



The role of language games in enhancing vocabulary acquisition: A meta-analysis

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Abstract

This meta-analysis aims to investigate gamification's impact on improving tertiary-level second-language learners' lexical repertoire. Forty-seven peer-reviewed works were evaluated for this analysis. The analysis focused on determining the effectiveness of gamified learning environments in the context of improving vocabulary and learning and remembering new vocabulary by learners. This study adopted a meta-analysis review methodology for reviewing the above articles. It explores gamification methodologies, challenges and considerations, the influence of activity-specific experiences, the advancements in Digital game-based learning, the effectiveness of different strategies in gamification, and the perceptions of learners and educators towards gamified tools for learning. After a detailed analysis, the result has shown that the use of gamification-enhanced vocabulary learning is better than that of conventional teaching methods. Consequently, this analysis demarcates the importance of gamification as a lively and captivating means of teaching and learning vocabulary, while making up a significant contribution to the body of knowledge in language learning.

Keywords: gamification; vocabulary acquisition; second language acquisition; motivation; retention; perception; challenges; educational technology

Introduction

The use of gamification in teaching and learning has increased due to the desire to introduce practices that will make learning more engaging and efficient (Deterding et al., 2011; Reiners & Wood, 2015). The application of this approach involves features like points, badges, leaderboards, and temperate challenges in the course in an attempt to apply game features to create more interesting learning experiences (Alison & Chrissi, 2019). Several studies have demonstrated that the use of gamification can increase students' engagement by up to 50%. Engagement is usually the main contributing factor to success in learning (Bitrián et al., 2021). Since gamified techniques are engaging, they help learners to stay focused and involved in activities, making language learning more efficient.

Acquiring new vocabulary, a fundamental aspect of language learning, often poses significant challenges for learners. Traditional methods, such as rote memorization and repetitive drills, while effective in establishing foundational knowledge, frequently lack the engagement needed to sustain motivation (Murad, 2023). These approaches can lead to disengagement and suboptimal performance as learners struggle to find meaning and relevance in monotonous tasks (Rana, 2023). Gamification serves as an innovative bridge between conventional learning and modern engagement strategies (Sridhivya et al., 2024). By incorporating elements of competition, collaboration, and instant feedback, gamification transforms vocabulary acquisition into an enjoyable and interactive experience (Jaiswal, 2024). Competitive features motivate learners to excel, while collaborative activities promote teamwork and peer-supported learning. Real-time feedback enhances the learning process by allowing students to immediately identify and address errors, reinforcing their understanding of the English language (Sadeghi et al., 2022). This integration of gamification with traditional approaches not only preserves the importance of the established methods but also revitalizes them, making vocabulary learning more dynamic and effective, and promoting engaging learning experiences for students (Hamari et al., 2014). Studies have shown that classes with students learning vocabulary through gamified methods tend to have higher retention rates, and the students have more positive attitudes toward learning (Bakhsh, 2016; Al-Jarf, 2023; Al-Saleem, 2023; Rahman and Ismail, 2023).

In addition, using the concept of gamification to teach and learn vocabulary is consistent with relevant theories in the area of second language acquisition (Dhivya et al., 2023). For example, Self-determination Theory posits educational games appeal to some of the important, innate psychological needs, thereby enhancing the students' motivation and overall learning experiences (Ryan and Deci, 2000). Also, most gamified activities have a social component, promoting students' cooperation in the mastery of new terms and their collective and mutual assistance in the educational process (Kapp, 2012).

Given the growing use of gamification in second language education, it would be worthwhile to conduct a meta-analysis that evaluates the feasibility of using the technique more broadly (Dhivya, Hariharasudan & Nawaz, 2023). As such, this meta-analysis seeks to evaluate and synthesize existing studies. Through doing this, meta-analysis aims to not only highlight the most impactful gamification strategies for vocabulary enhancement but also provide evidence-based recommendations for their implementation in educational settings. Additionally, it aims to identify limitations within current research and provide suggested directions for future investigations in the field of gamified language learning. Without such a meta-analysis being conducted, educators risk misapplying gamification, wasting resources, and overlooking its limitations. This could lead to inconsistent outcomes, disengagement, and missed opportunities to optimize its benefits for language learning (Anderson and Bavelier, 2019; Surendeleg et al., 2019).

Scope of the Study

A meta-analysis of this type entails a critical analysis of the findings of previous research (Deterding et al., 2011; Hamari et al., 2014). Such an analysis consists of several steps. First, relevant published papers are selected (Landers, 2015). This includes the use of filters in the selection of samples, such as the publication year, sample size, type of study, and the type of gamification strategies applied (Seaborn and Fels, 2015). Next, data are extracted from each study and examined. The goal is to identify and synthesize key findings (Sailer et al., 2017; Toda et al., 2018).

The above steps involve categorizing the studies related to specific elements, including the kind of gamification approach applied, time of intercession, and assessment techniques of vocabulary advancement (Smith, 2002). Statistical tools are then employed to determine the retrieved overall effect size for an estimate of the magnitude of change influenced by gamification concerning students' vocabulary development. The meta-analysis also takes into account moderating variables that may impact the efficiency of gamification for instance, the setting in which the gamified learning occurs, the learners, and the type of vocabulary being taught (Lee et al., 2022). This enables one to note down any cycles or trends that might explain differences in the degrees of gamification effectiveness across studies (Garcia and Lopez, 2023). In addition, the meta-analysis assesses the quality and levels of methodological rigor of the identified studies based on aspects such as sample size, type of studies, and sources of bias (Nguyen, 2021). This, in turn, helps prevent concluding inadequate results that may be faulty (Davis, 2018).

Methodology

This methodology adopts a systematic approach to evaluating the impact of gamification on second language (L2) vocabulary learning. The process begins with **Selection Criteria**, where studies are screened based on relevance, publication year, sample size, study type, and gamification strategies. **Data Extraction** follows, focusing on retaining relevant studies and extracting key details such as gamification type, learner demographics, and learning context. In the **Coding and Analysis** phase, the data are categorized according to gamification characteristics and learner attributes, with patterns analyzed for insights. Finally, **Synthesis and Conclusion** identify trends in vocabulary improvement and assess the overall effectiveness of gamification in L2 learning.

Figure 1 outlines the steps followed in this study, the chart helps to make clear the sequential and selective processes involved in evaluating gamification's impact on vocabulary acquisition.

During Step 1, we employed stratified sampling to ensure that various gamification strategies (e.g., game-based learning, digital badges, leaderboards, interactive apps) and participant demographics (e.g., different age groups, language backgrounds) were adequately represented. Studies were then categorized based on research design—experimental, quasi-experimental, and mixed methods. This stratification allowed the meta-analysis to compare results across different methodologies, enriching the study's findings with diverse perspectives.

Retrospective studies are an exception in that they observe participants over a specific period and draw conclusions from data that are gathered during that time (Smith, 2023). The experimental studies conducted in controlled environments focus closely on the variables of gamification strategies to provide robust evidence of causal and effect relationships in learning English vocabulary (Squire, 2011; Gikas & Grant, 2013; Chen, 2019; Hsu, 2020 & Alfadil, 2020; Dindar et al., 2020). Relative to the first sort, quasi-experimental designs provide findings derived from more real-world contexts, which points to the need for a new learning

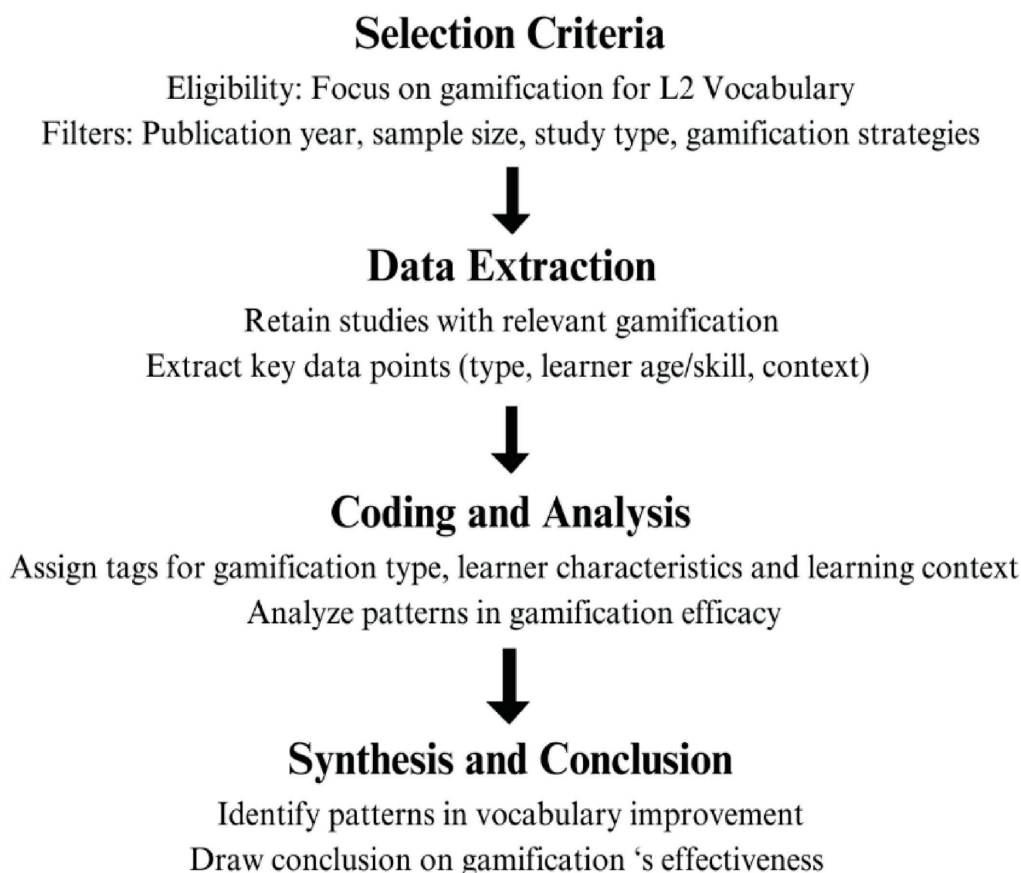


Figure 1 Steps involved in the meta-analysis

methodology incorporating technology for learning a language (Cai, 2015; Chen et al., 2019; Hung et al., 2016). The studies mentioned above show the findings by adding qualitative features to quantitative data, which pointed to a detailed picture of learning strategies and the learners' experiences.

Abstracts were subsequently examined according to their topical relation to the subject of interest, the quality of the research design outlined within, as well as the specificity and measures used to present the findings. This selection process also helped in the exclusion of low-quality and irrelevant studies and, therefore, increased the credibility and accuracy of the research studies (Cooper, 2016; Hart, 2018).

Figure 2 indicates how a systematic approach was used to identify relevant research. The overall process consisted of six sequential steps. Step 1 involved a database search across *PubMed*, *Google Scholar*, and *ERIC* to gather a broad range of studies. In Step 2, keyword filtering was applied using terms like 'gamification', 'vocabulary learning', 'second language acquisition', and 'educational technology'. Step 3 focused on the initial screening of titles and abstracts to exclude irrelevant studies. In Step 4, an eligibility check was performed to assess studies based on quality, relevance, and methodology. Step 5 involved a full-text review to examine specific measures and findings in detail. Finally, Step 6 resulted in the inclusion of 47 studies that met all criteria for analysis. This rigorous process ensured the selection of high-quality, relevant studies for the research.

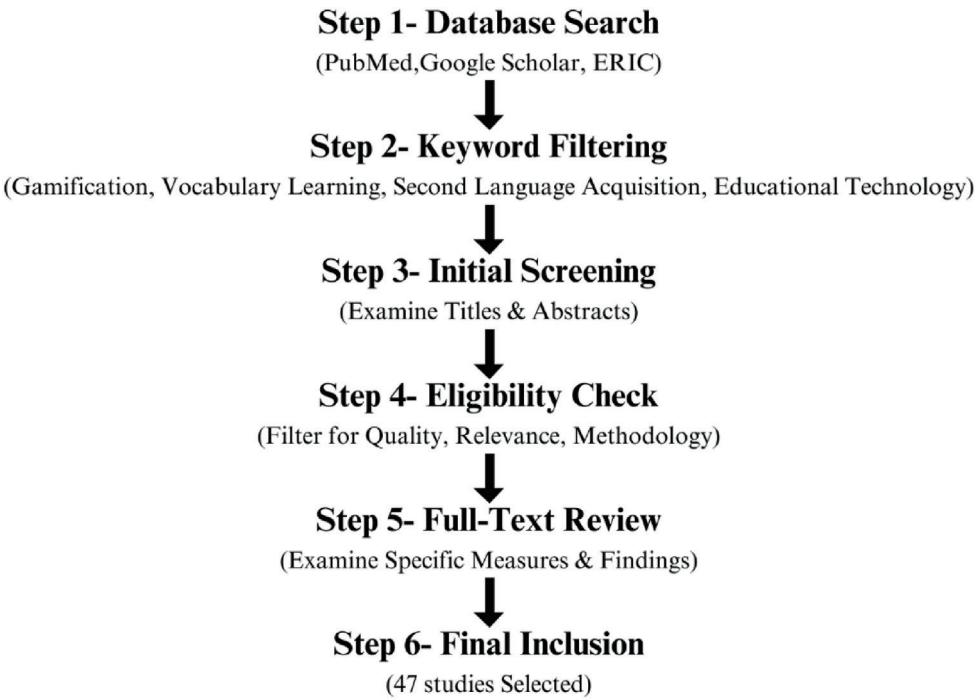


Figure 2 *Systematic literature identification and analysis process*

Data Collection and Analysis

Data collected from the studies were quantified and analyzed using systematic review as meta-analysis statistical tools. The outcomes obtained from different research investigations published only in ‘Scopus’ indexed journals were pooled to establish the context of the study. Meta-analysis enabled the integration of results obtained from different studies on the effects of gamification in learning vocabulary in a second language acquisition framework. Using this approach, not only was there an enhancement of the statistical power of the findings, but the patterns and trends that might not be identified in individual studies were also found. In contrast, the qualitative data collected in the identified studies were subjected to thematic analysis to come up with general themes and conclusions. This entailed categorizing the data repeatedly to classify it into code families which made it easier to analyze with a view of managing the contextual and complex nature of the research topic as advised by Miles et al. (2014) as well as Creswell and Poth (2018). Table 1 shows the studies that are involved in the gamification strategies for learning English vocabulary.

Discussion

Vocabulary Acquisition: Impact on Assessment Results and Memorization

Several empirical investigations aimed to show the facilitative effects of learning with the use of the concepts of the gamified learning environment; the enhancements concern the areas of vocabulary acquisition, and the outcomes endorsed test results as well as helped learners improve their memory. For example, León-Flores and Vega-Auquilla (2021) used a causal-comparative research design in a study that involved A1-level English learners and determined that there was a statistically significant difference in the improvement of the learners’ vocabulary test

Table 1. *Meta-analysis: Gamification and vocabulary acquisition*

Reference	Methodology	Focus	Findings
Abdullah Alhebshi & Gamlo (2022)	Experimental study (pre/post-test)	Mobile game-based learning for Saudi EFL students	Significant positive effects on vocabulary acquisition.
Abraham (2008)	Meta-analysis of previous studies	Computer-mediated glosses in L2 learning	Computer-based glossing improves vocabulary retention.
Alfadil (2020)	Experimental study	VR game in vocabulary acquisition	VR-based learning enhances vocabulary retention.
Akgün-Kayserilioğlu & Samur (2018)	Experimental study	Gamified Q&A app for vocabulary learning	Gamification positively impacts vocabulary learning.
Al-Jarf (2023)	Literature review on the empirical data	Gamification and L2 vocabulary learning	Increased engagement and better learning outcomes.
Bitrián et al. (2021)	Survey-based research	Gamification in mobile apps	Gamification enhances user engagement.
Bakhsh (2016)	Experimental study (pre/post-test)	Games in teaching vocabulary to young learners	Games are an effective tool for vocabulary acquisition.
Chen et al. (2019)	Case study on Taiwanese EFL learners	Mobile game-based vocabulary app	Improved learning performance and learner perceptions.
Dindar et al. (2020)	Experimental study	Gamified cooperation and competition	Positive effects on vocabulary learning.
Domínguez et al. (2013)	Mixed-methods study	Gamifying learning experiences	Practical benefits, but motivation varies.
Hanus & Fox (2015)	Longitudinal study	Gamification in classroom settings	Higher motivation, effort, and performance with gamification.
Tsai & Liu (2018)	Meta-analysis of studies	Digital game-based vocabulary learning	Strong evidence supporting gamification’s effectiveness.
García-López et al. (2023)	Experimental study	Gamification and student motivation	Increased motivation, engagement, and performance.

performance and motivation when gamification is used as compared to traditional classroom approaches (Dhivya, Hariharasudan, Balamurali et al., 2023). The researchers associated such changes with the fact that game elements make learning more fun and at the same time increase students' likelihood of recalling and utilizing newly acquired terms.

Similarly, Mirzoyeva and Gurbanova (2021) aimed to investigate the effectiveness of an online gamification platform for intermediate-level students of English. According to studies conducted by these researchers, students who adopted the use of Quizizz (Interactive Learning Platform) had better memorization of new words than learners who were under normal traditional methods of learning. It is also worthy of note that the areas like feedback and reward that captured interactive features of the built gamified platform were seen as being vital for the above-documented purposes. Employing this type of learning not only captured the attention of the students but also allowed for quick retrieval of information learned by the students which in turn enhanced their performance in the assessment of vocabulary. Together, these studies stress the possibility of the effective application of gamification in increasing vocabulary acquisition. As a valuable addition to the ineffective and non-interactive traditional methods of memorizing new words, gamified tools can increase students' performance as well as motivation levels. Hence, the positive outcomes highlighted by A1 level and intermediate learners indicate that gamification methods can easily be incorporated into language learning programs in facilitating the development of word banks.

Retention and Recall: Long-term Benefits of Gamification

Usage of gamification in learning has been used repeatedly with a special interest in increasing competency in the use of adequate word sets (Dhivya, Hariharasudan, Balamurali et al., 2024). A meta-analysis by Tsai and Liu (2018) found that digital games are very effective for Second Language Vocabulary (SLV) acquisition and their long-term retention has positive effects. The present literature review that incorporated several studies highlighted that those learners who adopted the gamified tools had improved retention as compared to their counterparts who relied on conventional approaches. They demonstrated the effectiveness of the selected gamified tools in increasing learners' retention rate as compared to their counterparts who used conventional learning tools. Learner motivation and participation thus protect their interest and ability to remember the newly learned vocabulary, and this is in agreement with the findings of Tsai and Liu.

In addition, Chen et al., (2019), and Alfadil, (2020), established that by using mobile games and 'Virtual Reality' games in learning, the discovery of new vocabulary is more prominent than normal learning. Chen et al., (2019) used a single case study involving Taiwanese EFL learners in a vocabulary-learning mobile application. Learners who used the fun-based application retained more words for a longer time in contrast to those who used conventional study methods that were studied in the experiment. This implies that the kind of learning that is associated with mobile games due to their capability of being played interactively and dynamically seems to yield a better learning outcome due to the ability of the learner to get immediate feedback and the feeling of having achieved something.

Also, in the studies of the researchers (Alfadil, 2020; Dhivya, Gurusamy et al., 2024) VR games as a tool of teaching vocabulary were conducted where the results showed that the immersion of VR highly improved the recall of content involved in the game. It noted that learners were able to put the acquired vocabulary into some context such that in handling the electronic cards, they were able to explain and use the vocabulary better since their memory was jogged. As a result, the aspects of an ideal Vygotskian approach are fulfilled by using VR games in terms of making vocabulary learning more effective and enjoyable by practicing these words

in real-life contexts. In this way, these studies taken together focus on the positive outcomes of gamification by referring to its importance in learning languages by suggesting exporting it to other educational approaches.

Motivation and Engagement: Enhancing Learner Motivation

Motivating the learner and making the learner actively involved is always a priority in any learning process, especially language learning and this is why gamification has been developed as a powerful tool in the process. (Cancino & Castillo, 2021) described the positive correlations of employing gamification in the learning process in terms of learners' engagement and learning retention. In their study with high school students as their participants, wherein they teach English as a second language, the authors discovered that optimizing classroom learning with game elements proved to be extremely effective in increasing the level of engagement of the student. This is an implication that it is easier and even more effective to incorporate game elements like points and badges into learning to enhance engagement and bring out the fun in learning hence enhancing class modes.

Similarly, the scholar Yu (2023) prepared a study concerning university students and revealed that using the approach to gamified English vocabulary learning yielded better results in learning, higher levels of motivation, and satisfaction in comparison with the non-commercial, traditional one. Yu's study applied a mixed method in which both quantitative and qualitative data were collected and analyzed. In addition to increasing the learners' test performance, Yu confirmed that gamification also positively impacted learners' self-reported levels of intrinsic motivation. Included in the study comments from the participants revealed that the gamified activities were fun and hence served as a source of incentive to the participants to dedicate their energy in going through the learning materials. Therefore, the results of this study call for future studies on the use of gamification in changing the views toward language learning and the levels of motivation of learners. The findings demonstrate that gamification is a powerful tool in supporting and advancing language learners' progress. When designing an enriched and proactive motivational climate, teachers can improve students' performances as well as their potential attitude to the acquisition of knowledge. It is also beneficial for learners and educators, as (Cancino & Castillo, 2021) and (Yu, 2023) have established that adding elements of games to teaching foreign languages not only increases learners' motivation but also creates better learning outcomes.

Influence of Activity-Specific Experience on Lexical Ambiguity Resolution

The studies carried out regarding lexical ambiguity show that some specific activities can impact how people understand words having multiple meanings. For instance, Rodd et al. (2016) showed that the rowing experience significantly alters the ways participants understand ambiguous terms, which confirms how people's participation in particular activities may affect language perception (Eligio & Kaschak, 2020). This is not restricted to physical interactions but also includes virtual ones as well. In this context, it needs to be mentioned that the current phenomenon cuts across all types of interactions, including virtual ones. For instance, video gamers have been observed to display an interpretive advantage for gaming-related meanings against obfuscated words during word association experiments, which indicates that the media consumption habits of gamers tend to impact how meaning is construed from words that are usually ambiguous (Eligio & Kaschak, 2020). Thus, the obtained results point to the fact that the process of experience and activity forms specialized hermeneutic constructions influencing language interpretation.

Advanced online gamers demonstrate a cognitive preference for words specific to their gaming activities. Decker and Gay (2011) investigated Warcraft players, and the results showed that

the participants discriminated those words which were associated with the game faster and more accurately. Concerning the effects on the process of lexical interpretation, it is necessary to pay attention to these players' improved skills with terms particular to specific games. The complexity of the terms used concerning the game and the often use of terms of art cause this sensitivity and enhance the fast processing of inputs. This implies that using certain jargon frequently can increase the word identification ease for similar words an aspect of context in language processing.

Thus, neural pathways for the identification of such ambiguous words comprise temporal and frontal zones of the brain (Rodd, 2018). Some of the investigations undertaken with the help of cross-modal priming technologies have proved meaningful for showing how meaning frequency and associative strength impact the perception of contextually uncertain lexical items. (Hino et al. 1997) have reported that dominant meanings are likely to show a higher value of priming after a time interval hence showing that more frequently used meanings are stored in a more accessible manner in the brain. This suggests that we are naturally inclined to focus on frequent possibilities, yet this tendency can be influenced by context and experience. The relations between these factors do portray the intricate aspects of languages and their processing in the brain and how experience interacts with these structures to give meaning to the unknown vocabulary. These findings demonstrate that lexical ambiguity is one of the most significant phenomena in language processing while also indicating that apprehension of it requires both twentieth and practical approaches.

Advancements in Digital Game-Based Learning (DGBL) for EFL Vocabulary Acquisition

Some research essays conducted in the last few years have shown that students get a significant improvement in learning vocabulary through DGBL in EFL contexts. Kazu and Kuvvetli (2023) and Alhebshi and Gamlo (2022) are the most exemplary studies that revealed that in the research DGBL provides a better learning advantage in terms of vocabulary than the conventional learning strategies. According to the findings, can be concluded that through offering an interactive methodology, digital games lack traditional approaches. Games seem to hold the students' attention longer as well and promote participation compared to rote flashcards, which give better long-term retention and retrieval of new vocabulary.

The students, from their experience, hold a positive attitude towards DGBL, as efficiency resulting from factors such as in-game boosts, competition, and the rate at which the game gives feedback positively influence students' motivation (İbrahim & Murat, 2023). All these aspects of gamification also avail the learning process and make it a less strained affair. The forms that have the leading impact on knowledge acquisition are quick feedbacking, which provides immediate outcomes of students' actions, thus giving students the chance to learn from their mistakes. The competitive aspect especially when it is self or peer competition compels students to work harder hence, engaging them more in the learning materials. Such motivation is quite relevant in the learning of a foreign language where constant practice is an important factor when it comes to memorization of new terms.

However, it was also found that the utilization of DGBL depends on game design features. The literature presented by (Chen et al., 2018) reveals that age or the learners' linguistic background does not influence DGBL's efficiency, but the game design does. It is suggested for such a classification that adventure-oriented games, which refer to those that offer insoluble problems and entail the necessity of strategic planning, are more efficient compared to non-adventure-based games. Retail vocabulary instruction is commonly embedded in these games in such a way that these aids are used where they are required; in meaningful contexts and narratives that help in the learning and even retention of the words. In this regard, Vnucko

and Klimova (2023) concur with this view arguing that DGBL fosters a positive learning environment that can increase the student's vocabulary knowledge as well as the course outcomes possibly improving traditional teaching. Based on these findings, DGBL can be recommended for practice as an addition to or as a replacement for conventional approaches to EFL teaching and learning since it is engaging and has a significant impact on increasing the learner's vocabulary.

Efficacy of Digital Game-Based Vocabulary Learning (DGBVL)

Digital games have been disseminated as a hopeful approach to the development of vocabulary in EFL environments. When the concepts of game-based learning were introduced in the language education system, it yielded positive results in improving the teaching methods and reducing the stress that comes with the normal methods of learning among students (Bin-Hady, 2023). Some of the most useful games are The Sims and the Semantic Boggle which has been especially useful for proving the acquisition of the many terms in the English language among learners. These types of games let learners directly interact with language and are therefore very effective in encouraging what is declared and how it is said. This form of learning adopts the use of games not only engages the student but also ushers in a more comfortable learning environment which is core to learning a new language.

The present studies show that Digital Game-Based Vocabulary Learning (DGBVL) can improve short-term and long-term vocabulary retention. In the self-generated speech, vocabulary knowledge was higher among the DGBVL group than the control group; in addition, (Zou et al. 2019) opined that DGBVL enhances the comprehension of reading and listening and overall language proficiency. Due to the repetitive learning exercises that are involved in language games and the automated and quick responses obtained in the related platforms, such learning is made effective in vocabulary retention. Furthermore, the elements of motivation including attaining high scores, demography, and levels, make the learners stick to the learning of languages. This is important for the mastery of newly learned terms since constant revision is necessary for proper retention and utilization of the terms learned.

Moreover, it encourages correct behavior of learners as well as possibilities of learning outcomes that may exceed the traditional approach to education in DGBVL. Examples of game-based strategy include language repetitions, context clues, and/or any interactions with native speakers or peers especially about practicing and using the Activity in real contexts (Yudintseva, 2015). These are elements that create language use practice situations for learners, to make their practical language use. (Vnucko & Klimova, 2023) have pointed out that meaningful vocabulary games should be included in the schemes of teaching English and should be used in classroom practices. Some recommend such integration because, aside from the specified benefit of improving the acquisition of the second language's vocabulary, it motivates the learners and makes language learning more engaging.

Impact of Extramural English Activities on Vocabulary Acquisition

A study has shown that Extramural English activities, especially gaming, are critical to increasing the English Language vocabulary. Sylvén and Sundqvist (2012) in their study showed that frequent gamers had better L2 proficiency than moderate gamers and non-gamers. This infers that, since gaming is rather experimental and engaging people get numerous platforms to practice and learn language, which is not the case normally with classrooms. Playing games involves the use of language and in this respect several points include, in their exercise, the child is exposed to intelligently used and put language; and so, he handles large surfaces of language; and over time, gains in vocabulary.

Yudintseva (2015) synthesized game-enhanced learning strategies for learning a second language, and these are repetition and contextual clues within a game. These strategies help learners develop their vocabulary by using those new words in meaningful contexts to increase the chances of memorizing and using needed words. Moreover, studies by Calafato and Clausen (2024) showed that employing strategies like inferencing, referencing to the language, and note-taking while gaming were positively related to productive vocabulary knowledge. Such strategies foster interaction with the language, making the learners guess meanings, search for some definitions, and consolidate the information in writing. These active processes of learning make the whole picture of vocabulary wider and at the same time deeper.

However, EE activities have both positive and negative impacts on the process of development of children's vocabulary or other results. According to (Jones & Calafato, 2023), as much as inferencing during gaming was positive, receptive EE activities had negative implications on the productive vocabulary test scores. This goes further to suggest that while being exposed to the language as a receptor where one is not expected to respond or apply the language in any way might not be enough to improve productive vocabulary skills. In addition, Calafato and Clausen (2024) observed the modest and negative impact of playing driving games on learners' receptive vocabulary knowledge, which shows that all types of gaming activities align with language acquisition in equal measure. Consequently, these results point to the effect of type of the game and learning approaches used by the learners in the efficacy of EE activities to teach new vocabulary. It has emerged that there is a challenge of educating students on how to get to more productive and interactive EE activities which in turn enhances the usage of active language.

Expanding the Scope of Digital Games in Foreign Language Learning

This is about the progressive studies showing that technology-enhanced learning applies game playing in learning a foreign language, especially concerning the learned vocabulary. A meta-synthesis of research by Poole and Clarke (2020) regarded papers published between 2012 and 2017 and obtained 49 papers with an emphasis on vocabulary. This emphasis reflects learners' perception of the impact of digital games in enhancing their learning ability in terms of gaining new words in a foreign language. Games that involve the learners can be implemented as they retain the words explained to them through repetition and practical use of the words.

Amorphously defined Massively Multiplayer Online Role-Playing Games (MMORPG) have also become a favored genre of digital game-based language learning, particularly for EFL. Peterson et al., (2020) identified 26 articles and established that MMORPGs were the most researched kind of game. These games present lifestyle experiences where people socialize with other people, in many cases they use the target language in this process. Besides, this instructiveness not only leads to learning new terms but also helps practice other elements of language usage, including speaking and listening in the social sphere. The social and goal-based nature of MMORPGs continues to make the tools used for this type of gaming highly useful in achieving language learning goals.

Although the literature published on Digital Game-Based Language Learning (DGBLL) has expanded in recent years, research has primarily looked into vocabulary learning only, indicating the necessity of the following types of research. One trend analysis of articles published from 2010 to 2014 performed by Hung et al. showed that, out of 250 reviewed papers, only 4 of them were related to DGBLL, and the most often used research methods were mixed ones. This limited scope is a good indication of the further possibility of extending the studies to the other crucial language skills, which are reading, writing, and listening. Kazu (2023) has also noted that there is a need to conduct more large-scale research that investigates the multiple advantages of the use of digital games in language learning. This way, educators and researchers

will be able to identify and explore other possibilities of using digital games in the promotion of language in the classroom.

Role of Glossing in Second Language Vocabulary Acquisition

Glossing, especially in Computer-Assisted Language Learning (CALL) has therefore attracted considerable research attention because of the effect on the acquisition of second language (L2) vocabulary. That is why meta-analyses have established positive effects of glosses on L2 vocabulary learning with medium to large effect sizes described (Abraham, 2008; Vahedi et al., 2016; Mohsen et al., 2023). Reading strategy that entails the rendering of further information or clarification of any unfamiliar word in a text to facilitate learners' understanding and retention of the new word. The application of the glosses can help learners to refresh the vocabulary frequently and in contrast, more depth by giving them contextual information.

The studies also revealed that when presenting multiple glosses in the form of text and graphics, then it is preferable as compared to single-mode glosses. Directions 1 and 2 highlighted that including both text meanings and illustrations of words is more effective for increasing the size of the reader's vocabulary than using only one type of gloss, as concluded by (Vahedi et al., 2016). The use of several media, which includes text, pictures, and an assessment, also appears to engage the learners because it comes in a variety of formats that complement how each learner learns. Learner's proficiency level, type of text read, and sort of assessment tasks can affect the effectiveness of the glosses (Abraham, 2008; Mohsen et al., 2023). For example, recognition tests that engage learners to identify previously learned vocabulary will give a larger effect size compared to recall tests that will compel the learners to bring to memory the learned vocabulary without any prods.

However, there is voluminous evidence in the literature on the outcomes and advantages of glossing, still, certain issues prevail over the accuracy of measuring the efficiency of the procedure and fine-tuning of carrying out the practice. Thus, Boers (2021) stresses that there is a need to develop more fine-grained studies to solve problems like those regarding ecological validity, as well as the character of vocabulary acquisition from glosses. There are still many questions concerning the further effective way of gloss implementation and the extent to which glossing promotes the term retention. In particular, these aspects should be elaborated on in future studies, as well as to fine-tune the approaches used in glossing to fit different learning situations. The given gaps will be alleviated to provide the educators and researchers with a clear insight of how glossing can be used for improved vocabulary learning and retention in L2 learners.

Effectiveness of Adventure Video Games in Second Language Vocabulary Acquisition

Some current researchers have investigated the ability of adventure video games to attain media for second language (L2) vocabulary, and the findings are quite encouraging. To conclude, (Chen et al., 2020) pointed out that adventure games might enhance incidental vocabulary acquisition where learners learn various words through a game's content without direct pre-teaching. However, the study also revealed that the inclusion of L1 glosses in subtitles improves the level of vocabulary acquisition. Thus, the learners are easily able to associate the new vocabulary with the native language further enhancing understanding and recall. With the extra help, and with most adventure games being fully immersive, good vocabulary retention is facilitated in a highly efficient manner.

A subsequent study by (Chen et al., 2020) carried out that including vocabulary studies within the exercises in games means better word retention. Incorporation of the targeted vocabulary tasks into the game's structure ensures learners handle new lexical items in practice. It improves the learning process because it integrates the practice of the vocabulary within the gameplay.

Most of the exercises are expected to be repeated, this is important because repetition forms a fertile ground when it comes to vocabulary learning; the samples used also facilitate the usage of words in sentences and phrases. Thus, the link between gameplay and direct activities based on structured vocabulary helps learners achieve significant changes.

Yudintseva, (2015) reviewed works on the impact of games on learning and stated that the strategies include pronunciation practice, contextual prompts, and live speaking with native speakers. These are incorporated in adventure games to ensure the games have the highest educational value possible. (Janebi & Haghighatpasand, 2019) supported these findings by revealing that the adventure game with supplementary material overcame the control group's performance in the immediate receptive and delayed productive vocabulary tests. Thus, this evidence supports the idea that for students, adventure games are an excellent tool that can help them establish a pleasant and conducive learning environment for accomplishing the objectives of vocabulary acquisition. The introduction of extra lexical accents or practice into the adventure games improves the character of games as a useful resource to teach foreign languages, especially in terms of helping the learner to improve his/her vocabulary both in the short term and long term.

Comparative Effectiveness of Gamification Strategies: Different Approaches to Gamification

When applied to cases of learning, lots of strategies for gamification have been tried out with mixed results. (Kazazoglu, 2023) undertook a quasi-experimental study that aimed at comparing the effectiveness of gamification and storytelling integrated to improve middle school students' passthrough and their working memory when learning English. The outcomes of Mante (2013), study showed a clear trend that states that gamification has improved performances more than storytelling. Specifically, while performance on the vocabulary tests and working memory tasks was alike between the two groups, the amount of performance improvement in the gamified group exceeded that seen in the storytelling group. This implies that gamification can be more effective in that it is engaging and thus enhances learning in aspects such as language learning more than traditional methods.

Moreover, (Akgün & Samur, 2018) investigated the effectiveness of a gamified application for word acquisition specifically in the German language. This research established that the integration of the point system, the leaderboard, and the badges stimulated the learners' engagement and facilitated enhanced acquisition of studied words. All these elements increased the learners' interaction and made learning a joyful and fun process as well as increased the competitiveness of learning. Such findings confirm the benefit of applying such gamification features in the learning activities, as it was mentioned by (Kazazoglu, 2023) about the positive impact upon motivation in academic environments and, therefore, the better achievement of the learning outcomes. In both studies, the possibilities of applying gamification to modify regular educational processes with elements of the game are described. Based on the study conducted by (Kazazoglu, 2023), as well as the study done by (Akgün-Kayserilioğlu & Samur, 2018) blocked all the arguments that assert that the use of gamification boosts not only participants' engagement but also learners' achievements. In their cumulative sense, these findings affirm the present study's suggestion that there is merit in the integration of elements of game playing in the application of education, given that these could be beneficial in the attempt at improving the learning experience and results of all learners.

Learner and Educator Perceptions: Positive Attitudes Towards Gamification

Learners' and educators' general attitudes towards gamification have been found to be positive over time, indicating increased appreciation for the approach and its implications in the support

of learning. In a study involving Malaysian university students, Zainal (2023) established that they considered gamification a positive phenomenon within learning due to its fun aspect. However, the shift to the use of game-based learning has some difficulties that have to be considered. Students have challenges in adopting such formats, and most, if not all, of them find it hard to combine them with the traditional methods of learning. This suggests that, although there appears to be a plethora of possible ways to gamify learning to make it appear cooler and fun, there should be reinforcements and frameworks that facilitate its incorporation into students' learning paradigms. However, apart from the students' observations, the educators' attitude toward learning applications also has a major impact on the utilization of gamification. Weissheimer and Reis (2019) carried out an analysis of the positive effects of the Vocabox Experience, an educational tool that incorporates a game on vocabulary acquisition, and to the surprise of the researchers, both the teachers and learners acknowledged the usefulness of the tool insofar as they are in different standpoints. Teachers appreciated the systematic approach of the designed tool as it helped offer systematic methods of teaching the intended vocabulary. On the other hand, the students appreciated the aspects of the integrated elements added competition, thus making learning more interesting and fun. Such views indicate that in adopting gamification in school settings, one should take into account teachers' and students' requirements and inclinations.

The successful incorporation and reception of gamification from both sides of learning: students and instructors further substantiate the communications of gamifying education. Nevertheless, the difficulties students encounter in relation to these tools indicate the necessity of better integration and application of the features of both game-based educational solutions and more traditional approaches to learning. The studies (Zainal, 2023) and (Weissheimer & Reis, 2019) encourage the idea that to successfully implement game-based learning, an elaborated strategy and an overall understanding of the stakeholders' expectations are needed. It is only possible to achieve this by embracing a comprehensive strategy that can guarantee that the introduction of gamification in learning will improve results and make the learning process more attractive.

Challenges and Considerations: Implementing Gamified Learning

Recent studies have highlighted both the potential benefits and challenges of gamification in online learning environments. While gamified programs have been shown to enhance student engagement and motivation, their success is often inconsistent due to various factors. For instance, during the COVID-19 pandemic, the rapid shift to online learning exposed significant technical challenges, such as platform access issues and connectivity problems, which hindered effective interaction with learning materials. These technical difficulties have been widely noted as prevalent in online classes (Koh & Daniel, 2022). To address these challenges, it is crucial to provide comprehensive training and support for both students and teachers. Educators should be well-versed in gamification strategies and prepared to troubleshoot potential technical issues, thereby minimizing obstacles for students. Regular evaluation of gamification tools and methods is also essential, taking into account the evolving needs and feedback of learners to maintain the relevance and effectiveness of these strategies (Manzano et al., 2021).

However, the effectiveness of gamified learning is highly dependent on the underlying infrastructure. Educational institutions must ensure the availability of adequate technological systems and provide ongoing professional development for teachers. This approach enables the creation of a flexible learning environment that fosters student engagement and ensures equitable access to gamified education, regardless of external conditions (Koh & Daniel, 2022). In summary, while gamification holds promise for enhancing online learning, its success hinges

on addressing technical challenges, providing adequate training and support, and ensuring robust infrastructure to create an effective and inclusive educational environment.

Conclusion

This meta-analysis reinforces the value of gamification as a dynamic and effective tool for vocabulary acquisition in second language learning. Numerous studies illustrate that gamified learning methods can significantly boost learners' motivation, retention, and engagement by integrating elements like points, badges, and leaderboards. For example, (Deterding et al. 2011) highlight the motivational power of game elements. (Bakhsh, 2016) affirms the higher retention rates associated with gamified vocabulary learning, where learners experience improved performance and positive attitudes compared to traditional methods. Furthermore, the reviewed literature reveals that gamified environments are particularly impactful in facilitating long-term vocabulary retention. The studies (Chen et al., 2019); (Alfadil, 2020) observed that tools like mobile and VR games encourage sustained engagement and reinforce learning through immediate feedback and contextual practice, aligning with the findings of Tsai and Liu (2018), who documented long-term retention benefits from Digital Game-Based Learning (DGBL). Additionally, (Cancino & Castillo 2021) demonstrate the ability of gamified strategies to foster deeper learner engagement by appealing to intrinsic motivation and social cooperation within students.

However, implementing gamified learning also presents challenges, particularly in online settings, as (Johnson, 2023) notes regarding platform access and connectivity issues during the COVID-19 pandemic. Technical preparedness and continuous review of gamified tools are essential to overcome these obstacles, especially as educators strive to blend traditional and digital methods effectively.

This synthesis also reveals the key features and contextual factors that influence the success of gamified learning, offering valuable guidance to educators and policymakers. Overall, this meta-analysis contributes to the growing body of empirical evidence supporting gamification as a pedagogical tool in second-language vocabulary instruction. By identifying the approaches that elicit the most positive learner responses, it aims to optimize future vocabulary learning interventions and address gaps in the literature. Ultimately, this work provides a solid foundation for advancing gamified teaching methods to enhance students' language learning experiences and instructional outcomes (Deterding et al., 2011; Godwin-Jones, 2014). Future research should continue to explore how gamification methods can be refined and applied to address diverse learning needs and contexts, thus ensuring gamified learning's sustainable integration into language education.

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