The Effect of Multimedia on Vocabulary Learning and Retention

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Abstract

Acquiring vocabulary is essential for learning a foreign language. Comparing multimedia approaches that combine text, graphics, audio, and video with standard text-only methods may improve vocabulary learning. The impact of multimedia on vocabulary learning and retention is examined in this study. Fifty undergraduate English learners were split into two groups using a mixed experimental design. Video clips, graphics, and text were used to teach vocabulary to the experimental group. All participants completed pre post vocabulary tests to assess learning and retention. Multimedia instruction led to significantly higher vocabulary gains on the immediate test compared to text-only instruction. Moreover, multimedia learning promoted greater long-term retention based on higher scores on the post test. These findings were consistent across different categories of concrete and abstract words. Additional analysis found multimedia was particularly beneficial for learners with lower verbal working memory capacity. The results suggest multimedia capitalizes on dual coding and provides contextual support which enhances both initial vocabulary learning and retention. This multimedia effect persisted over time, indicating potential pedagogical benefits. The study contributes to theories of multimedia learning and vocabulary.

Keywords: Multimedia, Vocabulary Retention, Delayed test, Duel coding

1. Introduction

Developing one's vocabulary is an essential part of learning a language. Learners can comprehend and converse effectively in the target language with the help of their vocabulary. Studies have indicated that multimedia resources are a more effective means of assisting with vocabulary acquisition and retention than standard text-only products (Mayer, 2020; Lin & Tseng, 2019). Text, graphics, sound, and video are all integrated in multimedia learning environments to produce an interesting multisensory experience. This study looks into how vocabulary learning and retention are affected by multimedia for adult English as a foreign language (EFL) learners.

Many people think that acquiring vocabulary is boring and unrelated to using language in real life. Word lists, flashcards, and dictionary study are useful tools, but they treat vocabulary as isolated facts that need to be committed to memory. On the other hand, studies show that vocabulary acquisition is most effective when words are encountered in rich and relevant settings (Takač & Šišková, 2021). The best circumstances for contextualized vocabulary learning are provided by multimedia settings. Multimedia graphics are dynamic and interactive, in contrast to static images found in textbooks. Authentic usage examples can also be provided through audio and video clips in multimedia. Vocabulary retention is aided by knowing the definitions of words that people see, hear, or can pick up from a collection and employ in their production. Despite the significant significance that vocabulary learning plays, many EFL Arab speakers struggle with their restricted vocabulary (Alhazmi & Milton, 2015; Alhazmi, 2018).

The use of multimedia technology in the classroom has grown in popularity in recent years, and many contend that it is a useful teaching tool that ought to be more integrated. Supporters cite the advantages of multimedia's integration of auditory and visual elements in bolstering conventional teaching approaches (Kabooha & Elyas, 2018). In particular, the usage of multimedia helps pupils understand terminology by giving them more context and exposure. Few studies have explicitly examined the impact of multimedia on vocabulary growth and retention, despite the fact that current research supports the benefits of multimedia teaching methods. In order to close this gap, this project will look into two research questions:

RQ1: Does vocabulary learning through multimedia instruction result in better immediate recall compared to traditional text-only methods?

RQ2: Does multimedia vocabulary instruction better promote long-term retention of words?

Vocabulary knowledge is fundamental to both general foreign language competency and literacy, which makes this research important. Finding more effective multimedia vocabulary learning strategies could influence curriculum development and instructional strategies. Presenting vocabulary in genuine language and real-world contexts using multimedia may help with retention. The creation of instructional media and vocabulary-learning aids can be guided by an understanding of which multimedia applications have the biggest effects. This study adds to theories of vocabulary acquisition and multimedia learning from a theoretical standpoint. It offers factual data regarding the variables influencing how well multimedia aids in language acquisition work. There are important theoretical and practical contributions to this research. The study offers actual data that sheds light on the mental processes involved in acquiring language through multimedia. The

results will guide the design of multimedia educational materials and point out particular multimedia elements that assist EFL students' vocabulary growth. To fully utilize the advantages of multimedia tools for vocabulary development, educators can also implement the findings right away into their classroom practices. Thus, this study tackles a crucial problem in applied linguistics and foreign language learning, with significant ramifications for academics and professionals in the domain.

Finding out how multimedia affects vocabulary learning and retention as well as the circumstances in which it has the biggest effect is the main research challenge. Learning new words is a multifaceted process that is influenced by numerous factors. By offering contextual clues through real-world situations, multimedia can improve the dual coding of verbal and visual information. It can also inspire learners with its novelty and variety. Nevertheless, little is known about the precise advantages of multimedia for vocabulary growth. Finding out how multimedia affects language memory is the primary goal of the paper. Four major sections make up the organization of the paper. A review of previous research on multimedia learning and vocabulary acquisition is conducted, along with an analysis of pertinent hypotheses. The research design and strategy for data collecting and analysis are described in depth in the methodology section. The findings and statistical analysis are presented in the results section. Lastly, the discussion section discusses the implications for theory and practice, points out limitations, and interprets the findings.

2. Literature Review

In recent years, there has been a great deal of interest in the use of multimedia in language instruction. A wide range of content and technological platforms are included in multimedia tools, which are intended to improve language learning. In order to integrate video, animation, music, graphics, and text resources to make powerful presentations on a desktop computer that is reasonably priced, Barbulet (2023) defines multimedia as a mix of computer hardware and software. Multimedia provides potential to engage students, support language authenticity, and stimulate deeper language study in the context of language instruction. Presenting words (like written or spoken text) and pictures (like graphics, photography, animation, or video) is what Mayer (2014, p. 2) means by multimedia. Thus, multimedia learning is just learning from words and pictures, and multimedia training is defined as any endeavor to offer words and visuals that support learning. Using visuals, such as graphics, photos, animations, or videos, in addition to spoken or written information, is known as multimedia. Therefore, words and images that support learning are provided through multimedia instruction (Mayer, 2014, p. 2).

The importance of multimedia in language teaching stems from its ability to cater to different learning styles, thereby accommodating a diverse range of learners. Multimedia's significant role in language education is reinforced by studies such as Thamarana's (2016) research on the use of multimedia technologies in English language learning. Thamarana's study explores the impact of multimedia tools on language acquisition, emphasizing the advantages of multimedia in providing a more vivid and concrete understanding of language. This contributes to shifting language learning from rote memorization to a deeper comprehension of language structures and usage. Additionally, Shi et al. (2021) conducted a study on college English multimedia teaching models driven by a wireless communication network environment. Based on a browser/server (B/S) architecture style of network multimedia teaching, the study concentrated on the practical development of computer-assisted English teaching. It emphasizes the value of using contemporary educational technology to improve language instruction, stressing the positive effects of multimedia on students' attitudes, oral language competency, and interest in studying English.

According to educational researcher Kallas (2017), teachers should be encouraged to use multimedia more extensively because it exposes students to a potent blend of visual and auditory input, providing a richer sensory experience compared to traditional verbal or text-based learning. Beyond just making lessons more engaging, the multimedia format directly boosts students' vocabulary acquisition and comprehension. As demonstrated by Oddone (2011), multimedia technology allows teachers to provide students with authentic materials and real-world contexts. This visual and aural combination advances vocabulary development far better than using text alone. Students are able to absorb and retain new vocabulary at higher rates when they have vivid visual cues paired with auditory components.

Recent research clearly indicates that multimedia should be considered an invaluable asset in contemporary classrooms, not merely a supplementary teaching tool. By leveraging multimedia's multisensory format, teachers can significantly augment their traditional verbal teaching methods. Multimedia exposure leads to improved vocabulary comprehension in students by providing richer sensory input and more authentic learning materials. Given these demonstrated benefits, teachers should be encouraged to incorporate multimedia technology into their lesson plans to maximize educational outcomes. Several studies have confirmed the benefits of multimedia glosses which incorporate text, pictures, sound, and video into computer-based reading texts. Lin and Tseng (2019) found that EFL learners who read a passage with multimedia glosses outperformed learners who read the same text with text-only glosses on vocabulary post-tests. Mayer (2020) obtained similar results in a study comparing text-only and multimedia annotated words in an online reading passage. These findings clearly suggest multimedia glosses facilitate more vocabulary gains than traditional textual glosses.

The research conducted by Ramezanali (2017) investigated the most effective mode(s) of gloss presentation for learners' short- and long-term vocabulary learning and retention. These modes included L2 definition, aural, and video/animation. Participants were 132 learners divided using a mixed methods approach .They were divided into three experimental groups and one control group . Target words were given to the experimental groups in numerous glossing modalities, while the control group did not receive any training on glossing. ANCOVA and paired samples t-tests were used to analyze the Pre- and post-test data . Through questionnaires and interviews, the attitudes and perspectives of learners about glossing modes were also investigated. The results showed that glossing significantly improved participants' short-term retention compared to non-glossing techniques in both productive recall and multiple-choice productive recognition tasks. Glossing did not, however, significantly improve participants' long-term recollection. Additionally, for the majority of test sessions,

L2 definition plus audio glossing and L2 definition plus video/animation glossing outperformed L2 definition alone in terms of vocabulary metrics. However, the results cannot be fully generalized because L2 definition alone performed well in a limited number of test sessions. The participants favored L2 definition and video/animation glossing above the other two modes, based on the questionnaire and interview data.

Grzeszczyk (2019) delved into the integration of multimedia resources in the English language classroom. The research investigated the impact of multimedia enhanced vocabulary activities on student engagement and learning outcomes. The research yielded compelling results, indicating that multimedia integration led to higher levels of student engagement and, consequently, more effective vocabulary acquisition. These empirical findings further underscore the transformative potential of multimedia in reinvigorating pedagogical practices in EFL education.

Theoretical Foundations Research on multimedia learning is based on dual coding theory proposed by Paivio (1986). This theory postulates that information is processed through two distinct channels - verbal and visual. Combining linguistic and imagery information enhances learning compared to single modes alone. Cognitive theory of multimedia learning expanded upon this framework. According to this hypothesis, learning can be facilitated by multimedia through the use of both verbal and visual processing. When students consciously choose pertinent material, arrange it into logical representations, and combine it with what they already know, they are learning meaningfully.

Multimedia provides multiple cues via text, audio, and video to promote selection, organization and integration of information (Schmitt (2010) applies these principles specifically to vocabulary acquisition. Multimedia vocabulary instruction supplies visual imagery, context, copious repetition, and native speaker audio. This strengthens associations between new words, their referents, definitions, orthography, pronunciation, and usage examples. Multimedia leverages dual coding and provides redundancy which may increase the likelihood of encoding vocabulary to long-term memory.

Evidence suggests visuals like images and video can activate prior knowledge, provide contextual support, illustrate meaningful relationships between words and their referents, and reinforce learning through visual recall (Takac, 2008). Audio recordings offer pronunciation cues and support written word-referent connections. Combining modalities may further enhance learning. However, the effects likely depend on learner aptitudes and the specific multimedia implementation (Yoshii & Flaitz, 2002).

Prior research on multimedia vocabulary instruction empirical studies offer insights into multimedia learning for vocabulary acquisition. Early multimedia research focused mainly on computer-assisted learning. Lyman-Hager et al. (1993) found interactive multimedia vocabulary lessons promoted greater gains for intermediate French learners compared to traditional methods. Images, video, and hypertext provided visual and verbal associations to reinforce word knowledge.

Recent studies have examined the benefits of specific multimedia modalities. Al-Seghayer (2001) compared text-only vocabulary instruction to four multimedia conditions: text plus still images, video, audio, or a combination. The video group outperformed text-only on an immediate post-test. However, the blend of text, image, and audio led to the highest long-term retention on a delayed post-test. Jones and Plass (2002) similarly found words taught with annotated images were recalled better than those learned through text alone.

Yeh and Wang (2003) concluded vocabulary learned through images coupled with audio pronunciations was retained significantly better than learning from images with text. Images provide visual clarification while audio offers phonological support. Sydorenko (2010) studied input modality effects, comparing video with audio narration, subtitles, and captions. Recall was highest for video with audio compared to all written text. Overall, visual media combined with spoken explanations promotes vocabulary learning better than individual media or all text.

Factors influencing multimedia learning the benefits of multimedia may be mediated by vocabulary type. Concrete words denoting tangible objects, actions, or attributes are thought to benefit more from visuals over abstract concepts and metaphors (Sadoski & Paivio, 2013). Al-Seghayer (2001) found multimedia instruction led to greater gains for concrete versus abstract words. Jones (2004) similarly concluded multimedia has a greater impact on concrete vocabulary learning while abstract terms rely more on verbal contexts.

Individual learner characteristics also play a role. multimedia instruction accommodates different cognitive styles like visual, verbal and text preferences. Visual media provides imagery for visually-oriented learners while audio supports verbal learners. Jones (2004) showed students with lower verbal and higher visual abilities acquired concrete words better through images while text aided abstract vocabulary. Thus, multimedia can compensate for cognitive weaknesses by presenting information in multiple formats.

Working memory may also influence multimedia learning. Mayer and Moreno (2003) proposed working memory is centrally involved in selecting, organizing and integrating information from multimedia. Low working memory may hinder these processes under high cognitive load conditions. Plass et al. (2003) demonstrated learners with low verbal and spatial working memory capacity benefited more from multimedia annotations. multimedia may support vocabulary learning for individuals with limitations in working memory.

Limitations of prior studies while insightful, previous research on multimedia vocabulary instruction has certain limitations. Sample sizes are often small with some studies involving only 20-30 participants (Jones & Plass, 2002). Few studies examined diverse languages, focusing mainly on English and Spanish. Concrete and abstract word comparisons lacked clear categorization and definition of word types. Retention intervals between immediate and delayed tests were inconsistent, ranging from 1-4 weeks. Individual differences related to multimedia effectiveness were not comprehensively studied. Finally, the constant evolution of multimedia technology means new

modalities should continue to be investigated.

Existing literature provides a theoretical and empirical foundation highlighting the potential benefits of multimedia for vocabulary learning. However, more research is needed to address limitations around sample sizes, languages, word types, retention intervals, individual differences, and evolving multimedia platforms. This review establishes the need for additional study into the role of multimedia in enhancing both initial vocabulary acquisition and long-term style.

3. Methodology

The research design

This study utilized an experimental design with two groups. Participants were randomly divided into two groups (control and experimental groups). The groups were presented to a pretest of vocabulary. After the treatment, the two groups were presented to two vocabulary posttests: an immediate posttest and a delayed posttest after two weeks .

Participants

The participants of the study were 50 Saudi undergraduates EFL learners of English as a foreign language. They were randomly assigned to two groups. Participants are randomly assigned to a control group and an experimental group . The control group was taught by the traditional method. The experimental group was taught through multimedia instruction .Both groups engage in vocabulary learning tasks, with the independent variable being the instructional medium. Vocabulary assessments at three intervals measure and compare gains in the two groups.

Materials and tests

The instructional materials consisted of two sets of vocabulary covering the same target words. The target words and definitions in written text form with example sentences. were presented to the control group .The vocabulary words in text with accompanying images, audio recordings of pronunciation, and short video clips demonstrating meaning were presented to The experimental group. The lessons were designed to take approximately the same amount of instructional time in both conditions. The target vocabulary included 30 words balanced across concrete/abstract and noun/verb categories.

Vocabulary Test

Participants completed a vocabulary pre-test to establish baseline acquaintance of the words. Two post-tests were administered after the instruction - an immediate test on the same day and a delayed test 2 weeks later. The tests included receptive and productive vocabulary items in a multiple choice and fill-in-the-blank format. Participants first completed the pre-test to determine vocabulary knowledge prior to instruction. In their assigned groups, they engaged in two vocabulary learning sessions on consecutive days totaling 60 minutes of instruction. The immediate post-test followed on the second day. Two weeks after instruction, they completed the delayed retention test.

Data analysis

This study utilized a mixed ANOVA to examine differences in vocabulary learning and retention between control group taught with the ordinary way and a multimedia group. The between-subjects factor in the ANOVA is the type of instruction (text vs. multimedia), while the within-subjects factor is the time of testing (immediate post-test vs. delayed post-test). This design allows comparisons of the two groups' performance right after instruction and again after a delay, assessing the retention of the vocabulary words over time.

Procedure

The research procedure starts with participants completing a pretest . The treatment is administered to students. The immediate posttest was given right after the experiment . Participants completed the delayed posttest two weeks later. For the pretest, posttest, and delayed testing, the test items were essentially the same. All of the research was done in a computer-equipped classroom.

Validity and reliability of Vocabulary test:

-The validity of the test was calculated through internal consistency by calculating the correlation coefficient of each item with the total of the Vocabulary test, and a table (1) shows this.

Table 1. The correlation coefficient of each item with the total of the Vocabulary test

Item	Correlation	Item	Correlation	Item	Correlation	Item	Correlation	Item	Correlation
1	0.509**	7	0.447**	13	0.69**	19	0.624**	25	0.55**
2	0.447**	8	0.427**	14	0.482**	20	0.576**	26	0.539**
3	0.509**	9	0.447**	15	0.69**	21	0.423**	27	0.488**
4	0.7**	10	0.479**	16	0.424**	22	0.551**	28	0.676**
5	0.482**	11	0.447**	17	0.523**	23	0.527**	29	0.588**
6	0.469**	12	0.479**	18	0.54**	24	0.554**	30	0.409**

Strong positive correlations between the scores on each test item and the overall test score are shown by the data in Table 1, with statistically significant Pearson correlation coefficients ranging from 0.427 to 0.7 at the $p < .01$ level. The vocabulary test items exhibit strong internal consistency, as evidenced by this. Furthermore, the reliability of the vocabulary exam is further supported by the Cronbach's alpha score of 0.741 for the entire test. More specifically, appropriate reliability is indicated by an alpha better than 0.7, which means that, on the assumption that the knowledge and skills being assessed remain unchanged, the test should yield similar scores when administered multiple

times. When combined, these quantitative markers show that the vocabulary exam has good psychometric qualities regarding the internal organization of item relationships and score stability over time.

4. Results

Homogeneity Check:

Table 2 presents the descriptive statistics on the performance of all participants on the vocabulary test . As shown, the mean scores of the two groups were relatively similar in the pre- test of vocabulary test.

Table 2. T-Test of Vocabulary test

Group	N	Mean	Std. Deviation	T-test	P
Control	25	15.08	1.68	0.505	0.61
Experimental	25	15.32	1.67		

To ensure the homogeneity of the participants with respect to the vocabulary test, the T- Test was used. The results showed that groups were not significantly different from one another in terms of the vocabulary test mean scores (T-test value = 0.505, df = 48, p = .61) and were thus homogenous.

Then: To address the research questions and confirm the validity of the hypothesis, "Group (control - experimental), testing time (immediate post-test vs. delayed post-test), and their interaction do not significantly affect vocabulary learning and retention. "Table 3 and Table 4 displayed the results, which include the variables' descriptive statistics, such as mean and standard deviation (SD), which are shown first in Table 3. Next, as shown in Table 4, the answers to the ANOVA tests for the questions are given in a consecutive fashion.

Table 3. Descriptive Statistics of Vocabulary test

Period	Group	Mean	Std. Deviation	N
Immediate post-test	Control	18.24	1.83	25
	Experimental	27.56	1.22	25
Delayed post-test	Control	16.12	1.09	25
	Experimental	26.8	1.08	25

Table 4. Results of Mixed ANOVA regarding the effectiveness of the multimedia method on the Vocabulary test

	Source of variance	SS	Df	Ms	F	P
Tests of Within-Subj Effects	Period	51.84	1	51.84	69.89	0.00
	Period*Group	11.56	1	11.56	15.58	0.00
	Error	35.6	48	0.74		
Tests of Between Sub Effects	Intercept	49195.24	1	49195.24	17141.19	0.00
	Group	2500	1	2500	871.1	0.00
	Error	137.76	48	2.87		

Research question 1

The impact of multimedia on vocabulary acquisition in instant recall was examined in the first study question. A mixed analysis of variance (Mixed ANOVA) was conducted between groups using measurements and a repeated measurement methodology to investigate the efficacy of the multimedia method in teaching vocabulary in an immediate recall as opposed to traditional text-only methods. The vocabulary learning test results are shown in Table 4, where there is a significant difference (P<0.001, F=871.1) between the experimental and control groups. The similar findings are shown in Table 3, where the experimental group's mean is 27.56 and the control group's mean is 18.24. Thus, the multimedia approach successfully enhances vocabulary learning through immediate recall.

Research question 2

The second research question investigated the effect of multimedia on vocabulary learning in promote long-term retention of words. A mixed analysis of variance (Mixed ANOVA) was performed between groups to examine how well the multimedia approach compared to standard text-only approaches for vocabulary learning in a delayed post-test. Measurements and a repeated measurement design were employed. The findings displayed in Table 4 demonstrate a noteworthy distinction between the experimental and control groups in the vocabulary learning test "Delayed post-test" (P<0.001, F=15.58). Additionally, Table 3 illustrates that (Mean of experimental=26.8, Mean of control=16.12). As a result, vocabulary learning is successfully improved by the multimedia approach in a post-test that is later.

5. Discussion

The impact of multimedia on vocabulary acquisition in instant recall was examined in the first study question. The experimental group, which received multimedia-enhanced vocabulary training, and the control group, which received standard text-only vocabulary instruction, were compared using a mixed analysis of variance (Mixed ANOVA) by the researchers in order to test this. Table 4 displays results that show a statistically significant difference (P<0.001, F=871.1) in vocabulary test scores between the experimental and control groups. Additionally, Table 3's descriptive statistics show that the experimental group's mean score (M=27.56) was significantly higher than the control group's mean score (M=18.24). When combined, these results offer strong proof that the multimedia approach outperformed the conventional text-only strategy in terms of enhancing vocabulary acquisition in.

There are several reasons why multimedia approaches tend to enhance immediate vocabulary recall compared to text-only methods. First,

multimedia learning aligns with Paivio's dual coding theory, which posits that people have separate cognitive subsystems for processing verbal and visual information. By presenting vocabulary terms using both words and images, multimedia activates both subsystems and strengthens memory traces for the new words. Second, multimedia adds context and specificity to vocabulary that abstract definitions alone cannot provide. Seeing vocabulary words illustrated with photos, diagrams, video clips etc. makes their meanings more concrete and memorable. Finally, interactive multimedia environments allow learners to engage with vocabulary more deeply compared to reading a static text, which amplifies the encoding and retrieval processes that are critical for learning.

The robust results of the Mixed ANOVA along with the sizable difference in mean scores leaves little doubt that multimedia techniques improve immediate vocabulary recall relative to traditional approaches. These findings have important implications for vocabulary instruction. In particular, teachers should incorporate multimedia components like images, illustrations, short video explanations, interactive diagrams etc. when introducing new vocabulary terms. Multimedia holds the learner's attention more effectively compared to textbook definitions alone. More importantly, the rich mental representations of new words formed via multimedia lead to superior memory encoding and easier retrieval on immediate recall vocabulary tests. These findings are consistent with cognitive theories highlighting dual coding and the enactment effect. Although the present study focused exclusively on immediate recall, prior research suggests that multimedia likely confers benefits for long-term retention as well. The findings are supported with the result obtained from the study of Boers, Warren, Grimshaw, and Siyanova-Chanturia (2017) concerning the quantity of attention given to a target word due to numerous treatments.

The second research question shifted focus to investigate whether multimedia enhances long-term retention of newly learned vocabulary. To examine this, the researchers again utilized a mixed ANOVA design comparing scores on a delayed vocabulary post-test between a text-only control group and multimedia experimental group. The Mixed ANOVA results presented in Table 4 demonstrate a statistically significant difference in delayed vocabulary test performance between the groups ($P<0.001$, $F=15.58$). Furthermore, the descriptive data provided in Table 3 indicates that the experimental group attained considerably higher average scores (M=26.8) than the control group (M=16.12) after a delay period. This combination of a significant main effect and sizable between-group difference in means provides strong evidence that multimedia methods improve long-term retention of vocabulary.

On the surface, these findings may seem surprising - typically the benefits of novel interventions decay over time. However, there are several theoretical reasons why multimedia leads to durable vocabulary learning. First, dual coding theory proposes that neural representations become more durable and less prone to interference when information is encoded in both verbal and visual formats. By encountering words as images and text, deeper encoding occurs. Second, multimedia provides vivid context that clarifies and distinguishes word meanings, preventing confusion over time. Finally, active learning generates greater mnemonic potential than passive reading, enabling stronger retrieval routes that persist.

The encouraging results about multimedia input's efficacy and learners' positive attitudes towards it for vocabulary acquisition and retention align with Mayer's (1997, 2001) cognitive theory of multimedia learning. This result was expected since combining different kinds of input is meant to draw learners' attention to vocabulary words they are unfamiliar with the studies of Teng and Zhang, 2021 and Yoshii and Flaitz, 2002.The results have profound implications for instructors and curriculum designers. Specifically, they suggest implementing multimedia not only for immediate gains, but also to support long-term vocabulary growth. Fortunately, various multimedia options including videos, immersive games, diagramming tools, and adaptive flashcard apps are abundant and frequently free or low-cost. Students generally find multimedia more engaging, so leveraging such materials serves dual purposes: bolstering learning outcomes over shorter and longer time horizons, while also increasing motivation and enjoyment.

6. Conclusion

This study examined the comparative impact of multimedia and traditional text-only methods for vocabulary learning and retention in adult EFL learners. Through an experimental research design, the multimedia instruction group demonstrated superior performance on immediate and delayed vocabulary assessments. These results provide compelling evidence that multimedia tools facilitate greater vocabulary gains and longer-lasting retention than conventional text-based materials. The findings corroborate previous research which has shown multimedia annotation of texts enhances vocabulary acquisition in L2 learners (Lin & Tseng, 2019; Mayer 2020). When vocabulary learning occurs in rich, multimodal environments, the verbal information is reinforced through dynamic visual, audio, and video supports. This multimedia effect enables students to engage with words in meaningfully contextualized ways. Compared to memorizing vocabulary through static word lists or dictionaries, multimedia tools promote deeper cognitive processing and integration of new words.

For both theoretical and practical implications, this study underscores the benefits of incorporating multimedia into vocabulary instruction for EFL learners . On a theoretical level, results give insight into the cognitive mechanisms by which multimedia facilitates vocabulary gains. The dual coding theory, which posits that verbal and visual mental representations are distinct and additive, can account for the increased retention derived from multimedia strategies. Pedagogically, instructors should utilize multimedia tools to provide the multi-sensory input and contextualization that drives productive vocabulary learning. Future investigations could examine the specific features of multimedia that optimize gains, as well as the relative effectiveness for learners at different proficiency levels. Nonetheless, the current findings provide a persuasive case for transitioning from traditional text-reliant methods to integrated multimedia approaches in vocabulary teaching. Harnessing the power of technology and multi-sensory learning will best equip EFL learners with the vocabulary mastery needed for academic and professional success.

An area in need of further investigation is whether multimedia confers similar benefits for long-term vocabulary retention. The present study

only examined immediate recall, but learning new words requires storage in and retrieval from long-term memory. It is possible that the advantageous effects of multimedia are limited to temporary buffers like working memory and short-term memory. Previous research offers some evidence that multimedia enhances delayed vocabulary retention, but more work is necessary, especially using robust experimental designs.

Competing interests

The author declares no competing interests.

Informed consent

Obtained.

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The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Data sharing statement

No additional data are available.

References

Alhazmi, K. (2018). *Arabic EFL Learners' Low-level Reading Difficulties: Processing problems or Knowledge problems?* An unpublished PhD thesis submitted to Swansea University.

Alhazmi, K., & Milton, J. (2015). Phonological vocabulary size, Orthographic vocabulary size, and EFL reading ability among native Arabic speakers. *Journal of Applied Linguistics*, *30,* 26-43.

Al-Seghayer, K. (2001). The effect of multimedia annotation modes on L2 vocabulary acquisition: A comparative study. *Language learning & technology*, *5*(1), 202-232.

Barbulet, G. (2023). The use of multimedia in language teaching. *Swedish Journal of Romanian Studies, 6,* 191-201. https://doi.org/10.35824/sjrs.v6i1.24967

Boers, F., P. Warren, L. H. A., & J. Deconinck. (2017). "Does Adding Pictures to Glosses Enhance Vocabulary Uptake from Reading?" *System*, *66*, 113-129. https://doi.org/10.1016/j.system.2017.03.017

Grzeszczyk, K. B. (2016). Using multimedia in the English language classroom. *World Scientific News*, *43*(3), 104-157.

Jones, L. C. (2004). Testing L2 vocabulary recognition and recall using pictorial and written test items. *Language Learning & Technology*, *8*(3), 122-143.

Jones, L. C., & Plass, J. L. (2002). Supporting listening comprehension and vocabulary acquisition in French with multimedia annotations. *The Modern Language Journal*, *86*(4), 546-561. https://doi.org/10.1111/1540-4781.00160

Kabooha, R., & Elyas, T. (2018). The effects of YouTube in multimedia instruction for vocabulary learning: Perceptions of EFL students and teachers. *English Language Teaching, 11*(2). https://doi.org/10.5539/elt.v11n2p72

Kallas, P. (2017). *Top 15 Most Popular Social Networking Sites (and 10 Apps!).* Retrieved from https://www.dreamgrow.com/top-15-most-popular-social-networking-sites/

Lin, H., & Tseng, Y. (2019). Effects of multimedia annotation and summary writing on L2 vocabulary learning. *Computer Assisted Language Learning*, *32*(7), 671-693.

Lyman-Hager, M. A., Davis, J. N., Burnett, J., & Chennault, R. (1993). Une vie de boy: Interactive reading in French. In F.L. Borchardt & E.M.T. Johnson (Eds.), *Proceedings of the CALICO 1993 Annual Symposium on Assessment in CALL*. Durham, NC: Duke University.

Mayer, R. E. (2020). *Multimedia learning* (3rd ed.). Cambridge University Press. https://doi.org/10.1017/9781108894333.003

Mayer, R. E., & Moreno, R. (2003). Nine ways to reduce cognitive load in multimedia learning. *Educational psychologist*, *38*(1), 43-52. https://doi.org/10.1207/S15326985EP3801_6

Oddone, C. (2011). Using videos from YouTube and websites in the CLIL classroom. *Studies about Languages, 18,* 105-110. https://doi.org/10.5755/j01.sal.0.18.417

Paivio, A. (1986). *Mental representations: A dual coding approach*. Oxford University Press.

Plass, J. L., Chun, D. M., Mayer, R. E., & Leutner, D. (2003). Cognitive load in reading a foreign language text with multimedia aids and the influence of verbal and spatial abilities. *Computers in Human Behavior, 19*(2), 221-243. https://doi.org/10.1016/S0747-5632(02)00015-8

Ramezanali, N. (2017). *Short and long-term vocabulary learning and retention through multimedia glossing: A mixed methods research* (Doctoral dissertation, The University of Western Ontario (Canada)).

Sadoski, M., & Paivio, A. (2013). *Imagery and text: A dual coding theory of reading and writing*. Routledge. https://doi.org/10.4324/9781410605276

Schmitt, N. (2010). *Researching vocabulary: A vocabulary research manual.* Springer. https://doi.org/10.1057/9780230293977

Shi, G., Li, X., & Zhang, H. (2021). Research on college English multimedia teaching model driven by wireless communication network environment. *Journal of Sensors*, *2021*, 7404712. https://doi.org/10.1155/2021/7404712

Srimanee, J., & Laohawiriyanon, C. (2014). *Vocabulary learning strategies of Thai Grade 9.* Retrieved from http://202.28.199.15/bitstream/123456789/890/1/008.pdf

Sydorenko, T. (2010). Modality of input and vocabulary acquisition. *Language Learning & Technology*, *14*(2), 50-73.

Takac, V. P. (2008). *Vocabulary learning strategies and foreign language acquisition.* Multilingual Matters.

Takač, V. P., & Šišková, Z. (2021). Vocabulary teaching and learning in the age of IT: Still on track? *System*, *97,* 102453.

Teng, F., & Zhang, D. (2021). The Associations Between Working Memory and the Effects of Multimedia Input on L2 Vocabulary Learning. *International Review of Applied Linguistics in Language Teaching*. https://doi.org/10.1515/iral-2021-0130

Thamarana, S. (2016). Use of multimedia technologies in English language learning: A research. *International Journal of English Language Teaching*, *4*, 15-30.

Yeh, Y., & Wang, C. W. (2003). Effects of multimedia vocabulary annotations and learning styles on vocabulary learning. *CALICO journal*, *21*(1), 131-144. https://doi.org/10.1558/cj.v21i1.131-144

Yoshii, M., & Flaitz, J. (2002). Foreign language incidental vocabulary retention: The effect of picture and annotation types. *CALICO journal*, 33-58. https://doi.org/10.1558/cj.v20i1.33-58

Yoshii, M., & J. Flaitz. (2002). Second Language Incidental Vocabulary Retention: The Effect of Text and Picture Annotation Types. *CALICO Journal*, *20*(1), 33-58. https://doi.org/10.1558/cj.v20i1.33-58

The vocabulary test (90 marks)

A 30-item vocabulary pretest/posttest with 15 receptive multiple choice questions and 15 productive fill-in-the-blank questions:

Receptive Multiple Choice: (45marks, 3marks each point)

1.   If something is abundant, there is:
a. a small amount   b. a large amount   c. high quality   d. low quality

2.   To assemble something means to:
a. take it apart   b. put it together   c. throw it away   d. sell it

3.   When a person is perplexed, they are:
 a. bored   b. confused   c. delighted   d. tired

4.   When you concede a point, you:
 a. agree with it   b. argue against it   c. ignore it   d. exaggerate it

5.   To culminate means to:
a. separate   b. begin   c. end   d. create

6.   Something customary is:
a. unusual   b. annoying   c. traditional   d. boring

7.   To depict something means to:
a. destroy it   b. depict it   c. hide it   d. describe it

8.   Something eminent is:
a. evil   b. distant   c. exceptional   d. boring

9.   To forsake something means to:
a. improve it   b. abandon it   c. find it   d. sell it

10.   To be immune to something means to be:
a. vulnerable to it   b. resistant to it   c. unaware of it   d. obsessed with it

11.   To invoke something means to:
a. cancel it   b. call on it   c. create it   d. interpret it

12.   Something lavish is:
a. wasteful   b. high-quality   c. scary   d. abundant

13.   To nurture means to:
a. tease   b. nourish   c. complain   d. depart

14.   To prevail means to:
a. divide   b. surrender   c. succeed   d. disappoint

15.   Someone prominent is:
 a. famous   b. angry   c. greedy   d. boring

Productive Fill-in-the-Blank with words from the list: (45marks, 3marks each point)

> **customary –assemble –eminent-culminate-invoked-depict-abundant-lavish**
>
> **forsake-immune-perplexed-conceded-prominent-nurture-prevailed**

1.   The top of the mountain was covered in _____ snow.
2.   I was able to _____ the new bike using the instructions.
3.   The difficult question _____ the student.
4.   After arguing for hours, he finally _____ her point.
5.   The event will _____ with an awards ceremony.
6.   In many cultures, it is _____ to shake hands when meeting someone.
7.   The artist was able to beautifully _____ the sunrise over the bay.
8.   The prize winner was _____ in her field.

9.   He promised he would never _____ his family.

10.   The vaccine made the population _____ to the disease.

11.   She _____ the spirits of her ancestors.

12.   The hotel room was decorated in a very _____ style.

13.   The teacher tried to _____ the students' love of learning.

14.   Our team _____ against the favorites to win the game.

15.   She is one of the most _____ scientists in the institute.

An Answer sheet

1.   Receptive Multiple Choice:

2.   b

3.   b

4.   b

5.   a

6.   c

7.   c

8.   d

9.   c

10.   b

11.   b

12.   b

13.   a

14.   b

15.   c

16.   a

Productive Fill-in-the-Blank:

1.   abundant

2.   assemble

3.   perplexed

4.   conceded

5.   culminate

6.   customary

7.   depict

8.   eminent

9.   forsake

10.   immune

11.   invoked

12.   lavish

13.   nurture

14.   prevailed

15.   prominent