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Visual Language Learning: Exploring the Effects of Artificial Intelligence-Generated Animations on Vocabulary and Motivational Growth

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Abstract

This study aimed to utilise artificial intelligence (AI) tools to create animations to assess the impact of AI-created cartoons on vocabulary growth and motivation levels among learners. For this purpose, 80 Omani EFL learners with a pre-intermediate level of English proficiency were randomly assigned to an experimental and a control group, each with the same number of students. To collect the data, the Updated Vocabulary Level Test was used as a vocabulary measure, and a motivation questionnaire was administered to the experimental group. The study's findings revealed that both groups made progress in vocabulary, with the experimental group showing significantly more improvements in the post-test than the control group; the control group's counterparts did not show significant improvements in vocabulary acquisition. Additionally, a detailed analysis of the motivation questionnaire revealed a substantial increase in the motivation level of students who used AI tools to create animations for vocabulary learning. Teachers, students, and institutions can apply the study's results.

Keywords: Animation; vocabulary growth; increased motivation.

Introduction

Acquiring vocabulary is a crucial component of second language (L2) study, since it enhances L2 hearing, speaking, reading, and writing skills (Gorjian et al., 2011). A comprehensive understanding of

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Data Availability Statement: *All relevant data are within this paper.*

a word encompasses various aspects, including its pronunciation, spelling, morphological characteristics, and grammatical properties, as well as the recognition of its diverse interpretations across contexts, which is associated with an awareness of the intricate and interconnected information conveyed by that word. Because of the complexity of comprehending terminology (Schmitt, 2014), vocabulary acquisition is one of the most challenging endeavours learners face in their language studies, particularly with limited classroom time and minimal L2 exposure beyond the classroom. Predictably, vocabulary acquisition frequently falls short of expectations for those learning English as a second or foreign language, and the consequences of insufficient vocabulary proficiency may diminish students' motivation to learn (Gibson, 2016).

Nation (2001) argues that vocabulary knowledge and learning play a significant role in competence and language use, making the learning of vocabulary very critical. In addition, Thornbury (2002) notes that English vocabulary is a problematic issue for non-native English speakers. Such difficulties can lead to low academic performance in various subjects related to the language. The challenges that students face include pronunciation, spelling, word length and complexity, grammar, meaning, range, connotation, and idiomaticity. In addition, as noted by Schmitt (2000), these processes in vocabulary acquisition are somewhat unclear, although it is definite that words are not learned randomly. Moreover, according to Schmitt (2000), aside from knowing the meaning of words or their conceptual contents and how they relate to other ideas and words, mastery of vocabulary requires students to be conversant with word forms, which includes pronunciation, spelling, and correct grammatical use. According to Salam and Nurnisa (2020), all students should be able to employ specific learning techniques to achieve better vocabulary learning. In this case, it appears that the most effective way to achieve mastery in vocabulary is to utilise creative approaches, such as incorporating semantic and situational clues.

Harmer (2007), and Behforouz and Frumuselu (2021) believed that teachers found available technological instruments, such as generative artificial intelligence (AI) tools and web-based assessments (Choi et al., 2025; Dilani, 2025), to be helpful in supporting the strategies and methods they use in the teaching process. Teachers can use materials such as audiovisual tools and movies as effective instruments to engage their students in the vocabulary learning process (Al Ghaithi et al., 2024, 2025). Taj et al. (2017) stated that multiglossed and multimodal representation of vocabulary could be helpful for vocabulary growth. Hirschel and Fritz (2013) found that learners demonstrated higher levels of vocabulary acquisition when learning through the use of technology compared with those taught by conventional methods, such as pen and paper. The advantage of learning vocabulary with the help of technology depends on the possibility of practising and using media to support vocabulary understanding, whether in or out of context, through videos, images, audio, and through first language support (Yu & Trainin, 2022). The use of animated video material in teaching is more effective and economical, resulting in a deeper understanding of the curriculum.

Video animation can stimulate students' interest in the learning process, enhancing their learning performance by capturing their thoughts, issues, feelings, and abilities (Sari et al., 2017). The use of animation in learning enables students to perform better and achieve the objectives of their studies (Khamzawi et al., 2015). Media are necessary to increase the activity of learning English words; simply relying on notes and descriptions is not enough. The learners require concrete and explicit materials that will help them memorise the words they are learning. Teaching vocabulary using video animation helps instructors make it easier for students to understand the meanings. Animations are particularly beneficial for students, as they are associated with increased motivation through reduced cognitive load and engaging, visually rich learning experiences (Tugtekin & Dursun, 2022). When visual aids are used, such as animations based on dynamic material, they help support prolonged attention and greater overall cognitive activity, which are vital in the process of efficient language acquisition (Liu

& Elms, 2019; Barut Tugtekin & Dursun, 2022). Interactive films are also an additional instructional tool that can support motivation and aid in the effective management of cognitive load (Sukiyasa & Sukoco, 2013). Moreover, it is assumed that content presented in a visually unique manner stimulates students' interest in high technology (Alessi & Trollip, 2000; Qaddumi et al., 2021). According to Rohendi (2012, as cited in Tambak et al., 2025), students who were taught through animated programming tutorials became more passionate and achieved better results compared with those taught through traditional approaches. This means that there is a good chance to increase motivation through innovative media. Tambak et al. (2025) demonstrated that video media (animations) contribute to increased student interest, making them more attentive and focused on the learning process. Students show more passion and motivation when the information was presented graphically and interactively.

Although it can be explicitly stated that vocabulary plays a vital role in language learning, and animations have their potential for vocabulary growth, there are still some gaps in understanding the best way to implement these techniques to achieve better results. Therefore, further studies are necessary to determine the optimal exposure time and sequences for the vocabulary learning process, as well as the methods to integrate animation-enhanced vocabulary learning (Siregar et al., 2021). Recently, it has been noticed that Oman is prioritising the integration of educational technology, especially AI, in its higher education system. Despite this national initiative, the use of such AI tools in the learning process, as well as their effect on the vocabulary and motivational level of Omani learners, remains insufficiently examined and lacks empirical validation. Previous studies have examined the impact of traditional animations on vocabulary learning and motivation in various settings; however, there has yet to be a dedicated investigation into the utilization of AI-generated animated content within the Omani English as a foreign language (EFL) environment. Therefore, this study aimed to investigate the impact of AI-generated cartoons created by the students on vocabulary acquisition and learners' motivation. This study uses AI-driven technology to create tailored and contextually relevant cartoons that cater to learners' linguistic and cultural needs, diverging from prior studies that relied on pre-existing animated films. This study experimentally investigated the effectiveness of animated AI tools to provide language instructors, curriculum designers, and policymakers with ideas to enhance students' engagement and vocabulary retention in the EFL classroom. By addressing this gap, the findings are expected to improve teaching methods and support national efforts to integrate AI into higher education in Oman. Therefore, the following questions will be addressed in this research study.

1. To what extent does the use of AI-generated animations affect the vocabulary acquisition of pre-intermediate Omani EFL learners?
2. How does the integration of AI-generated animations influence the motivation level of pre-intermediate Omani EFL learners?

Literature Review

The Effect of Animation on Vocabulary Learning

The power of animated movies as a tool for enhancing English vocabulary acquisition in various educational institutions has been repeatedly demonstrated in recent studies. Younas and Dong (2024) examined the effectiveness of using animated films in enhancing English vocabulary learning among students in a Pakistani college. A total of 64 12th-grade students were used in that study. The control group underwent evaluation through a pre-test and post-test, whereas the treatment group received instruction on the exact words using an animated movie. The findings revealed statistically significant differences in vocabulary scores, with the treatment group performing considerably better. The scholars established that animated movies significantly promote vocabulary acquisition and should be integrated into English language studies. The study's strength lies in its controlled

treatment design, which provides statistical evidence of effectiveness. However, the focus on a four-week short intervention and college-level students may limit its applicability to other age groups and learning platforms.

Similarly, a study by Wijaya and Sutopo (2024) examined the effectiveness of animated films in vocabulary acquisition among junior high school students in Indonesia. The study population consisted of 31 students. A descriptive research design and qualitative research approach were used to collect data in their study. The results showed that students believed that animated movies helped them learn and remember new words, as animations offered language in interesting conversations and memorable story circumstances. About 85% of students agreed that animations helped them learn new words, and 70% stated that the movies' visual and contextual reinforcement helped them remember the words better. The animated content's dynamic and enjoyable qualities increased motivation and active participation, which helped people learn and remember language better. The findings also demonstrated a significant growth of the students' vocabulary, considering the overall scores, since some of them improved after watching an animated film called *The Monkey and the Crocodile*. Besides being more enthusiastic and actively involved in class activities, the students became more confident in using their vocabulary. This study found that video animation enhanced students' vocabulary learning. The study's main strength lies in its thorough mixed-methods approach, combining quantitative and qualitative data collection methods. Its drawbacks, however, are the small sample size resulting from the engagement of only one school and the short study period of exposure to animated films, which does not allow the study to be generalised and its long-term pedagogical impact to be accurately estimated.

Building on these findings, Minalla (2024) investigated how contextualised animated films can impact the acquisition of vocabulary among young EFL learners. The research involved 20 Sudanese students, with a control study group based on exclusive context-based learning and an experimental study that combined animated movies with context-based learning. The experimental group watched short videos that were made just for this study to teach them linguistic items. Using real-life examples and the speech patterns of native speakers to explain the meanings of new vocabulary words is an example of context-based learning. The results of the statistical analysis showed that the experimental group significantly outperformed the control group, particularly in vocabulary learning. The experimental group had a higher average score than the control group. The study's results indicate that animated movies enhance vocabulary acquisition and increase engagement and motivation among young learners, making them a potentially valuable tool for early language learning. The strength of the study lies in its well-designed experiment and clear statistical support of significant vocabulary gains, but the limitations of the study are the small number of participants involved in the study (20 participants) and the relatively short period of treatment, restricting the implications and application of the research to larger populations and the assessment of long-term learning outcomes.

In another study, Ningsi and Tambusai (2023) investigated how English vocabulary can be acquired through YouTube animated films. In this quantitative study, 58 students were divided into two groups: The experimental and control groups, where either animated movies or traditional techniques were used. The findings showed a significant improvement in the experimental group compared with a minor gain in the control group. The study found that animated films significantly contributed to vocabulary learning through the inclusion of real-life content, which helped students identify and correctly use the English language, and also increased their motivation. The study featured a strong experimental design, which clearly demonstrated the statistical significance and its potential applications in the real world, particularly in the context of YouTube services. However, the study's small sample size and focus on high school students are its limitations.

Animation and Motivation

In a study by Rashid et al. (2024), the impact of animation as an innovative teaching technique was investigated using 170 students divided into two groups, focusing on attention, motivation, retention, and reproduction. The control group followed the traditional learning style, whereas the experimental group learned through animation. The study's findings revealed that the experimental group performed significantly better than the control group in all criteria, particularly in terms of motivation and engagement. Animation engages and captivates students' attention more efficiently than conventional static teaching methods or textual materials. The dynamic quality of animation captivates students' senses, stimulates their curiosity, and enhances the learning experience. Animation enhances students' engagement in replicating acquired behaviours, leading to improved learning outcomes. The dynamic aspect of animation stimulates students' curiosity, engagement, and participation in the curriculum, leading to improved academic performance and accomplishments. The study's strength lay in its solid theoretical basis and thorough analysis of the factors that affect learning. However, focusing on young learners made the generalisation process challenging.

Al-Khalidi et al. (2022) investigated Plotagon as a three-dimensional animation tool to help 70 Omani undergraduate learners in EFL classes stay interested and motivated. The results found that Plotagon significantly increased students' interest and engagement in both physical and online EFL learning settings. Most of the participants reported that the animation tool made learning more enjoyable, reduced their fear of speaking, increased their willingness to engage in conversation, and boosted their confidence. The study confirmed that Plotagon is a suitable environment for language learning activities, as it motivates students to be more interested and engaged. The study's strength lies in its use of Plotagon, a well-known digital tool for learning EFL, which is not often employed in teaching English as a second language (TESOL) settings, especially in the Arabian Gulf region. However, its main flaw is that it relied solely on a subjective assessment of perception and failed to consider the actual effects of learning a language or improving performance.

In a relevant study, Indriani et al. (2023) investigated the effectiveness of Powtoon (an animated video) as a digital learning tool in academic writing courses for 37 students of the English Department at a Jakarta-based institution. The utilisation of animated movies provided by Powtoon enhances the appeal of the students' learning process. The features encompass text, music, animation, characters, and audiovisual elements. The lecturer's concise and lucid explanation of the Powtoon animated film significantly aids students in comprehending the content presented. Powtoon media enhance the teacher's subject delivery, facilitating students' comprehension and thereby elevating their motivation to learn. The findings reflected that the students held positive attitudes towards Powtoon, and 60% of the respondents concurred that Powtoon also increased their engagement in online and face-to-face classroom activities. Students reported that they developed a higher interest in learning English writing through the use of captivating animations (83.8%). The study concluded that Powtoon is an effective tool that motivates students and increases their engagement level; however, it should be used as a supplement to instructors' explanations rather than a replacement for them. A mixed-methods study design can be viewed as a strength of the study, as it combines the results of the quantitative approach with those of the qualitative approach to provide a more in-depth understanding of the experiences and difficulties that students face. Nevertheless, the small sample size of 37 students from one university limits the generalisability of the conclusion to other academic settings.

Kleftodimos (2024) reviewed the effects of teacher-created animations on students' engagement and motivation by assessing 77 publications and conducting interviews with educators who had created their own animations. The outcomes demonstrate that the animations created by teachers have a significant impact on students' motivation and engagement, highlighting the benefits of using custom animations in

the educational environment. Therefore, it is necessary to incorporate instructor-generated autonomous content into pedagogical practices in animated form to foster a more participatory and interactive educational environment. The comprehensive nature of the dual approach is a key strength of the study, as it combined a systematic literature review with practical experiences. This approach offers both theoretical insights and practical implications for various applied areas within any educational sphere. However, it has several weaknesses, namely a limited number of examined sources, as only two databases were used, and an insufficient sample of teacher creators, which may limit the research scope of the literature review and the applicability of the practical results to other educational settings.

Methodology

Participants

In this study, the sample population consisted of 80 Omani EFL learners who were at the pre-intermediate English proficiency level, as determined by the university's placement test. The students had an age range of 18 to 21 years, and Arabic was their native language. These students were selected from the Foundation Department and randomly assigned to two groups: an experimental group and a control group, each comprising 40 students. Since there was no age or gender control, students of various ages and genders were combined.

Oman's national curriculum requires students to finish one to two academic years of the General Foundation Program. In Oman, every student who wishes to attend university is required to participate in the program. In this program, learners study various subjects, including English, maths, and information technology, before entering specialised departments. English is the primary language used for instruction.

Instruments

Updated Vocabulary Level Test

The Updated Vocabulary Level Test (UVLT) was used to collect data on the vocabulary knowledge of the students in this study, serving as both a pre-test and a post-test. Webb et al. (2017) developed the UVLT for the first time and thoroughly tested it. There were five levels of word frequency used in this test: 1000, 2000, 3000, 4000, and 5000. Users can administer this test to all participants at once or divide it according to their ability levels. There are 10 groups in the lexicon, and each group has 6 words. There are three main words and three supplementary terms in each cluster. In addition, each level has three definitions. The people taking the test are told to put a check mark (✓) by the sentence that matches its meaning. The UVLT is scored by giving 1 point for each word that is correctly confirmed, with a maximum score of 150 points. Figure 1 below shows a part of the UVLT.

Before the main round of the study, the questionnaire was translated into Arabic, and a pilot study was caried out with 40 Omani EFL learners who had similar levels of English ability. This test has a

	eye	father	night	van	voice	year
body part that sees						
parent who is a man						
part of the day with no sun						

Figure 1 *Part of the UVLT (Webb et al., 2017).*

Cronbach's alpha coefficient of 0.850, indicating reliability. Cronbach's alpha measures the degree to which the test items are inter-related, indicating the instrument's overall reliability. Generally, numbers below 0.6 indicate moderate reliability, scores between 0.6 and 0.7 demonstrate good consistency, values between 0.7 and 0.8 indicate high reliability, and coefficients above 0.8 indicate strong to remarkable internal consistency. Additionally, two Omani reviewers with a PhD in Applied Linguistics, each with 15 years of teaching experience, examined the UVLT items to ensure their authenticity and that the test was a reliable measure of receptive vocabulary knowledge. This study defined authenticity as the extent to which lexical items authentically reflected real-life English usage and effectively assessed learners' understanding of word meanings rather than their production. The assessors checked to ensure the test items fell within the 1000–5000-word frequency ranges, verified their semantic accuracy, and confirmed that the words were contextually appropriate and frequently used. The test structure aligned with its intended purpose of assessing receptive vocabulary knowledge, hence enhancing the content validity and reliability of the instrument.

Table 1 *The Reliability Index of the UVLT*

Tests	Number of items	Cronbach's alpha
UVLT	150	0.850

Vocabulary Package

The 10 words for each week were selected from the *English for the 21st Century* textbook. The textbook covers various English skills: listening, reading, writing, and grammar. This book serves as the foundational text for the university's pre-intermediate-level students during their regular training within the Foundation Program introduced by the college. Additionally, the book covers each word's category, including a good mix of nouns, verbs, adjectives, and adverbs, to demonstrate how real language is used, as well as exercises to practice these concepts. There was no official assessment to measure the vocabulary knowledge of students for these words, but the book serves as the main source of regular training for students covered during the academic semester. The nature of these books is to improve the students' general English knowledge and prepare them for their midterm and final examinations. The vocabulary-related exercises within the textbook were limited to either matching the words with their definitions or fill-in-the-blank activities. Furthermore, to provide students with additional vocabulary exercises, the teacher utilised in-house materials to practice the 10 words in the classroom, including multiple-choice questions, synonym and antonym matching exercises, and cloze exercises. Since the nature of these exercises was to expose the students to a greater number of learning activities, there was no formal scoring of these activities. However, the teacher provided the answers to the exercises, along with explanations, to the students in class, and the learners were responsible for matching the feedback to their results. The 10 words were selected from the various units of the book, I which each unit covers a specific theme. The textbook was the primary source of vocabulary learning, although Webb et al.'s (2017) UVLT also validated that the chosen vocabulary was appropriate and frequently used. The UVLT's frequency bands, ranging from 1000 to 5000 words, ensured that the selected items were at the proper level for the learners, making it possible to measure their receptive vocabulary knowledge accurately.

Motivation Scale

The researcher adapted the motivation scale from a study by Tugtekin and Dursun (2022) in the Turkish context. The survey includes 14 different themes. The Likert scale has five choices: (1) strongly disagree, (2) disagree, (3) undecided, (4) agree, and (5) strongly agree. A pilot research study with

35 participants used the test–retest approach to assess the reliability of the survey. The motivation scale measures the learners' situational motivation toward the AI-generated animation materials deployed during the intervention. It examines if learners found the content interesting, engaging, and useful, and how these perceptions influenced their motivation to learn and readiness to interact with it. Item 10 ("This material contained interesting properties") measures how engaging and appealing the material was to learners. Other items, like Item 4 ("I enjoyed studying with this material") and Item 11 ("This material increased my desire to study"), measure enjoyment and increased motivation. These items together provide us an idea of how the resources affect students' attention, effort, and positive attitudes toward learning.

Tugtekin and Dursun (2022) reported a Cronbach's alpha value of 0.96 for the scales, indicating that the questionnaire was reliable. To ensure its proper use in the Arabic context, an Arabic translation of all statements was provided to students. Additionally, two Omani holders of PhDs in Applied Linguistics with over 5 years of teaching experience in the EFL context validated the adaptability and quality of the statements.

ChatGPT 4o

In this project, ChatGPT 4o was used to transform photographs that the learners sent in into artwork in the style of Studio Ghibli. Learners send the pictures to the AI model, which then uses those pictures to create art that mimics the style of Studio Ghibli movies, featuring soft colour palettes, natural surroundings, and humorous character designs. These AI-generated Ghibli-style pictures serve as the foundation for vocabulary learning activities. Students used the target vocabulary to describe, narrate, and create stories using the generated pictures.

Hedra AI

Hedra Character 3 is an AI-powered platform that transforms static Studio Ghibli-style images into dynamic video narratives. The application enables users to convert AI-generated artwork into animated sequences by integrating visual movements with synchronised speech synthesis. Users can upload Studio Ghibli-style images, add character dialogue, and utilise the platform's voice synthesis technology to create lifelike character voices. The resulting output consists of animated videos featuring characters that exhibit both visual movement and vocal expression, maintaining the distinctive Ghibli aesthetic while providing personalised narrative experiences through integrated audiovisual storytelling.

Procedure

The research was conducted over six weeks in the third semester of 2025, following approval from the university's ethics committee and after obtaining consent from all participants. One week before the treatment, all students in both groups took the same vocabulary pre-test to ensure homogeneity in their vocabulary knowledge. After dividing the learners into two groups, the experimental group learned the words via Studio Ghibli animation, whereas the control group learned vocabulary through traditional in-class training.

To facilitate collaboration on the Studio Ghibli animation movie, the experimental group was divided into eight subgroups, each comprising five students. Before the treatment, the experimental group underwent a rigorous two-day training programme, teaching them to utilise ChatGPT 4o for creating Studio Ghibli-style pictures and Hedra AI for making Studio Ghibli animated movies. Additionally, students received a comprehensive user manual that provided detailed instructions on creating images, writing dialogue, and animating videos. The researcher also established weekly calibration sessions

to address any technological issues that arose during practice. To ensure that everyone could use both AI systems without any problems, the students were provided with passwords and contact information for technical assistance. The researcher set up a Microsoft Teams space that included lecture materials, discussion rooms for students to collaborate, and polling tools to provide students with quick feedback on any technical issues. An in-depth orientation workshop was held for the teachers to make sure that the experimental methods were consistently followed. After the preparatory phase was over, both groups followed a standardised treatment plan for four weeks. By following the same routine every week, the validity of the research and the systematic exposure to the language were maintained.

The experimental group followed a regimented five-day cycle during Weeks 1–4, with each day having a specific goal. The researcher sent out 10 target vocabulary terms using Microsoft Teams on the first day of each week during the lesson. Each word came with a simple meaning and instructions on how to pronounce it. In their subgroups, students quickly began a 20-minute decision-making exercise, working together to identify word categories, create examples of how each word is used in context, and discuss the various meanings of the words. After that, the teacher led a 20-minute discussion with the whole class to review the definitions of the words and the examples that the groups had developed, and to cover the vocabulary exercise from the book. These were written down on the board so everyone could see them. The lesson concluded with an extra 20-minute vocabulary exercise, which included various question types such as multiple-choice (five questions), cloze tests (five questions), and synonym and antonym activities (five questions), to ensure that everyone understood what they had learned. The feedback on the students' responses was provided within this 20-minute period without rigorous monitoring, which gave the students more responsibility to match their answers with those provided by the teacher. At the end of Day 1, the researcher instructed the students to use ChatGPT 4o outside of class to create Studio Ghibli-style pictures and write conversations including all 10 target words. Students were required to submit their assignments via Microsoft Teams to receive feedback from their teacher.

There were no lessons on Day 2 for teaching the vocabulary, as this day was set aside for independent creative work. Outside of class, students worked together in small groups to write short dialogues that included all the target language words. Students completed this task in the university's computer lab. To keep things clear and focused, each dialogue was limited to 20–25 sentences. The subgroups also utilized ChatGPT 4o to create Studio Ghibli-style pictures to accompany their dialogue. To ensure the language was used correctly, each picture had to include a description of no more than two sentences, with at least one target word in each description. At the end of Day 2, all the completed dialogues and Studio Ghibli-style pictures were sent to Microsoft Teams for the instructors to review and provide comments on.

The only goals for the third day were to provide feedback and improve the dialogue. The teacher spent the entire 60-minute lesson providing detailed written and spoken comments on each group's speech and picture choices. Students were given specific suggestions on how to improve their use of terminology, enhance the flow of their conversation, and ensure that the images and words aligned. After the feedback session, the teacher instructed the students to revise their dialogue on the basis of the feedback and then submit the final versions for approval. At the end of Day 3, the researcher instructed the students to utilize Hedra AI outside of class to convert their approved dialogues and Studio Ghibli-style pictures into Studio Ghibli animated videos.

On the fourth day, Hedra AI was used to make Studio Ghibli animated videos. Outside of class, students worked together in their subgroups to make Studio Ghibli animated videos. Students made sure that the language and visual components were in sync. The researcher was available on Microsoft Teams for technical help and troubleshooting as needed. By the end of Day 4, it was expected that the subgroups would have completed their animations and be ready for their presentations.

The last day of each week was reserved for a presentation and a comprehensive evaluation. During the lesson, each subgroup gave a 10-minute presentation of a completed Studio Ghibli animated film. Following that, a 10-minute question and answer session took place, during which the teacher and other students asked questions to assess the students' understanding of the vocabulary, their ability to use it creatively, and their grasp of how to create an animation. The researcher used a university rubric to grade both language use and creative execution, ensuring consistency in evaluation across all groups and weeks. Figure 2 below shows examples of students' screenshots when using AI tools during the treatment period.

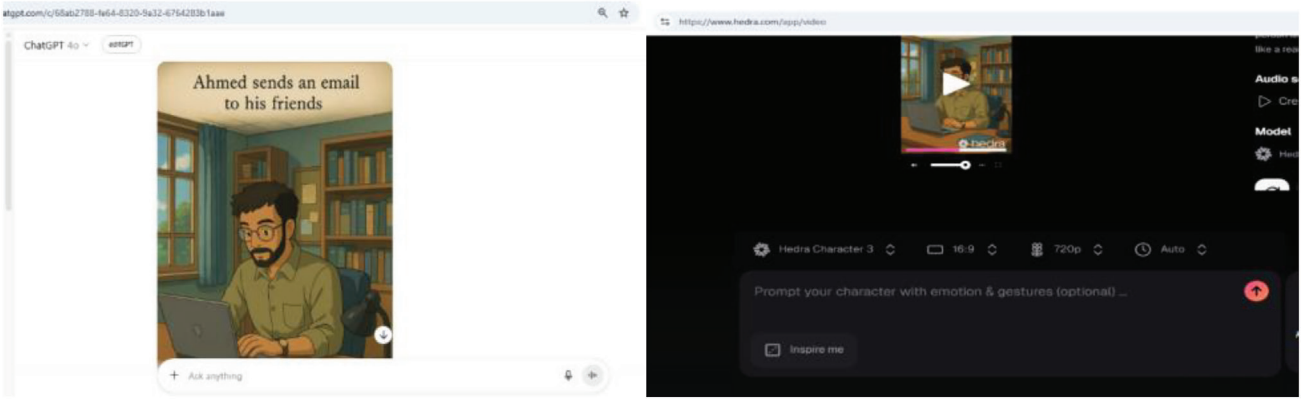

Figure 2 *The Sample Screenshots of using AI Tools to Create Animated Projects.*

The control group learned language traditionally, following approved teaching methods. The presentation–practice–production approach, a standard method for teaching language, was used to provide the control group with structured vocabulary instruction lasting 60 minutes. The words used to teach the experimental group were also used for the control group, drawn from the same textbooks and units. To ensure that identical materials were used in both groups, the same vocabulary exercises within the book were covered by the control group. Additionally, the extra activities provided by the teacher in the experimental group were also made available to the control group, with the exact same time duration. Similarly, the control group was divided into various subgroups that began a 20-minute brainstorming activity to identify parts of speech for the words, create examples of how each word is used in context, and discuss the several meanings of the words. After that, the teacher led a 20-minute discussion with the class to monitor the learners' engagement and responses, as well as to review the vocabulary exercise from the book. The words were written down on the board so everyone could see them. The lesson concluded with a 20-minute extra vocabulary exercise, which included various question types, such as multiple-choice questions (five questions), cloze tests (five questions), and synonym and antonym activities (five questions), to ensure that everyone understood what they had learned. This traditional strategy ensured that any improvements could be attributed to the treatment itself, rather than the time spent on it, by maintaining the same level of language exposure and practice opportunities as the treatment group without AI integration.

After the four-week treatment period, both groups of students took a vocabulary post-test under the same conditions to ensure that the results were genuine. The experimental group also completed validated motivation questionnaires to assess their emotional and behavioural responses to the treatment.

Data Analysis

This section is divided into two parts: a detailed analysis of all the relevant statistics for the UVLT pretest and post-test, and a thorough analysis of the motivation questionnaire completed by the experimental

group. JASP 0.19.3 and SPSS 27.0 were used for data analysis. Before conducting the statistical tests, it was essential to assess the normality of the data to select the appropriate test of comparison confidently. Table 2 below shows the results of descriptive analysis and the Shapiro–Wilk Normality Test.

Table 2 *Normality of the Data from the Pre-test and Post-test Results for Both Groups*

	Pre-test		Post-test	
	Control	Experimental	Control	Experimental
Valid	40	40	40	40
Mean	61.350	62.875	63.100	78.500
Standard deviation	8.094	7.456	7.993	7.345
Shapiro–Wilk	0.976	0.967	0.966	0.964
Shapiro–Wilk *p*-value	0.536	0.293	0.275	0.232

Table 2 shows that all datasets had a normal distribution, as indicated by *p*-values greater than 0.05. The Shapiro–Wilk values for the pre-test scores of the control group and the experimental group were 0.976 ($p = 0.536$) and 0.967 ($p = 0.293$), respectively. The values for the control group and the experimental group were 0.966 ($p = 0.275$) and 0.964 ($p = 0.232$), respectively. The results indicate that the assumption of normality was met across all groups and conditions. Consequently, a parametric analysis of variance test was used further to analyse the performance of students within and between groups. Table 3 below presents the results of a repeated-measures analysis of variance.

Table 3 *The Results of Within-group Analysis of Data from the Pre-test and Post-test Results for Both Groups*

Cases	Sphericity correction	Sum of squares	df	Mean square	*F*	*p*-value	η²p
Time	None	3018.906	1.000	3018.906	691.683	<0.001	0.899
Time × Group	None	1925.156	1.000	1925.156	441.086	<0.001	0.850
Residuals	None	340.437	78.000	4.365			

Table 3 shows that both groups started at around the same level, but only the experimental group had a significant improvement after the intervention. The control group showed a small increase in vocabulary, increasing from a mean of 61.35 (standard deviation (SD) = 8.09) on the pre-test to a mean of 63.10 (SD = 7.99) on the post-test. This indicates that they only showed a slight improvement after regular training. The experimental group performed significantly better, with their average score increasing from 62.88 (SD = 7.46) on the pre-test to 78.50 (SD = 7.35) on the post-test. This significant difference indicates that the intervention was effective in improving vocabulary knowledge. Additionally, it was revealed that time had a statistically significant main effect ($p < 0.001$), with a large effect size ($\eta^2_p = 0.899$), indicating that vocabulary improved in both groups. The next step was to compare the results of both groups together; Table 4 below shows this comparison.

Table 4 *Comparison of the Scores of the Two Groups on the Pre-test and Post-test*

Cases	Sum of squares	df	Mean square	*F*	*p*-value	η²p
Group	2864.556	1	2864.556	24.885	<0.001	0.242
Residuals	8978.637	78	115.111			

Table 4 clearly indicates that there were no significant differences between the two groups in the pre-test stage ($p = 0.767$). However, a significant difference was observed at the post-test stage ($p < 0.001$), with the experimental group achieving far higher marks than the control group. A statistically significant main effect for group ($p < 0.001$), with a moderate to large effect size ($\eta^2_p = 0.242$) indicates that students in the experimental group performed better than those in the control group. This result indicates that the type of training provided has a significant impact on overall vocabulary performance. However, the main effect of group alone does not reveal when or how the differences between the groups occurred; therefore, post-hoc comparisons are necessary, as shown in Table 5 below.

Table 5 *Post-hoc Analysis of Students' Scores on the Pre-test and Post-test for Both Groups*

		Mean difference	SE	df	*t*	*p*holm
Control, Level 1	Experimental, Level 1	–1.525	1.740	78	–0.876	0.767
	Control, Level 2	–1.750	0.467	78	–3.746	0.001
	Experimental, Level 2	–17.150	1.728	78	–9.923	<0.001
Experimental, Level 1	Control, Level 2	–0.225	1.728	78	–0.130	0.897
	Experimental, Level 2	–15.625	0.467	78	–33.447	<0.001
Control, Level 2	Experimental, Level 2	–15.400	1.716	78	–8.972	<0.001

*p*holm, Holm-adjusted *p*-value.

Table 5 presents Holm-adjusted *p*-values to examine the relationship between time and group more closely. At the pre-test stage, the comparisons revealed no significant difference between the control and experimental groups ($p = 0.767$). This means that both groups started with the same level of vocabulary knowledge. The experimental group performed significantly better than the control group at the post-test stage ($p < 0.001$), with a mean difference of 15.40 points. The post hoc results indicate that the intervention was the primary factor contributing to the significant improvement in the experimental group, and that the difference between the groups at the post-test phase did not suggest that one group had an advantage before the test. Table 6 below provides further details on the conversion of UVLT scores to estimated vocabulary size in the word families.

Table 6 *Conversion of UVLT Scores to Estimated Vocabulary Size Across the 1000–5000 Frequency Bands Using 75 Items*

Group	Mean pre-test score	Estimated pre-test vocabulary size (word families)	Mean post-test score	Estimated post-test vocabulary size (word families)	Approximate frequency band reached
Experimental	62.88	≈ 4192	78.50	≈ 5233	5000
Control	61.35	≈ 4090	63.10	≈ 4207	4000

Table 6 shows a significant difference in the improvement in vocabulary between the experimental and control groups. The experimental group's average score on the pre-test was 62.88, indicating that they likely had a vocabulary size of approximately 4192 word families. After the intervention, the average post-test score increased dramatically to 78.50, indicating that the receptive vocabulary size was approximately 5233 word families. The notable rise of approximately 1041 word families indicates that the use of AI-generated animations significantly improved vocabulary acquisition. On the other hand, the control group saw only a slight improvement. Their average score on the pre-test was 61.35 (about 4090 word families), and their average score on the post-test increased slightly to 63.10 (about 4207 word families). This means that their vocabulary improved by around 117 word families. These

findings show that the experimental group moved from the 4000-word frequency band to almost mastering 5000 high-frequency word families. The control group, on the other hand, mostly stayed in the 4000-frequency region. This clearly demonstrates the effectiveness of using AI-generated cartoons to enhance students' receptive vocabulary knowledge compared with traditional teaching methods.

The second part of the data analysis involves comparing the motivational levels of students in the experimental group before and after the treatment. Therefore, a thorough statement-by-statement and analysis of the items was conducted using the paired samples *t*-test, and the results are presented in Table 7 below.

Table 7 *Comparison of Pre-test and Post-test Answers to the Motivation Questionnaire within the Experimental Group*

Measure 1	Measure 2	t	df	*p*-value	Cohen's *d*	Standard error Cohen's *d*
Pre_Q1	Post_Q1	–14.581	39	<0.001	–2.305	0.393
Pre_Q2	Post_Q2	–16.548	39	<0.001	–2.616	0.472
Pre_Q3	Post_Q3	–17.211	39	<0.001	–2.721	0.462
Pre_Q4	Post_Q4	–16.237	39	<0.001	–2.567	0.439
Pre_Q5	Post_Q5	–19.353	39	<0.001	–3.060	0.520
Pre_Q6	Post_Q6	–16.920	39	<0.001	–2.675	0.458
Pre_Q7	Post_Q7	–13.629	39	<0.001	–2.155	0.464
Pre_Q8	Post_Q8	–17.455	39	<0.001	–2.760	0.470
Pre_Q9	Post_Q9	–16.013	39	<0.001	–2.532	0.467
Pre_Q10	Post_Q10	–18.268	39	<0.001	–2.888	0.509
Pre_Q11	Post_Q11	–20.582	39	<0.001	–3.254	0.503
Pre_Q12	Post_Q12	–16.810	39	<0.001	–2.658	0.446
Pre_Q13	Post_Q13	–14.866	39	<0.001	–2.351	0.486
Pre_Q14	Post_Q14	–16.298	39	<0.001	–2.577	0.444

Table 7 shows that all 14 items on the motivation questionnaire improved significantly after the intervention, with all *p*-values being less than 0.001. The effect sizes, measured by Cohen's *d*, ranged from –2.155 to –3.254, indicating that the impacts were quite significant in real-life applications. Students were significantly more interested in the material (Q5, $d = -3.060$), more likely to use these kinds of resources for challenging courses (Q11, $d = -3.254$), and more confident that they could succeed (Q13, $d = -2.351$). The results show that the instructional content significantly boosted students' motivation by making them feel more useful, engaged, and capable, which supports its effectiveness in creating a more motivated learning environment. To gain a better understanding of the statements that motivated students more, a descriptive analysis of the items is provided in Table 8 below.

Table 8 showed that participants generally liked the learning material, with mean scores consistently above 4.3 out of 5 for all items. Q10, Q13, and Q8 earned the highest mean scores out of the 14 items. Item 10 ("This material had interesting properties") and Item 13 ("I put in less effort studying with this material") both had the highest mean score of 4.600 (SD = 0.496). This means that participants found the information both interesting and easy to understand. These answers indicate that the learners were pleased with the content, as it was interesting and helped alleviate their mental burden. Item 8, which said, "This material has increased my belief that I can be successful," had the third-highest mean score of 4.575 (SD = 0.501). This indicates that the content significantly enhanced learners' self-efficacy and confidence in their academic performance. On the other hand, Items Q1, Q6, and Q9

Table 8 *Descriptive Analysis of Motivation Questionnaire*

	N	Mean	SD	SE	Coefficient of variation
Post_Q1	40	4.300	0.464	0.073	0.108
Post_Q2	40	4.475	0.506	0.080	0.113
Post_Q3	40	4.525	0.506	0.080	0.112
Post_Q4	40	4.450	0.504	0.080	0.113
Post_Q5	40	4.525	0.506	0.080	0.112
Post_Q6	40	4.300	0.464	0.073	0.108
Post_Q7	40	4.425	0.501	0.079	0.113
Post_Q8	40	4.575	0.501	0.079	0.109
Post_Q9	40	4.400	0.496	0.078	0.113
Post_Q10	40	4.600	0.496	0.078	0.108
Post_Q11	40	4.475	0.506	0.080	0.113
Post_Q12	40	4.425	0.501	0.079	0.113
Post_Q13	40	4.600	0.496	0.078	0.108
Post_Q14	40	4.500	0.506	0.080	0.113

had the lowest mean scores, although they were still high overall. The average score for Item 1 ("I studied with this material easier than I expected") and Item 6 ("This material allowed me to focus on the topic") was 4.300 (SD = 0.464). The average score for Item 9 ("I prefer to study with such materials on complex topics") was 4.400 (SD = 0.496). The somewhat lower means indicate that, although most students liked the subject, some may have had difficulty understanding or staying focused. The lower score for Item 9 suggests that the knowledge was generally applicable, but it may not have been as evident how it applied to more complex topics. However, the slight difference in mean scores and the low coefficients of variation between questions indicate that the content consistently raised people's motivation.

Discussion

This paper aimed to measure two key objectives by having students create animations and examining the impact on vocabulary improvement among English language learners and on their motivational levels. Therefore, 80 Omani EFL learners were randomly divided into a control group, which participated in in-class training sessions, and an experimental group, which used Hedra AI and ChatGPT 4o, in addition to class training. The analysis of the vocabulary size test revealed little to negligible progress in vocabulary for the control group from the pre-test to the post-test; however, the experimental group showed a significant improvement in vocabulary by the post-test. Furthermore, investigation of the motivation questionnaire revealed that all students in the experimental group exhibited a significantly higher level of motivation. These results are associated with using accessible AI tools to create animations, which facilitates the learning process and enhances students' vocabulary knowledge, thereby increasing the motivational level.

The examination of the vocabulary size test for the experimental group revealed significant improvement from the pre-test to the post-test. This progress can be attributed to the use of AI tools, particularly ChatGPT 4o, which generated customised and contextually relevant animations specifically designed and by for the learners. These animations featured instances, conversations, and settings that were quite similar to what learners experienced every day and how well they spoke English. The AI-generated content helped students understand, remember, and use new words by putting them in

real-life situations and linking them to visual stories. The results of the motivation questionnaire showed that the participants in the experimental group were significantly more motivated than those in the control group. The AI-generated animations were engaging and dynamic, and the content was tailored to each user's needs. This made learning more enjoyable and promoted active participation.

On the other hand, the control group, which used only traditional in-class training, showed little to no improvement in vocabulary from the pre-test to the post-test. The lack of interactive, personalised information limited students' access to contextual examples and reduced opportunities for deep interaction with the language. As a result, their motivation levels were lower than usual, and their vocabulary advances were quite limited.

Several well-known learning theories may help explain the improvements reported in the experimental group. Using AI tools like Hedra AI and ChatGPT 4o to create animated content enhanced the learning experience by making it more multimodal, aligning with dual coding theory (Paivio, 1986). This notion suggests that combining verbal and visual stimuli enhances memory and recall, thereby supporting vocabulary growth. Self-determination theory (Deci & Ryan, 1985) can also help explain why the experimental participants were more motivated. This theory emphasises the importance of autonomy, competence, and relatedness in developing intrinsic motivation. The interactive and personalised nature of AI-generated content probably strengthened these factors. Several students said that learning vocabulary through AI-generated cartoons increased their enthusiasm and involvement in the learning process. One student said, "I found the activities really interesting and wanted to learn more, especially because the animations made it easier to understand difficult words". Another student said, "I remembered the new words more easily because the animations helped me understand what they meant, and I didn't see it as rote memorization". One student said, "I enjoyed studying with these materials and wanted to keep watching them until I was done". Others said they were more motivated, with comments like, "This material made me more eager to study, and I prefer using similar resources for hard topics". Mayer's cognitive theory of multimedia learning (Mayer, 2005) suggests that well-designed multimedia resources help students build coherent mental models by actively selecting, organising, and integrating information from multiple sources. This supports the observed improvements in learning. On the other hand, the control group, which just used traditional in-class instruction without any new technology, made very little progress. This might be because traditional education does not involve students as much and is more passive. It does not provide the individualised feedback and multimodal help that AI-enhanced settings do, which makes it more challenging for students to remember words and stay motivated.

The results for the first objective of the study align with those reported by Ridha et al. (2022), who investigated the effectiveness of animated videos in enhancing English vocabulary acquisition among Iraqi students. They found that video animation enhances vocabulary acquisition among students. Similarly, Septiani et al. (2024) conducted a study to investigate whether developing animated learning videos would strengthen the process of vocabulary acquisition among EFL education students by including descriptions of personalities and idioms. The study's findings suggest that video animation enhances students' vocabulary learning by engaging them and facilitating the acquisition of material, ultimately supporting the effective development of vocabulary. Munawir et al. (2022) conducted a study to investigate whether animated films could be used to teach magic tricks. This might help second-year students learn new words. The results showed that the experimental group had a far better grasp of language than the control group after using animated films. Hikmah (2021) examined the effectiveness of animated movies in helping junior high school students learn new words. The study shows that using animated videos significantly enhances pupils' ability to learn new words, making the learning process more effective and enjoyable. Students said that this medium made them much more interested in studying, engaged, and happy to acquire new English words.

The results of the second goal of this study are similar to those of Khairuna and Ismahani's (2024) study, which investigated the impact of animation on helping people learn a language and stay motivated. The results suggest that integrating animations into English learning environments increases students' interest in studying and enhances their learning. Pujiani et al. (2022) conducted a study examining the effectiveness of using animated movies to teach English to young children, and the results found that animations were highly beneficial for young learners, motivating them to study more. Rachmavita (2020) conducted a literature study on the theoretical framework of student motivation and learning media. They found that interactive video animation can help keep students motivated as they learn. Laksmi et al. (2021) examined the effectiveness of animated movies in assisting preschoolers to learn English. The study found that young learners are eager to learn English, and using animated movies can help facilitate this process by making it more enjoyable and easier to grasp.

Conclusion

The current study measured the impact of animations on vocabulary improvements and the motivational level of EFL learners. The study's findings revealed that using animations can help learners improve their vocabulary knowledge, and the use of animations significantly increased the learners' motivational level. The results of this study provide some positive insights for language teachers, their students, and educational institutions.

For teachers, the results indicate that using animation-based technology to teach vocabulary in a visually interesting and contextually rich manner is more effective for learning and retention. Animated material makes learning more engaging and interactive for students, which increases their intrinsic motivation and keeps them interested in language tasks for a more extended period. Schools that utilise AI-supported technologies are in line with current educational trends, aid in digital transformation, and could enhance learning outcomes for a variety of student groups. This suggests that utilising readily accessible technology may enhance both students' interest and their academic achievement in EFL settings.

Although the study provided valuable information on the use of animations and their positive impacts in the learning process, it is not devoid of limitations. The short length of the intervention is a significant limitation, as it may not adequately demonstrate how animation-based learning affects vocabulary retention or long-term motivation over time. The sample consisted of 80 Omani EFL learners, which makes it challenging to apply the results to other populations or learning contexts. Another problem is that the study relied on self-reported motivation tests, which, though helpful, might be influenced by social desirability or personal interpretation. The study only examined vocabulary and motivation, omitting other language abilities such as reading comprehension and writing, which the use of animations may have influenced.

Future research should investigate extending the intervention period to examine how animation-based teaching impacts vocabulary retention and learner motivation over time. It may be possible to make the results more useful by including participants from diverse linguistic and educational backgrounds in the study. Future studies may also employ a mixed-methods approach, combining qualitative data from interviews or focus group discussions with quantitative data to gain a deeper understanding of the learners' feelings and thoughts. More research should investigate how animations affect other areas of language acquisition, such as grammar, reading comprehension, and writing fluency. Ultimately, understanding how various animation forms function, such as two-dimensional, three-dimensional, and interactive formats, can offer language teachers and instructional designers' valuable insights.

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