAI:	generative artificial intelligence
L2:	second language
SLA:	second language acquisition

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