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Research Article

A Mixed Methods Study of Teachers' Experiences with Gencraft AI Visual Content Generator to Boost EFL Learners' Vocabulary

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Abstract

Traditional methods have often failed to enhance vocabulary instruction to junior EFL learners. While there is considerable research on vocabulary instruction and the integration of educational technology, there is limited research on the implementation of AI-generated visual content in EFL teaching. As technology plays an increasingly significant role in modern education, this study explores innovative methods leveraging AI technology to improve vocabulary teaching. This 16-week investigation involved eight experienced EFL teachers, selected purposively based on their teaching experience and exposure to pre-intermediate students, along with their pre-intermediate students, examining how the teachers utilized the tool, the challenges they encountered, and the outcomes of its implementation. Pre- and post-implementation surveys, teacher interviews, and classroom observations were employed to collect data. Results showed improvement across the board, with the highest improvements in creative expression and vocabulary retention one week after learning. A significant increase in student engagement was also reported, and teachers stated that lesson planning became faster and more efficient. Both quantitative and qualitative data analysis showed significant improvements in vocabulary learning and student engagement. The quantitative results revealed large improvements, while qualitative findings highlighted increased student participation, motivation, and creativity. These results suggest that AI-generated visual content, when implemented effectively, can enhance vocabulary retention and foster a more interactive and engaging EFL classroom. This research contributes to the emerging understanding of AI's application in language teaching and provides practical guidance on implementing AI tools in EFL vocabulary instruction.

Keywords: AI-generated visual content, educational technology integration, vocabulary instruction, mixed methods research, teacher experience

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1. Introduction

Vocabulary acquisition is a complex process, especially for young English as a Fecond Language (EFL) learners (Nation, 2013; Schmitt, 2008). As technology shifts education, tools like Gencraft, an AI-driven visual content generator, offer new, more interactive ways to teach vocabulary. Teachers have traditionally relied on textbooks, flashcards, and manually created materials to teach vocabulary (Folse, 2004). However, these traditional methods no longer meet the needs of the technology-driven younger generation of learners, who are accustomed to collaborative, dynamic digital content (Harmer, 2001). As such, in the current rapidly changing technology era, new tools such as artificial intelligence (AI) are influencing the way vocabulary is learned, promising more interactive learning processes (Crompton et al., 2024). One of these tools is Gencraft, an AI-driven visual content generator. It enables the production of personalized, image-intensive learning resources that can be instantly adjusted to meet specific pedagogical requirements. This shift represents a significant advance in educational technology, transcending the limitations of static content (Luckin et al., 2016).

Vocabulary acquisition is a mainstay of language proficiency, particularly for junior pre-intermediate students (Nation, 2013). Mastery of vocabulary not only aids students' communication but also their linguistic confidence (Schmitt, 2008). However, traditional methods of teaching vocabulary may not be the most engaging for younger students, who expect a more participatory and appealing experience (Folse, 2004). This shift towards more attractive learning methods has led to the exploration of new tools like artificial intelligence (AI). AI-generated content, for example, addresses this need by creating contextually relevant visuals that complement the verbal learning process (Montero Perez & Rodgers, 2019). These visuals, when combined with vocabulary instruction, help to solidify meaning and facilitate vocabulary retention (Mayer, 2009). Hence, research has yet to explore the practical application of AI-generated visual content in EFL classrooms, specifically in vocabulary instruction, where there remains limited exploration of its impact.

While there has been considerable research on how vocabulary is acquired and the role of visual aids, there are still gaps concerning the effective use of AI-generated visual content in English as a Foreign Language (EFL) classrooms. Previous studies have explored both static and dynamic visuals, gamified applications, and mobile platforms, showing improvements in engagement, understanding, and retention (Montero Perez & Rodgers, 2019; Phillips, 2016; Sahebkheir & Jalali, 2024; Wu, 2024). Nonetheless, while

research exists on vocabulary instruction and education technology, a gap remains in understanding how AI-generated content is implemented in EFL classrooms from the teacher's perspective, which is crucial given that teachers are the primary facilitators of technology integration.

Therefore, this mixed methods study aimed to address the need to examine how emerging technologies, specifically AI-generated visual content, can be applied practically in language pedagogy. It also sought to explore how EFL teachers utilize Gencraft to teach vocabulary to junior students, assessing the tool's effectiveness, limitations, and impact on vocabulary retention and student engagement. In the same vein, the following research questions guided the study:

RQ1: How do teachers perceive the impact of Gencraft's visual aids on student engagement and classroom interaction?

RQ2: What potential effects do AI-generated visual aids have on students' vocabulary acquisition and retention

RQ3: Is there a relationship between teacher experience and the success of Gencraft-AI implementation?

RQ4: How does using Gencraft influence teachers' vocabulary lesson delivery strategies?

RQ5: What benefits and challenges do teachers encounter when incorporating AI-generated visual content into their teaching?

2. Literature Review

Learning vocabulary is essential to second language acquisition, supporting communicative competence (Nation, 2013; Schmitt, 2008). Vocabulary learning research distinguishes two broad categories of learning: intentional learning and incidental learning. Intentional learning refers to concerted efforts to study and memorize vocabulary, typically through programmed classroom activities such as word lists, flashcards, and explicit instruction on vocabulary. Schmidt's (1990) Noticing Hypothesis posits that language must be consciously noticed and attended to for effective internalization, which is particularly relevant in guided learning situations where learners directly engage with words. Hulstijn (2003) also emphasized the importance of attending carefully to word forms and meanings.

On the other hand, incidental learning occurs as a secondary process resulting from exposure to language through content consumption or communication interactions. It is less deliberate and spontaneous compared to intentional learning. Bruton et al. (2011) suggested that incidental learning may be enriched by ensuring that students interact with new words through reading, listening, or conversational practice. Although incidental learning occurs naturally through language use, it cannot always lead to long-term retention unless complemented by explicit learning strategies (Nation, 2013). While incidental learning is an effective method, it may not be sufficient on its own for long-term retention, especially without additional structured learning interventions (Lee & Anderson, 2023). This is an important factor to consider when evaluating the overall impact of different learning methods on vocabulary acquisition.

The combination of the two approaches can lead to a more effective strategy for vocabulary learning. For instance, learners would first be exposed to unfamiliar words through reading practice and then supported through systematic study. Integration is highly effective in enhancing both the depth and extent of vocabulary knowledge (Schmitt, 2008). Research also suggests that integrating both types of learning can lead to improved retention and recall, which has important implications for language teaching (Nation, 2013). Nonetheless, research remains inconclusive regarding the universal effectiveness of a balanced combination of both approaches.

Visual aids have been used to teach vocabulary for decades. Flashcards, pictures, and realia have been used to help students visualize vocabulary, making abstract words more concrete. Phillips (2016) found that second-grade students taught with visual aids learned an additional 15% of vocabulary compared to students in the control group, who were taught with traditional definition-based methods. Flashcards, displaying a picture paired with a corresponding word, are particularly effective for students who benefit from visual prompts. Similarly, Sahebkheir and Jalali (2024) demonstrated that Iranian EFL learners exposed to visual aids showed significant improvements in vocabulary acquisition, highlighting the universal applicability of visual aids across diverse educational contexts. Hashemi and Pourgharib (2013) investigated the impact of visual aids on intermediate students, reporting substantial gains in contextual comprehension and increased student motivation.

Such aids present information in multiple formats, fostering engagement and improving retention (Phillips, 2016). Moreover, strategies such as semantic mapping—where students visualize and organize

relationships among words—have been found to enhance comprehension by strengthening connections within the word set (Schmitt, 2008). For example, using semantic maps to relate words like "dog," "cat," and "pet" can help students better understand the vocabulary in context, making abstract concepts more concrete. Although visual aids have been extensively studied, they may not be effective in all contexts, sometimes causing cognitive overload or being less beneficial for learners with limited prior knowledge (Guo et al., 2020).

Visual aids can be categorized into two types: static and dynamic. Static visual aids, such as pictures, flashcards, and charts, provide concise, uniform references for vocabulary. For example, a chart outlining animal types with corresponding pictures helps learners remember related vocabulary. Dynamic visual aids, such as videos and animations, offer even greater benefits with the addition of movement and interactivity. Montero Perez and Rodgers (2019) argued that dynamic images create interactive learning environments that facilitate learning by making it more engaging. These aids are beneficial in teaching abstract or challenging vocabulary, as they provide context and enhance the effectiveness of the learning process.

Dynamic graphics also support constructivist learning principles through active engagement (Vygotsky, 1978). For example, interactive elements in videos or animations allow learners to explore words within a context, increasing their understanding and retention. Learners' interaction with graphics through gestures or clicks facilitates active vocabulary processing and enhances cognitive engagement. Similarly, Zuo (2025) demonstrated that integrating short videos into English fragmented learning enhances learners' acquisition of language skills by providing contextualized experiences that align with constructivist approaches.

The application of digital resources has revolutionized teaching vocabulary. The initial digital tools, such as flashcards and multimedia presentations, have evolved into sophisticated technologies like virtual and augmented reality applications. These tools provide students with greater interaction, personalized learning, and access to resources. Sun et al. (2020) opined that the benefit of mobile learning apps is that students can learn vocabulary content anywhere and at any time, thereby enhancing their flexibility and motivation.

Other recent trends also include the incorporation of gamified elements in vocabulary learning. Duolingo and Quizlet incorporate game-like features to enhance learning and retention of vocabulary through rewards, competition,

and progress tracking (Hamari et al., 2016). These gamified platforms not only motivate learners but also provide instant feedback, enabling them to track their progress and identify areas where they need improvement. While gamified learning apps are widely popular, there is evidence suggesting that they may encourage surface-level learning in some cases, especially if the gamification elements overshadow the educational content (Mogavi et al., 2022).

Interactive whiteboards and mobile learning platforms are all part of vocabulary learning. Wu (2024) demonstrated that mobile apps like Memrise and Anki enhance flexibility, as students can create and learn electronic flashcards with multimedia components, such as photographs and audio. Karami (2019) found that interactive whiteboards enable instructors to deliver multimedia information, annotate images, and involve students in responsive exercises. These tools engage learners actively, making vocabulary acquisition more collaborative and participatory. They also enable teachers to present vocabulary-related games, administer instant quizzes, and support co-constructive vocabulary building among students.

Recent advancements in artificial intelligence have opened up new avenues for vocabulary teaching. AI technologies, such as adaptive learning systems, produce customized visual materials tailored to learners' needs. Crompton et al. (2024) highlighted the primary features of AI incorporation, including adaptive content generation, immediate feedback, and contextually responsive usage examples. AI-powered visual aids offer learners vocabulary examples within real-life situations, enhancing understanding and application. Despite the potential, there is limited empirical data on the long-term impact of AI-generated tools on vocabulary retention, and further research is needed to assess their effectiveness in sustained learning over time.

3. Method

3.1. Design

This study employed a sequential triangulation mixed-methods approach (Creswell, 2014) to examine how the use of the Gencraft AI visual content generator influenced lesson preparation, student engagement, vocabulary acquisition, and long-term teaching practices. This design is well suited for investigating complex educational phenomena because it integrates measurable outcomes with contextual insights into teachers’ and students’ experiences with AI-aided vocabulary learning. Quantitative data provided a framework for assessing the statistical significance of changes in students’ learning outcomes, while qualitative data enhanced the analysis by situating

these changes within classroom contexts. Triangulation was achieved through questionnaires, interviews, and observations, which offered a comprehensive perspective on the research question (Flick, 2018).

3.2. Participants

The research sample included eight EFL instructors from the Shahrebabak Language Institute. The participants were selected purposively based on specific criteria: their level of teaching experience, exposure to pre-intermediate junior students, and willingness to utilize Gencraft AI in their teaching. The sampling method ensured that participants had sufficient experience to provide meaningful feedback on integrating AI tools into their classrooms.

The choice of eight teachers follows the saturation principle (Guest et al., 2006), which states that effective patterns and themes will become evident within a sample size of 6-12. By selecting a small but targeted sample, it was possible to ensure that each teacher's experience could be fully explored while maintaining a manageable analysis scope. This sample size strikes a balance between capturing the complexity of the data and allowing for in-depth exploration of each teacher's unique experience with Gencraft AI. Moreover, diversity of teaching styles and instructor backgrounds was considered in the study, adding depth to the data. This diversity increases the transferability of the findings and provides insights relevant to similar EFL contexts, offering a broader understanding of the effective utilization of Gencraft AI in EFL classes.

3.3. Instrumentation

3.3.1. A Questionnaire of Classroom Dynamics and Student Performance

The quantitative data regarding classroom dynamics and student performance were collected through a questionnaire developed by the researchers and validated by expert reviewers. The questionnaire was distributed at two key times: Week 1, before the introduction of Gencraft AI, and Week 16, after its integration to compare pre- and post-implementation scores across seven aspects of class activity: learning routines, student mood, creative expression, vocabulary recall, class participation, student engagement, and creative vocabulary use. The use of a 5-point Likert scale for questionnaire items provided a consistent measure of responses, making it possible to identify trends and compare pre- and post-implementation results.

To determine content validity, five expert reviewers, specializing in language instruction, EFL teaching, and educational technology, participated in the review phase of the questionnaire development. They evaluated the relevance and clarity of each item to ensure they provided relevant and authoritative feedback. In addition to specialist checking, the questionnaire was also pilot tested with a small group of EFL teachers before it was used in the research. Pilot testing enabled the identification of any inconsistencies or issues with question wording, thereby making the instrument more robust and enhancing its overall clarity and utility. To assess the reliability of the study instruments, Cronbach's alpha was used to measure the questionnaire's internal consistency, indicating that the items in the questionnaire consistently measure the same constructs ($\alpha = .78$). Sample questionnaire items illustrating the scope of each dimension included:

- My students talk about the visuals without being asked (In-Class Activity)
- My students write down new words when they see the visuals (Learning Habits)
- My students smile when I show Gencraft visuals (Student Mood)
- My students feel creative when making their own visuals (Creative Expression)
- My students can tell what words mean when they see the visuals (Understanding)
- My students use new words correctly in different situations (Using New Words)
- My students remember word meanings in later classes (Remembering)

3.3.2. Semi-structured Interview Protocol

Qualitative data were gathered through semi-structured interviews with teachers. The interview process allowed participants to share their perceptions of Gencraft AI, its impact on instructional methods, and its effects on students' learning and engagement. The interview guide included ten questions, which were developed by the researchers based on literature on teacher perceptions of educational technology and AI in the classroom. Its validity was reviewed by two expert professors in the field.

In addition to the main questions, probes and prompts were used to encourage elaboration and gain deeper insights into teachers' experiences. For example, when a teacher mentioned challenges, they were asked to describe specific instances or strategies they used to overcome them. The interview questions included:

Tell me about how Gencraft changed the way you teach vocabulary.
What surprised you most when you first started using Gencraft?
How easy or difficult was it to use Gencraft in your lessons?
Can you share a specific lesson where Gencraft worked really well?
What was challenging about using Gencraft?
How do your students react to visuals created by Gencraft?
What skills did you need to learn to use Gencraft effectively?
How is Gencraft different from other teaching materials you've used?
If you could change something about Gencraft, what would it be?
How has using Gencraft changed your thinking about technology in teaching?

3.3.3. Observation

Classroom observations were conducted every two weeks over a period of 16 weeks, resulting in a total of eight sessions. Each session lasted approximately 45 minutes and was guided by a pre-established rubric that focused on the use of AI software, teacher–student interactions, and student engagement with the technology. The rubric included criteria for evaluating how the software was integrated into lesson activities and how students interacted with AI-generated visuals. Detailed observation notes were taken during each session, capturing both the challenges teachers faced in integrating the technology and the ways students engaged with the visuals. For example, one teacher reported struggling with software lag during a vocabulary activity, while another observed that students were more likely to participate in discussions when visuals were incorporated. These observations provided valuable contextual data for the qualitative analysis and highlighted the practical implications of AI use in the classroom.

3.4. Procedures

The application of Gencraft AI to EFL vocabulary classes followed a structured approach to ensure consistent and systematic integration of the tool. The first phase of the study was a teacher training program, which lasted four hours and included two sessions of two hours each. During these sessions, teachers were introduced to the capabilities of Gencraft AI and how to utilize the tool effectively in the classroom. A standardized training manual was provided, offering step-by-step instructions for using the tool and incorporating visuals into lesson plans. The training also included a hands-on demonstration in which teachers designed AI-enriched visuals for specific vocabulary topics. Training materials included sample lesson plans and visuals

demonstrating integration of Gencraft AI into topics such as household items, emotions, and activities.

During the implementation stage, teachers used Gencraft AI in their classrooms to deliver vocabulary lessons on household items, emotions, and activities. Each lesson lasted 45 minutes, and the number of lessons ranged from six to ten per topic. Teachers were encouraged to adjust the visuals according to their students' needs, and these modifications were documented in teacher logs to ensure replicability and to track variations across classes. Teachers' use of the AI tool was monitored every two weeks through digital logs and tracking tools, which recorded the frequency of use, vocabulary topics covered, and types of visuals integrated into lessons.

Classroom observations were also conducted to examine how the AI tool was applied and how students interacted with the visuals. Observers used a detailed rubric to assess the effectiveness of the AI-generated visuals during lessons. Interviews with teachers were carried out at the beginning and end of the implementation phase, each lasting approximately 45 minutes. The interview format was flexible, incorporating open-ended questions that provided insight into teachers' evolving attitudes toward the tool and its influence on instructional practices.

In the qualitative analysis stage, observation notes and interview data were transcribed and coded by two independent coders, with intercoder reliability assessed using Cohen's $\kappa = .85$. Discrepancies were discussed and resolved through consensus. To ensure credibility and trustworthiness, peer debriefing and member checking were employed. Peer debriefing involved reviewing emerging themes with colleagues and field experts to verify accuracy, while member checking allowed participants to review preliminary findings and confirm that their perspectives were accurately represented.

The coding process was inductive, following Braun and Clarke's (2006) guidelines for thematic analysis. Codes were developed to reflect common ideas and experiences reported by teachers, including challenges of technology integration, pedagogical adaptability, and student involvement. This process highlighted key patterns in AI tool application, as well as the advantages and challenges experienced by teachers.

3.5. Data Analysis

The obtained quantitative data were analyzed using *IBM SPSS Statistics* (Version 27.0). Descriptive statistics, including means and standard deviations, were calculated, and paired t-tests were conducted to determine whether changes between pre- and post-implementation data were statistically

significant. Correlation analyses were also performed to examine relationships between the dimensions measured in the questionnaire, providing insight into how different factors influenced one another.

The collected qualitative data were analyzed using thematic analysis (Braun & Clarke, 2006), which involved familiarization with the data, generating initial codes, and developing themes from teachers' responses and classroom observations. Coding was performed by two independent specialists, and inter-coder reliability was assessed to ensure consistency. MAXQDA software was used to code and categorize the qualitative data systematically, facilitating the identification of patterns and emerging themes.

4. Results

4.1. Results for the First Research Question

The quantitative results for the first research question (i.e., How do teachers perceive the impact of Gencraft's visual aids on student engagement and classroom interaction?) are indicated in Table 1.

Table 1
Pre- and Post-Implementation Scores for Student Engagement Dimensions

Dimension	Pre-Implementation	Post-Implementation
In-Class Activity	2.84 – 3.33	4.33 – 4.78
Learning Habits	3.12 – 3.55	4.27 – 4.53
Student Mood	2.76 – 3.08	4.33 – 4.78
Creative Expression	3.05 – 3.50	4.53 – 4.78

As shown in Table 1, the results demonstrate that Gencraft AI enhanced student engagement, participation, mood, and creative expression, fostering active involvement, improved learning habits, and a positive classroom atmosphere. Accordingly, the results showed the following:

- **In-Class Activity:** Participation rates increased notably, with pre-implementation scores ranging from 2.84 to 3.33 and post-implementation scores from 4.33 to 4.78. These results suggest that AI-generated visuals significantly boosted student engagement during classroom activities.

- **Learning Habits:** Students' study habits improved after using Gencraft AI. Pre-implementation scores ranged from 3.12 to 3.55,

reflecting moderate consistency, while post-implementation scores increased to 4.27–4.53, indicating greater responsibility and consistency in learning routines.

- **Student Mood:** Motivation and classroom enthusiasm also improved. Pre-test scores for mood ranged from 2.76 to 3.08, whereas post-implementation scores rose to 4.33–4.78, showing that AI visuals contributed to a more positive and engaging learning environment.

- **Creative Expression:** This dimension showed the largest improvement. Pre-test scores ranged from 3.05 to 3.50, while post-implementation scores increased to 4.53–4.78. The AI tool encouraged greater creativity, particularly in activities such as storytelling and role-playing.

4.2. Results for the Second Research Question

To address the second research question (i.e., What potential effects do AI-generated visual aids have on students' vocabulary acquisition and retention?), the pre-post differences of all dimensions were examined (Table 2).

Table 2
Pre- and Post-Implementation Scores for All Topics

Variable	Pre-Implementation Mean	Post-Implementation Mean	Difference	*P*
Class Participation	2.84	4.33	+1.49	< .001
Learning Habits	3.12	4.27	+1.15	< .001
Student Mood	2.76	4.33	+1.57	< .001
Creative Expression	3.05	4.78	+1.73	< .001
Concept Understanding	3.22	4.45	+1.23	< .001
Use of New Vocabulary	3.18	4.53	+1.35	< .001
Vocabulary Retention	3.42	4.68	+1.26	< .001

Note: Scores are based on a 5-point Likert scale. Higher values indicate greater engagement, comprehension, and retention.

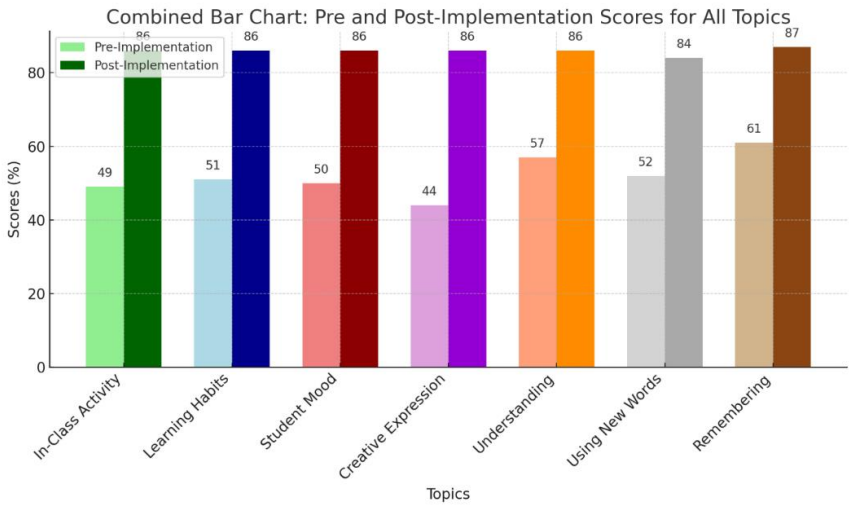
Table 2 shows significant improvements across all dimensions, with the largest increases observed in Creative Expression (+1.73), Student Mood (+1.57), and Class Participation (+1.49). Learning Habits, Concept Understanding, Use of New Vocabulary, and Vocabulary Retention also showed meaningful gains (+1.15 to +1.35), confirming the effectiveness of Gencraft AI in enhancing classroom dynamics, engagement, and vocabulary

learning. The following dimensions were assessed to examine the impact of AI-generated visuals on vocabulary acquisition and retention:

- **Understanding:** Students' comprehension of new vocabulary improved notably with Gencraft AI. Pre-test scores ranged from 3.22 to 3.55, reflecting moderate understanding. Post-implementation scores increased to 4.45–4.78, indicating a marked improvement in comprehension due to the contextual support provided by AI-generated visuals.
- **Using New Words:** Students' ability to apply new vocabulary correctly across different contexts also improved. Pre-test scores ranged from 3.18 to 3.55, whereas post-implementation scores rose to 4.53–4.78, demonstrating higher competency in using new words appropriately.
- **Remembering:** Vocabulary retention showed the most substantial gain. Pre-implementation scores ranged from 3.42 to 3.78, while post-implementation scores increased to 4.68–4.78, suggesting a significant positive effect of AI visuals on long-term recall.

Figure 1

Combined Bar Chart: Pre- and Post-Implementation Scores for All Topics



The questionnaire analysis was supplemented by line graphs displaying three focal dimensions—class participation, vocabulary retention, and student mood—tracked biweekly over the 16-week semester. The visual trends showed that class participation and vocabulary retention had the greatest room

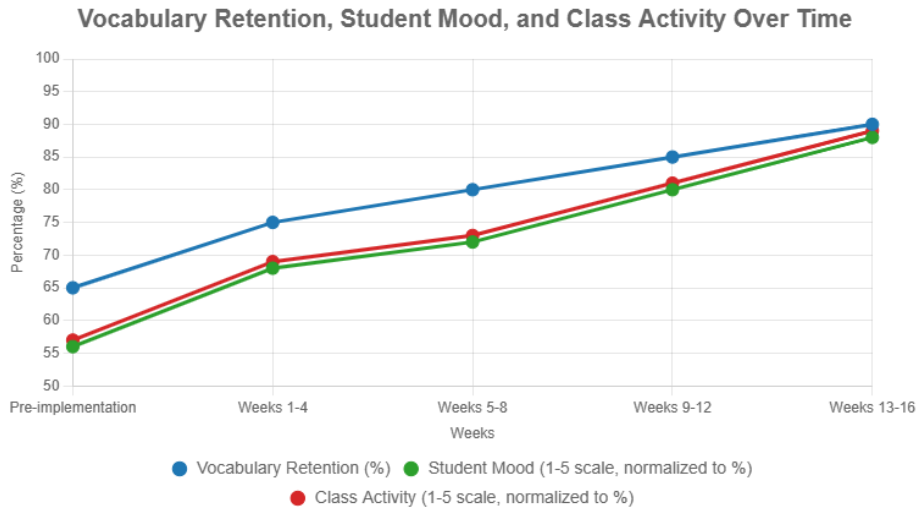
for improvement at baseline and demonstrated the largest gains over time. This pattern aligned with the statistically significant pre–post differences identified through paired *t*-tests ($p < .001$).

Vocabulary retention, operationalized as the percentage correct on delayed post-tests administered one week after instruction, increased from 55% to 85% across the measurement period. This suggests that AI-generated visuals were associated with meaningful improvements in vocabulary learning and longer-term recall, although the results should be interpreted as correlational rather than strictly causal. Student mood also showed a notable increase, rising from a pre-implementation mean of 2.76 to a post-implementation mean of 4.33. These findings indicate a positive shift in students' attitudes and motivation toward learning. Collectively, the results suggest that the use of visually dynamic materials contributed to a more engaging and supportive classroom environment.

Figure 2 illustrates the line graphs of vocabulary retention, student mood, and class activity across five time points (i.e., pre-implementation, Weeks 1–4, Weeks 5–8, Weeks 9–12, and Weeks 13–16).

Figure 2

Line Graphs for Vocabulary Retention, Student Mood, and Class Activity



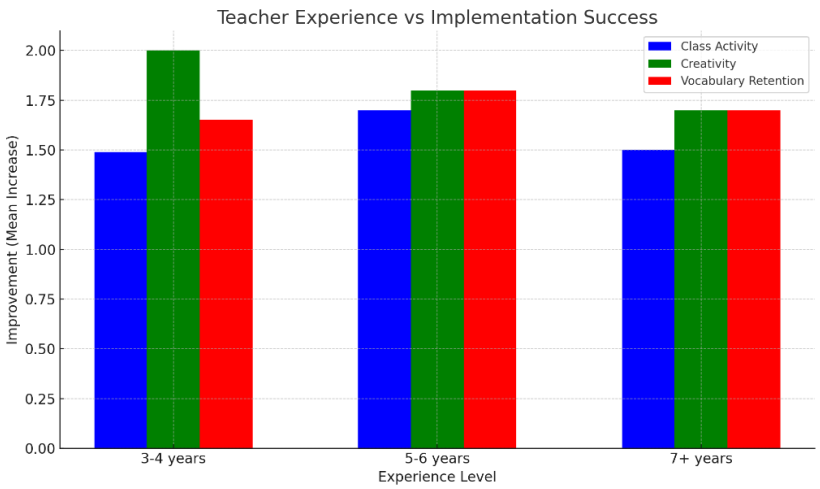
As shown in Figure 2, vocabulary retention began at approximately 65% prior to implementation and increased steadily across the study period, reaching nearly 90% by Weeks 13–16. Student mood started lower, at around 55%, but demonstrated consistent gains, ultimately reaching ~87% and

converging with vocabulary retention in the final measurement period. Class activity followed a similar trajectory, beginning near 58% and closely tracking student mood, with slightly higher values from Weeks 5–8 onward, peaking at ~88% by Weeks 13–16. Collectively, these patterns indicate steady improvements across all three measures, with notable convergence in the later weeks of the intervention.

4.3. Results for the Third Research Question

To address the third research question (i.e., Is there a relationship between teacher experience and the success of Gencraft-AI implementation?), correlation analyses were conducted to examine the associations between years of teaching experience and measures of Gencraft-AI success. Success was operationalized through gains in student participation (mean increase in Class Activity scores, 5-point scale), improvement in creative expression (0–10 rubric-based assessment), and vocabulary retention. Teachers with 3–4 years of experience showed the strongest relationship with student creativity gains (r = .72, p = .01). Teachers with 5–6 years of experience exhibited the most substantial associations with increased student participation (r = .68, p = .02) and vocabulary retention (r = .65, p = .04). In contrast, teachers with more than 7 years of experience demonstrated weaker relationships across all outcomes: creativity (r = .42, p = .15), participation (r = .33, p = .25), retention (r = .36, p = .22). Overall, these results suggest that moderately experienced teachers (5–6 years) are most strongly associated with effective implementation of Gencraft-AI to enhance student participation and vocabulary retention (Figure 3).

Figure 3
Teacher Experience vs. Implementation Success



4.4. Results for the Fourth Research Question

To address the fourth research question (*i.e.*, How does using Gencraft influence teachers' vocabulary lesson delivery strategies?), qualitative data analysis provided richer insights into the impact of the AI tool on teaching practice and student engagement. Eight teachers participated in this phase, contributing data from eight interviews and eight classroom observations. Thematic analysis produced several significant themes related to pedagogical adaptability, student engagement, and challenges in utilizing AI during teaching.

Teachers reported adapting their instructional strategies to integrate AI-generated visuals, which enhanced student engagement and supported vocabulary instruction. The frequent use of visuals was central to creating a more dynamic and effective vocabulary learning environment. Initial codes were consolidated into three higher-level themes (i.e., pedagogical flexibility, vocabulary support through visualization, and collaborative learning) that are summarized below.

- **Pedagogical Flexibility**. Teachers emphasized that Gencraft AI enabled them to customize lessons to better meet students' needs. For example, Participant 5 noted, "The ability to create visuals on demand helped me cater to the different learning speeds of my students. I could adjust the materials immediately, depending on how they responded in class." Similarly, Participant 8 stated, "Having the visuals ready within minutes allowed me to adapt lessons on the spot. This flexibility made my teaching more dynamic and responsive to student needs." The capacity for on-demand visual creation was perceived as a key advantage, allowing teachers to modify lessons in real time.
- **Vocabulary Support Through Visualization**. Teachers also highlighted the role of visuals in improving vocabulary comprehension. The images helped contextualize abstract words, making them more accessible to students. Participant 8 explained, "The images really helped the students grasp new vocabulary. For example, showing a picture of 'scream' helped them understand the word's intensity and context better." Teachers reported that visuals supported multiple learning modalities (visual, kinesthetic), thereby broadening accessibility for diverse learners.
- **Collaborative Learning**. Several teachers observed an increase in group discussions and peer interaction when visuals were incorporated. Participant 1 remarked, "I saw a lot more group discussions when we used the visuals. The students started explaining the words to each

other, which created a more collaborative learning environment." Visuals thus appeared to encourage peer-to-peer explanation and foster more meaningful collaboration.

In sum, the integration of Gencraft AI into vocabulary instruction fostered greater pedagogical flexibility, supported vocabulary comprehension through visualization, and promoted collaborative learning. The frequent and strategic use of visuals was central to creating a more engaging, responsive, and effective classroom environment.

4.5. Results for the Fifth Research Question

To address the fifth research question (*i.e.*, What benefits and challenges do teachers encounter when incorporating AI-generated visual content into their teaching?), the qualitative data were analyzed and revealed both pedagogical benefits and practical challenges.

4.5.1. Benefits

Teachers consistently highlighted increased student engagement, enhanced motivation, and improved vocabulary retention:

- **Student engagement.** Participant 1 stated, "When I used visuals, even the quietest students became more active in discussions. It was like they could finally connect with the words they were learning." Similarly, Participant 6 remarked, "The students seemed more interested and motivated when they could see the vocabulary in action. The images made the learning experience more interactive, and they were eager to participate."
- **Motivation and retention.** Teachers emphasized that visuals helped bring abstract concepts to life, boosting participation and supporting long-term retention.

4.5.2. Challenges

Despite these benefits, teachers encountered obstacles when integrating AI-generated visuals into their lessons:

- **Technical issues.** Participant 2 explained, "The internet issues were a constant hurdle. Sometimes, the visuals wouldn't load in time, which disrupted the flow of the lesson."

- **Learning curve.** Participant 4 reflected, "I felt overwhelmed at first by all the features of the tool. It took a while to get used to, and there were moments when I wasn't sure if I was using it effectively."

These findings indicate that while Gencraft AI enriched vocabulary instruction and promoted engagement, technical difficulties and initial tool complexity posed notable barriers to smooth implementation.

To further explore these findings, keyword and theme frequency analysis was conducted across interview and classroom observation data (Table 3).

Table 3
Word Frequency and Visual Representation

Word/Theme	Frequency	Context
Visuals	45	Central to the discussions on pedagogy and engagement.
Engagement	35	Related to the increase in student participation.
Vocabulary	30	Tied to the focus on vocabulary learning and retention.
Motivation	28	Associated with increased student interest and drive.
Adaptation	22	Describes how teachers adjusted their teaching methods.
Technical Issues	18	Refers to the challenges teachers faced in integrating technology.
Retention	15	Connected to the long-term impact of visuals on vocabulary recall.
Confidence	12	Describes the increased teacher confidence post-implementation.

As displayed in Table 3, the terms visuals (n = 45), engagement (n = 35), and vocabulary (n = 30) appeared most frequently, underscoring their central role in the success of the intervention. Other recurring words included motivation (n = 28), adaptation (n = 22), and technical issues (n = 18), reflecting both the benefits and challenges associated with AI integration.

4.6. Integration of Quantitative and Qualitative Findings

The integration of quantitative and qualitative findings demonstrated that the use of Gencraft AI-generated visual aids had a significant and positive impact on vocabulary instruction. Both data sets revealed improvements in student engagement, creativity, and vocabulary recall. Teachers noted that the tool offered an efficient and adaptable way to teach vocabulary, enabling students to learn and retain new words more effectively. While some technical challenges and a learning curve were noted, the overall effect remained positive, with students showing increased motivation, participation, and

engagement.The integration of findings from both qualitative and quantitative data directly addresses the research questions as follows:

RQ1: Student Engagement and Classroom Interaction. Both strands of data indicated a substantial increase in student engagement and interaction. AI-generated visuals encouraged more active vocabulary learning, supporting quantitative results that showed gains in participation and creative expression.

RQ2: Learning Outcomes. AI-generated visuals positively influenced vocabulary acquisition and retention. Students demonstrated stronger comprehension, application, and long-term recall of vocabulary, with quantitative data confirming significant improvements in retention and understanding, and qualitative data emphasizing contextualized learning through visuals.

RQ3: Teacher Experience and Success. Teacher experience emerged as an important factor. Moderately experienced teachers (3–4 years) reported the greatest success in fostering student creativity and vocabulary retention. Teachers across varying levels of experience benefited, though some technical challenges were more pronounced among highly experienced teachers.

RQ4: Pedagogical Adaptation. Teachers adapted their lesson delivery strategies by incorporating AI-generated visuals, which enhanced student engagement and participation. Qualitative accounts of teaching flexibility aligned with quantitative findings showing significant improvements in class participation.

RQ5: Technology Integration. Both data sets highlighted that AI visuals enhanced teaching adaptability but introduced challenges. Teachers adapted quickly, yet technical problems and tool complexity were recurring barriers. Quantitative findings showed improvements in learning habits and student mood, while qualitative data revealed the difficulties associated with technology integration.

Taken together, the findings indicate that Gencraft AI positively influences vocabulary lesson delivery by enhancing student engagement, creativity, and retention. Despite initial technical challenges, teachers were able to successfully integrate AI into lessons, resulting in more effective and engaging vocabulary instruction. Overall, the use of Gencraft AI contributed to more effective and engaging vocabulary instruction. Finally, the triangulation of interviews, observations, and questionnaire data strengthened

the study's validity. Each method supported and extended the others, reinforcing the conclusion that Gencraft AI had a meaningful and positive impact on both teaching practices and student learning outcomes.

5. Discussion

This study explored the EFL instructors' application of Gencraft AI visual content generator in teaching pre-intermediate junior learners' English vocabulary, and it produced significant results on teaching delivery, students' motivation, and vocabulary acquisition. Teachers reported significant improvements in lesson delivery, with class activity metrics showing a significant increase from moderate to high levels on the five-point scale. Almost all teachers adapted positively to the tool, emphasizing that AI-generated visuals enhanced their ability to present abstract concepts, reducing cognitive load and fostering dynamic classroom interactions.

However, there were problems during implementation. Teachers spoke of enhancements in visual narrative and instructing abstract vocabulary, with classroom collaboration showing a considerable increase. Technical problems, however, were common, particularly among teachers with more than seven years of experience. Those with three to four years of experience had a higher learning curve, with many explaining that adjusting lesson plans to accommodate AI took more time and effort. Exceptional improvement in student engagement was recorded. Voluntary participation nearly doubled, creative expression more than doubled, and student mood rose significantly, shifting from relatively low to consistently high on the five-point scale. The rates of peer interaction also more than doubled, reflecting that the images generated by AI improved cooperative learning and discussion.

Learning vocabulary also saw substantial gains. One-week retention jumped by more than half, and immediate recall rose from moderate to very high levels. Use of new vocabulary in context increased markedly, and creative vocabulary use showed a substantial improvement, rising from limited to strong levels of application. These results indicate AI's role in reinforcing vocabulary learning and long-term recall.

These findings align with established theories on the efficacy of visual tools and AI-enabled tools in language learning. Mayer's (2009) Multimedia Learning Theory suggests that combining verbal and visual elements enhances cognitive processing, which is supported by these findings on vocabulary retention. However, while Mayer (2009) emphasized the importance of reducing cognitive load, our results also suggest that balancing AI-generated visuals with appropriate teacher guidance is crucial for maximizing learning

outcomes. Furthermore, Plass et al. (2003) conducted a study on the motivational value of multimedia tools, and it was validated through enhanced engagement levels observed in the study, where students' voluntary participation increased significantly.

In addition to these frameworks, this study challenges the assumption that AI's role is universally positive. While the findings support Luckin et al.'s (2016) assertion about AI's increasing role in classrooms, the practical challenges experienced by teachers, particularly those with more than seven years of experience, highlight the need for further training and support. This finding suggests that while AI-generated visuals can enhance learning experiences, teacher readiness and the technical infrastructure remain significant factors for successful implementation. Recent research by Sun et al. (2023) highlighted similar challenges with AI tools, showing that a lack of familiarity with technology often impedes teachers' confidence and adoption. Such infrastructure challenges have also been emphasized by Liu et al. (2024), who argued that inadequate infrastructure remains one of the key barriers to effective AI adoption in diverse educational settings.

This study also critically engages with the framework of AI in education, acknowledging that while AI has the potential to improve vocabulary learning, there are contradictory findings in the literature. For instance, while some studies emphasize the effectiveness of AI tools in enhancing student engagement (e.g., Luckin et al., 2016), others (such as Jose et al., 2024) report that reliance on visual aids can result in shallow learning if students prioritize entertainment over comprehension. Furthermore, technical problems and teacher struggles, particularly with teachers having more than seven years of experience, were more pronounced than initially anticipated.

Moreover, the integration of AI into classrooms must be critically examined. While the study shows that AI can improve vocabulary retention and engagement, it's important to recognize that success varies by teacher experience and the type of support available. Studies such as those by Tan et al. (2024) argued that teachers without proper training may find AI tools overwhelming and difficult to integrate effectively, further supporting our findings on the steep learning curve faced by some instructors. A more balanced view of AI in education calls for more nuanced discussion on both its potential and limitations.

However, this study also had new findings. The retention rates observed were higher than in typical visual aid research, suggesting that

content written by AI provides more cognitive support. However, recent studies by Zuo (2025) and Wang et al. (2023) have shown that while AI-generated content can enhance cognitive support, it may sometimes lead to cognitive overload when not properly managed. The study also showed significant gains in peer learning, which has not been explored before in other studies. In contrast, Jose et al. (2024) found that AI tools in peer learning contexts might reduce face-to-face interaction, which could limit social learning dynamics. Also, the degree of creative language application observed in this study was unprecedented, demonstrating that AI aids can facilitate innovative uses of language. Nevertheless, some scholars like Zhai et al. (2024) have expressed concerns that over-reliance on AI-generated content might stifle students' creativity by limiting their need to engage in manual problem-solving and content creation.

The unexpected finding was the similarity of post-implementation scores among teachers. Regardless of their initial comfort level with AI, all the teachers received similar scores, countering the assumption that technology implementation is more effective for technologically advanced teachers. This suggests that with appropriate training and support, teachers with different levels of experience can effectively use AI tools. The most significant improvement was in creative expression, which increased by two points. Teachers observed that learners began to use vocabulary creatively, for instance, in narrating stories, role-playing, and creative writing, which showed more engagement with the language. Additionally, the study revealed a very positive shift towards peer learning, suggesting that visuals created by AI promoted more student engagement and cooperation. Contrarily, research by Anderson et al. (2001) highlighted that peer learning models can sometimes lead to groupthink, where students conform to dominant ideas without fully exploring diverse perspectives.

This study extends dual coding theory by showing that AI-generated content provides stronger cognitive support. It also puts aside technological adoption premises by showing evidence that language teachers of any experience can successfully apply AI tools via training. However, a contrasting viewpoint by Wu (2024) suggested that AI tools should be more gradually integrated into classrooms to allow for a more natural adoption process. For language instructors, the outcomes provide advice on integrating AI tools effectively, providing best practices such as starting with concrete words before transitioning into intangible concepts and including peer learning engagements.

This research contributes to AI-enhanced language learning by introducing AI-generated images as a novel pedagogical approach to vocabulary learning, significantly enhancing engagement, retention, and creativity. Wekerle et al. (2024) cautioned that the overuse of AI-generated visuals can lead to a passive learning environment if students become overly dependent on external tools. The research also provides evidence of the supportability of peer-to-peer interaction and collaborative learning by AI, aspects not well advanced in earlier research. The research also negates technology adoption myths by showing that teachers can effectively integrate AI tools if they receive proper training. Nevertheless, some studies like those by Lee and Kwan (2024) argued that teacher resistance and inadequate professional development remain significant challenges to the successful integration of AI tools in classrooms.

6. Conclusions and Implications

This study examined the effectiveness of Gencraft AI-generated visual content in teaching EFL vocabulary to pre-intermediate junior learners. The findings suggest that AI tools have the potential to positively impact instruction, student motivation, and vocabulary learning. The integration of Gencraft AI led to improvements in lesson presentation, class activity, and the ability to teach abstract concepts. AI-generated visuals were found to reduce cognitive load, fostering more interactive and participatory classroom environments. However, technical issues, particularly for older teachers, highlighted the need for better training, ongoing technical support, and seamless integration processes.

Despite these challenges, the findings indicate that AI tools could enhance the vocabulary learning process, but their impact depends heavily on teacher preparedness and infrastructure support. For educators and institutions, the study underscores the importance of providing targeted training programs that focus on practical AI applications in lesson planning and classroom management. Moreover, adequate infrastructure, including stable internet and accessible technical support, is critical to ensure the successful adoption of AI tools in teaching. Continuous professional development, such as workshops and peer learning groups, can further help teachers stay informed about emerging technologies and improve their comfort with using AI tools in their classrooms.

Although this research provides valuable insights into the use of AI-generated visuals in EFL teaching, several limitations should be considered

when interpreting the results. The small sample size of only eight teachers restricts the generalizability of the findings. While the results are promising, they should be viewed with caution, as a larger and more diverse sample would offer a more comprehensive understanding of AI's impact across different teaching contexts and learner demographics. Additionally, the study was conducted over a single semester, which may not fully capture the long-term effects of integrating AI tools into vocabulary instruction. Furthermore, the study was conducted in a single language institute, which may not fully represent the diversity of educational settings, such as public schools or online learning environments. Finally, technical limitations such as internet connectivity issues impacted the smooth implementation of AI tools. These limitations temper the conclusions drawn, as they suggest that while AI has potential benefits, its effectiveness may vary significantly based on contextual factors like infrastructure, teacher experience, and institutional support.

Future research should focus on involving a larger, more diverse sample of participants across different educational settings, such as public schools, online platforms, and multicultural classrooms, to evaluate how AI-generated visuals affect vocabulary learning in various contexts. A longitudinal study should assess whether the improvements in vocabulary retention and engagement persist beyond the initial phase, ideally extending over multiple academic years. Further studies should also investigate how AI-generated visuals impact different student groups, such as young learners, elderly students, and those with disabilities, and how AI tools can be used to support inclusive education, ensuring equal access to vocabulary learning for all demographics. Lastly, practical guidelines should be developed for implementing AI tools like Gencraft in schools with varying resources. Research should focus on creating best practices for overcoming technical challenges (e.g., internet connectivity) and ensuring effective teacher training. This will help make AI-based vocabulary instruction more accessible and affordable for schools with limited infrastructure.

In conclusion, the study highlights the potential of AI-generated imagery in EFL vocabulary learning but emphasizes that the findings should be interpreted with caution due to the small scale and context-specific nature of the research. While technical hindrances and teacher training remain ongoing issues, AI tools have the potential to revolutionize language learning by facilitating students' engagement, retention, and creativity. This study lays the groundwork for further development in AI-driven language learning, but future research with larger, more diverse samples and across different learning environments is essential to determine whether these results can be generalized.

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