Digital Games for Learning Vocabulary: The Effects on Foreign Language Anxiety, Buoyancy, Online Engagement, and Vocabulary Learning

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Abstract

This study explored the effects of Digital Game-Based Vocabulary Learning (DGBVL) on foreign language anxiety, academic buoyancy, engagement, and vocabulary learning among English as a Foreign Language (EFL) learners. The research utilized a quasi-experimental design with pretest-posttest control groups. Participants were 40 lower-intermediate EFL, randomly assigned to experimental and control groups. Foreign language anxiety was

measured using Spielberger's State-Trait Anxiety Inventory (STAI), academic buoyancy with Martin and Marsh's scale, and engagement with Dixon's scale. Vocabulary learning was assessed through teacher-made tests. Results indicated that DGBVL significantly reduces foreign language anxiety, enhances academic buoyancy, increases engagement, and improves vocabulary learning compared to traditional instruction. The study underscores the potential of DGBVL in creating dynamic and effective language learning environments, urging educators, materials developers, policymakers, and syllabus designers to consider its integration into language education practices. Future research should explore long-term effects and applicability across different proficiency levels.

Keywords: academic buoyancy, digital game-based vocabulary learning, foreign language anxiety, online engagement, vocabulary learning

Introduction

Vocabulary is a fundamental part of a language, and acquiring new words is crucial to language teaching (Schmitt, 2008). However, mastering the meaning and use of new words in a second or foreign language is complex, involving various knowledge components such as spelling, pronunciation, definition, part of speech, and typical collocations (Nation, 2001). Vocabulary learning is not immediate but incremental, with different aspects acquired at various times (Abdulrazzaq & Abdellatif, 2023). This means that understanding a word develops progressively over numerous encounters. Despite this, many language learners find vocabulary learning tedious and demanding, requiring focused attention on subtle differences in meaning. Unfortunately, learning outcomes are often disappointing due to declining memory retention. As a result, many learners feel frustrated and seek more effective vocabulary learning methods (Nation, 2001).

Digital games have demonstrated significant potential for improving vocabulary acquisition in recent years. Researchers suggest that digital games provide a platform for experimentation in a secure virtual environment (Reinders, 2012). The body of literature on DGBVL has expanded considerably over the past decade. Numerous studies in this field report positive impacts of DGBVL activities on general and specialized/technical vocabulary learning (Chen et al., 2018; Zou et al., 2021, among others). These studies indicate that DGBVL tasks offer unique opportunities to enhance vocabulary learning more effectively than traditional paper-and-pencil methods.

Language anxiety encompasses the unease, fear, and stress individuals encounter when using or learning a second language (Ellis, 2015). It can create obstacles in speaking, writing, and comprehending the target language. Language anxiety can severely impede language acquisition by diminishing learners' confidence and motivation. Ellis (2015) notes that language anxiety can stem from various sources, including the fear of making mistakes, being judged by others, or feeling inferior to native speakers. This anxiety often results in avoidance behaviors and disrupts learners' active engagement in language learning activities.

According to Horwitz et al. (1986), language anxiety is a complex phenomenon influenced by individual differences, classroom dynamics, and cultural factors. Recognizing and addressing language anxiety is crucial for creating supportive learning environments that promote effective language acquisition and communication skills.

Academic buoyancy pertains to emotional regulation and refers to an individual's ability to manage setbacks. In this context, emotions are mental responses to distressing or unsettling events (Abdellatif, 2022; Collie et al., 2015; Namaziandost et al., 2023; Putwain et al., 2012). Academic buoyancy is vital for enhancing academic engagement and mitigating the negative impacts of academic anxiety on student involvement (Martin & Marsh, 2009). Daily challenges and concerns can undermine students' confidence and persistence, affecting their motivation and participation in the learning process (Martin et al., 2017). While related to resilience, buoyancy fundamentally differs as it focuses on managing everyday academic challenges rather than severe adversity or significant threats to growth, such as prolonged isolation, self-disability, hostility, or alienation from peers in a school context (Martin & Marsh, 2009).

Engagement involves showcasing learning motivation, where learners direct energy and effort toward achieving specific educational goals (Reschly & Christenson, 2012; Schunk & Mullen, 2012). Student engagement is characterized by three interconnected dimensions: behavioral, emotional, and cognitive engagement. Behavioral engagement refers to active participation in learning activities, such as asking questions and completing assignments (Fredricks et al., 2004). Emotional engagement relates to students' feelings about teachers, peers, or the learning process, including interest, boredom, happiness, sadness, and anxiety during a course (Skinner & Belmont, 1993). Cognitive engagement centers on the depth of investment in learning, focusing on a psychological commitment to mastering knowledge and skills rather than just completing tasks (Fredricks et al., 2004). Consequently, cognitive engagement can be understood as students' comprehension of the subject matter being taught (Rotgans & Schmidt, 2011).

Despite the recognized importance of vocabulary acquisition in language learning, many learners struggle with traditional methods, finding them tedious and resulting in poor retention and engagement. This often leads to frustration and heightened language anxiety, further impedes effective learning. Additionally, managing everyday academic challenges, known as academic buoyancy, and maintaining high levels of engagement are critical for successful language acquisition. However, there is limited research on how innovative approaches, such as DGBVL, can address these issues. This study aims to explore the effects of DGBVL on vocabulary learning, foreign language anxiety, academic buoyancy, and online engagement, seeking a comprehensive understanding of its potential benefits in language learning.

The significance of this study lies in its potential to revolutionize language learning by integrating DGBVL into educational practices. By investigating the effects of DGBVL on vocabulary learning, foreign language anxiety, academic buoyancy, and online engagement, this research could provide valuable insights into more effective and engaging methods of vocabulary acquisition. The findings may reveal how digital games can mitigate the challenges associated with traditional vocabulary learning, such as low retention rates and high anxiety levels, thereby enhancing overall learner experience and outcomes. Moreover, this study could inform educators, curriculum designers, and policymakers about the benefits of incorporating digital games into language learning programs, ultimately contributing to developing more innovative, supportive, and effective language education strategies.

Literature Review

Digital games and language learning

Computer technology is rapidly advancing, particularly DGBVL, with billions of dollars being invested in this sector (McDonald, 2017), leading to the production of high-quality games. Children are already dedicating significant amounts of time to these DGBVL (Prensky, 2007; Sylvén & Sundqvist, 2012; Williams, 2003), which has inspired scholars to explore their potential for language learning over the past few decades (Kettemann, 1995; Sylvén & Sundqvist, 2012). This initiative, known as game-based learning, is defined by Tsai and Fan (2013) as any effort integrating or combining video games with education.

In language learning, Reinhardt and Sykes (2012) differentiate between game-based and game-enhanced language learning. This distinction primarily concerns the type of DGBVL used: educational DGBVL for the former and commercial DGBVL for the latter. It is arguable that commercial DGBVL, focusing on aesthetic features, offers more enjoyment and fun than educational DGBVL. However, commercial DGBVL is not specifically designed for language learning and, thus, does not prioritize teaching English. Reinhardt and Sykes (2012) suggest that research should explore both types of DGBVL to identify their strengths and improve the practice of second language acquisition through DGBVL.

Three notable meta-analytic studies have examined DGBVL. One such study by Tsai and Tsai (2018) analyzed 26 empirical studies within L2 contexts. This study identified four conditions based on Mayer's (2015) taxonomy of research designs for digital game-based learning. In Condition 1, the experimental group (using video games) was compared to the control group (engaged in non-game-related activities), revealing a large overall effect size favoring video games. Condition 2 compared groups using video games with specific features added or modified against those using the base versions, resulting in a medium overall effect size. Condition 3 involved comparing the effectiveness of playing a digital game with learning via traditional media, showing a medium to large overall effect size in favor of digital games. In Condition 4, participants played the same digital game but were grouped based on non-game-related variables, yielding a non-significant effect size. Thus, Tsai and

Tsai's (2018) study provides substantial evidence supporting the effectiveness of digital games in vocabulary learning.

In another meta-analytic study, Chen et al. (2018) assessed the effectiveness of DGBVL using Csikszentmihalyi's (1990) Flow Theory as a framework, analyzing ten studies. They found a large overall effect size for DGBVL. Game design emerged as the only significant moderator influencing the effectiveness of DGBVL, as game-related factors were directly linked to the level of challenge in the games (Chen et al., 2018). Consequently, the researchers suggested adding a hierarchy to the challenge axis in Flow Theory, positioning adventure games above non-adventure games. This is because the dynamic balance between challenge and learner abilities operates independently of learner-related factors such as age or linguistic background (Chen et al., 2018).

In a prior investigation, Chiu et al. (2012) conducted a meta-analysis of 14 studies concerning DGBVL. They found meaningful and engaging games resulted in a significant effect size, whereas drill and practice games yielded a smaller effect size. This difference was attributed to the interactive and negotiating opportunities provided by the former, which led to greater learning outcomes.

Foreign language anxiety

Second language (L2) anxiety has long been recognized as a significant factor influencing the success or failure of L2 learning endeavors. It encompasses feelings of tension and apprehension specifically linked to second language contexts such as speaking, listening, and learning (MacIntyre & Gardner, 1994). This anxiety manifests in various forms, including state-trait anxiety arising from temporary situations or inherent personality traits (Spielberger, 1983), facilitative-deliberative anxiety, which can either motivate or hinder L2 learning progress (Scovel, 1978), and, notably for our investigation, situation-specific anxiety stemming from L2 learning experiences. Such anxieties include communication apprehension, fear of negative evaluations, or test anxiety (Horwitz, 2001).
Horwitz et al. (1986) delineate language anxiety as a multifaceted construct comprising self-perceptions, beliefs, emotions, and actions intertwined with classroom language learning, a product of the unique nature of language acquisition processes. It's important to note that this anxiety is specifically linked to language learning scenarios occurring in controlled environments, such as language classrooms, rather than natural language immersion experiences while traveling or residing abroad. Within the realm of foreign language classrooms, Horwitz et al. (1986) identify three interconnected types of anxiety: (a) communication apprehension, (b) fear of negative evaluation, and (c) test anxiety. Communication apprehension pertains to an individual's apprehension or concern regarding actual or potential interactions with others (McCroskey, 1984). Test anxiety, conversely, refers to the apprehension towards the repercussions of inadequate performance in evaluative situations (Sarason, 1984). Fear of negative evaluation encompasses anxiety surrounding

being judged by others, distress over anticipated negative assessments from others, and the expectation of unfavorable evaluations (Watson & Friend, 1969).

Academic Buoyancy

Buoyancy, a psychological concept rooted in optimism, is the ability to confront challenges with a positive outlook (Jahedizadeh et al., 2019). Grounded in positive psychology, which underscores the significance of emotions in educational contexts, academic buoyancy finds its basis (Agudo, 2018). In domains where issues are prevalent, buoyancy signifies the capacity to navigate and surmount obstacles (Martin & Marsh, 2020). Within L2 learning settings, it pertains to the adeptness in addressing and overcoming the challenges inherent in language acquisition and instruction (Yun et al., 2018). Both internal and external factors influence this construct. External factors pertain to instructional environments that foster interpersonal communication skills and academic resilience (Comerford et al., 2015).

Internal factors encompass autonomy, motivation, self-efficacy, confidence, and high self-esteem (Anderson et al., 2020). Key tenets associated with academic buoyancy include leveraging strengths rather than fixating on weaknesses and approaching challenges proactively rather than reactively (Martin & Marsh, 2020).

Academic buoyancy has been linked to several terms, including coping, resilience, hardiness, and immunity, each with subtle distinctions. While sharing a theoretical foundation, these terms diverge in their focus. For instance, resilience tends to overlook the common challenges faced in students' academic lives (Phan & Ngu, 2014). Furthermore, buoyancy emphasizes navigating the varied and healthy challenges encountered in educational contexts, whereas resilience typically addresses a narrower set of extreme cases (Martin & Marsh, 2020). Immunity, synonymous with buoyancy, denotes protective measures to mitigate the controversies, distractions, and harm affecting one's identity, motivation, and practice (Hiver, 2017). Hardiness, akin to buoyancy, aids in coping with and minimizing the impact of stress, suggesting approaches to reduce stressors or alter individuals' perceptions (Hiver & Dörnyei, 2017; Somerfield & McCrae, 2000).

Engagement

Researchers have approached the comprehension of learner engagement from diverse angles, recognizing its multifaceted nature involving various components. In their investigation of student engagement within U.S. educational settings, Anderson et al. (2004) delineated a taxonomy consisting of four categories: behavioral, academic, cognitive, and psychological. The behavioral aspect encompasses activities like attendance and participation, while the academic dimension includes learning time and task engagement. Cognitive engagement centers on learning strategies and self-regulated learning, whereas psychological engagement relates to relationships with teachers, peers, and feelings of belonging. They argue that this taxonomy offers heuristic value for a comprehensive grasp

of students' performance and experiences in school. In their review of 44 studies on student engagement, Fredricks et al. (2004) identified three key dimensions: behavioral, emotional, and cognitive. Behavioral engagement involves positive behavior, task involvement, time allocation, and participation in academic and extracurricular activities. Emotional engagement encompasses emotional displays, attitudes towards educators and peers, and feelings of belonging. Cognitive engagement focuses on personal investment in learning, strategy utilization, and self-regulation. In Canada's secondary education context, Dunleavy (2008) categorized learner engagement into three dimensions: behavioral, academic-cognitive, and social-psychological.

In contrast to alternative models, Fredricks et al.'s (2004) three-dimensional engagement model appears more suitable for analyzing language learning. This model integrates behavioral, emotional, and cognitive dimensions, covering extensively researched areas in language learning studies such as motivation, affective orientations, cognitive traits, and learning strategies (e.g., Bailey, 1983; Dörnyei & Skehan, 2003; Garrett & Young, 2009; Griffiths, 2015; Oxford, 2003). This tripartite conceptualization has been applied in studies on corrective feedback in SLA and L2 writing (Zhang, 2017; Zhang & Hyland, 2018, 2022), where engagement is crucial for feedback uptake and writing enhancement. Emotional engagement has been scrutinized for affective responses, attitudinal reactions, and motivational changes, while cognitive engagement has been operationalized through cognitive and metacognitive strategies.

Despite the increasing investment and interest in DGBVL, many questions remain regarding their effectiveness in addressing challenges such as vocabulary learning, foreign language anxiety, academic buoyancy, and engagement. While meta-analytic studies have provided valuable insights into the benefits of DGBVL for vocabulary learning (Chen et al., 2018; Chiu et al., 2012; Tsai & Tsai, 2018), gaps persist in understanding how these games impact learners' emotional and cognitive experiences. Additionally, the complex nature of foreign language anxiety (Horwitz et al., 1986), academic buoyancy (Jahedizadeh et al., 2019), and engagement (Dunleavy, 2008; Fredricks et al., 2004) warrants further investigation within the context of DGBVL. Addressing these gaps is crucial for informing the design and implementation of effective language learning interventions, ultimately enhancing learners' experiences and outcomes in second language acquisition. Thus, the following research questions are raised:

1. Does DGBVL have any effect on EFL learners' foreign language anxiety?
2. Does DGBVL have any effect on EFL learners' academic buoyancy?
3. Does DGBVL have any effect on EFL learners' online engagement?
4. Does DGBVL have any effect on EFL learners' vocabulary learning?

Method

Design and Participants

This study employs a quasi-experimental design utilizing a pretest-posttest control group framework to investigate the effects of DGBVL on vocabulary learning, foreign language anxiety, academic buoyancy, and online engagement. Participants are divided into an experimental group and a control group. The experimental group engages in DGBVL activities, while the control group follows traditional vocabulary learning methods. Both groups undergo a pretest to assess their initial levels of vocabulary knowledge, language anxiety, academic buoyancy, and engagement.

The participants in this study were selected from two intact classes. Based on the institute's placement test, all participants were identified as lower-intermediate learners of English. Each class consisted of 20 participants, resulting in 40 participants for the study. These two classes were randomly divided into experimental and control groups, with 20 participants in each group. The age of the participants ranged from 18 to 24 years. The gender distribution was equal in both groups, ensuring a balanced representation.

Instrumentations

Spielberger's (1983) STAI scale was employed to measure foreign language anxiety. The STAI is a widely recognized instrument that assesses both state and trait anxiety, providing a comprehensive understanding of the participants' anxiety levels in language learning contexts.

The well-established scale developed by Martin and Marsh (2008) was utilized for the pivotal concept of academic buoyancy. This reliable instrument is trusted for its precision in gauging learners' emotional resilience and ability to manage everyday academic challenges.

Dixon's (2015) scale was used to assess online engagement. This scale effectively measures various dimensions of student engagement in an online learning environment, capturing the extent of their behavioral, emotional, and cognitive involvement.

Additionally, a teacher-made test was developed and validated to evaluate the effect of DGBVL on vocabulary acquisition and learning. This test was administered to both the experimental and control groups as part of the pretest and posttest, ensuring that the participants' vocabulary knowledge was accurately assessed before and after the intervention.

Instructional Procedures

Participants in the experimental group received DGBVL as the treatment intervention. This involved engaging with specially designed digital games to enhance vocabulary acquisition in a fun and interactive manner. Throughout the intervention period, participants in the experimental group actively participated in DGBVL sessions, where they interacted with vocabulary-related games and exercises on digital platforms. These activities provided opportunities for repeated exposure to target vocabulary words, reinforcement of word meanings through context, and practice in various language skills such as listening, speaking, reading, and writing.

Conversely, participants in the control group received traditional teacher-fronted sessions and relied on conventional methods such as vocabulary lists, teacher explanations, and translation of words and sentences. These sessions followed a structured format, with the instructor presenting new vocabulary items and providing answers and examples to aid understanding. While the control group did not engage in DGBVL activities, they received comparable exposure to target vocabulary through teacher-led instruction and practice exercises. The control group emphasized traditional teaching methods, focusing on explicit instruction and rote memorization of vocabulary items.

Both groups received equal instructional time and attention throughout the study period to ensure fairness and consistency in treatment conditions. The treatment phase lasted for a predetermined duration, during which participants in both groups underwent the intervention per the study protocol. This careful design aimed to isolate the effects of DGBVL on vocabulary learning, allowing for a clear comparison between the two instructional methods.

Data Analysis Procedures

Several statistical analyses will be conducted to evaluate the impact of DGBVL on foreign language anxiety, academic buoyancy, online engagement, and vocabulary learning. First, to assess the effect of DGBVL on foreign language anxiety, we compared the number of learners classified as anxious in the pretest and posttest phases. Similarly, for academic buoyancy, we counted the number of buoyant and unbuoyant learners in both the pretest and posttest. The same procedure was applied to measure online engagement by counting the number of engaged and unengaged participants before and after the intervention. We conducted chi-square tests to analyze these categorical data and determine whether there are significant differences between the pretest and posttest within each group. These tests helped identify any considerable shifts in the number of anxious, buoyant and engaged learners due to the DGBVL intervention.

Additionally, to examine the effect of DGBVL on vocabulary learning, we compared the mean vocabulary test scores of the experimental and control groups from the pretest and posttest. Since we are comparing the means of two groups, an independent samples t-test was performed (Pallant, 2020). This t-test determined whether there were statistically significant differences in vocabulary learning outcomes between the group that received DGBVL and the group that underwent traditional teacher-fronted sessions.

These analyses provide a comprehensive understanding of the effects of DGBVL on the various aspects of language learning being investigated in this study.

Results

The effect of DGBVL on EFL learners' foreign language anxiety

As we wanted to study the impact of DGBVL on EFL learners' foreign language anxiety, two chi-squares were conducted, one on the pretest and the other on the posttest.

Table 1.

Crosstabulation of Anxiety on the Pretest

		Anxiety pretest		Total
		anxious	unanxious	
Group	experimental	18	2	20
	control	17	3	20
Total		35	5	40

As Table 1 shows, there were 18 anxious learners in the experimental group and 17 anxious learners in the control group before the intervention.

Table 2.

Chi-Square Tests of anxiety on the pretest

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.229	1	.633		
Continuity Correction	.000	1	1.000		
Likelihood Ratio	.230	1	.632		
Fisher's Exact Test				1.000	.500
Linear-by-Linear Association	.223	1	.637		
N of Valid Cases	40				

Table 2 shows that the difference between the experimental and the control group in terms of anxiety was not significant on the pretest.

Table 3.

Crosstabulation of Anxiety on the Posttest

		Anxiety posttest		Total
		anxious	unanxious	
Group	experimental	6	14	20
	control	16	4	20
Total		22	18	40

Table 3 shows that on the posttest, six anxious learners were in the experimental group. However, there were 16 anxious learners in the control group.

Table 4.

Chi-Square Tests of Anxiety on the Posttest

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.101	1	.001		
Continuity Correction	8.182	1	.004		
Likelihood Ratio	10.600	1	.001		
Fisher's Exact Test				.004	.002
Linear-by-Linear Association	9.848	1	.002		
N of Valid Cases	40				

According to Table 4, the difference between the two groups in terms of anxiety on the posttest was significant ($p < .05$). Thus, DGBVL reduced the experimental group's anxiety.

The effect of DGBVL on EFL learners' academic buoyancy

Just as what went above, chi-squares were needed to measure the differences in EFL learners' academic buoyancy exposed and unexposed to DGBVL.

Table 5.

Crosstabulation of Buoyancy on the Pretest

		Buoyancy pretest		Total
		buoyant	unbuoyant	
Group	experimental	3	17	20
	control	1	19	20
Total		4	36	40

Table 5 indicates that on the pretest, only a few learners (3 learners in the experimental group and just one learner in the control group) were identified as buoyant learners.

Table 6.

Chi-Square Tests of academic Buoyancy on the pretest

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.111	1	.292		
Continuity Correction	.278	1	.598		
Likelihood Ratio	1.158	1	.282		
Fisher's Exact Test				.605	.302
Linear-by-Linear Association	1.083	1	.298		

N of Valid Cases	40

Table 6 indicates that the difference between the two groups was not significant on the pretest ($p > .05$).

Table 7.

Crosstabulation of Buoyancy on the Posttest

		Buoyancy posttest		Total
		buoyant	unbuoyant	
Group	experimental	18	2	20
	control	4	16	20
Total		22	18	40

Table 7 demonstrates that after the treatment, 18 learners in the experimental group were buoyant, while only 4 participants in the control group were buoyant.

Table 8.

Chi-Square Tests of Buoyancy on the Posttest

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.798	1	.000		
Continuity Correction	17.071	1	.000		
Likelihood Ratio	22.032	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	19.303	1	.000		
N of Valid Cases	40				

Table 8 illustrates a significant difference between the two groups on the posttest regarding academic buoyancy. Thus, DGBVL enhanced the experimental group's buoyancy.

The effect of DGBVL on EFL learners' engagement

Chi-squares were conducted to investigate the potential of DGBVL on EFL learners' engagement.

Table 9.

Crosstabulation of Engagement on the Pretest

		Engagement pretest		Total
		engaged	disengaged	
Group	experimental	5	15	20
	control	4	16	20

Total	9	31	40

Table 9 shows that on the pretest, only five learners in the experimental group and four learners in the control group were engaged.

Table 10.

Chi-Square Tests of Engagement on the Pretest

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.143	1	.705		
Continuity Correction	.000	1	1.000		
Likelihood Ratio	.144	1	.705		
Fisher's Exact Test				1.000	.500
Linear-by-Linear Association	.140	1	.708		
N of Valid Cases	40				

Table 10 indicates a non-significant difference between the two groups on the pretest ($p > .05$).

Table 11.

Crosstabulation of Engagement on the Posttest

		Engagement posttest		Total
		engaged	disengaged	
Group	experimental	14	6	20
	control	6	14	20
Total		20	20	40

Table 11 indicates that 14 learners in the experimental group and 6 learners in the control group were engaged post-intervention.

Table 12.

Chi-Square Tests of Engagement on the Posttest

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	6.400	1	.011		
Continuity Correction	4.900	1	.027		
Likelihood Ratio	6.583	1	.010		
Fisher's Exact Test				.026	.013

Linear-by-Linear Association	6.240	1	.012
N of Valid Cases	40		

Table 12 demonstrates a significant difference between the two groups on the posttest of engagement ($p < .05$). That is, DGBVL increased the experimental group's engagement.

The effect of DGBVL on EFL learners' vocabulary learning

T-tests were needed to measure the effect of DGBVL on EFL learners' vocabulary learning.

Table 13.

Group Statistics on the Pretest

	Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest scores	experimental	20	3.350	1.496	.334
	control	20	3.150	1.694	.378

Table 13 shows that the experimental group ($N = 20$, $M = 3.350$, $SD = 1.496$) performed similarly to the control group ($N = 20$, $M = 3.150$, $SD = .378$).

Table 14.

Independent Samples Test on the Pretest

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Pretest scores	Equal variances assumed	.297	.589	.396	38	.695	.200	.505	-.823	1.223
	Equal variances not assumed			.396	37.428	.695	.200	.505	-.823	1.223

Table 14 shows that on the pretest, the difference between the two groups in terms of vocabulary learning was not significant ($t = .396$, $df = 35$, $p > .05$).

Table 15.
Group Statistics on the Posttest

	Group	N	Mean	Std. Deviation	Std. Error Mean
Posttest scores	experimental	20	10.900	4.089	.914
	control	20	3.900	1.916	.428

Table 15 demonstrates that the experimental group (N = 20, M = 10.900, SD = 4.089) outperformed the control group (N = 20, M = 3.900, SD = 1.916) on the posttest.

Table 16.
Independent Samples Test on the Posttest

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Posttest scores	Equal variances assumed	8.956	.005	6.931	38	.000	7.000	1.009	4.955	9.044
	Equal variances not assumed			6.931	26.962	.000	7.000	1.009	4.927	9.072

Table 16 shows a significant difference between the two groups post-treatment (t = 6.931, df = 38, p = .001).

Discussion

The findings of this study highlight the significant impact of DGBVL on EFL learners' foreign language anxiety, academic buoyancy, engagement, and vocabulary learning. The results provide compelling evidence for the effectiveness of DGBVL in enhancing various aspects of language learning and emotional regulation.

The analysis revealed a substantial reduction in foreign language anxiety among learners in the experimental group following the DGBVL intervention. Initially, the experimental and control groups had a similar number of anxious learners. However, post-intervention, the number of anxious learners in the experimental group decreased significantly compared to the control group. This finding suggests that digital games can

create a low-stress environment that promotes experimentation and reduces anxiety. The interactive and engaging nature of digital games likely contributed to this reduction by making language learning more enjoyable and less intimidating.

The study also demonstrated a significant increase in academic buoyancy among learners exposed to DGBVL. While both groups started with few buoyant learners, the experimental group showed a remarkable improvement post-intervention. This suggests that DGBVL not only aids in vocabulary acquisition but also enhances learners' emotional resilience and ability to handle academic challenges. The supportive and interactive elements of digital games, which encourage persistence and provide immediate feedback, may foster a sense of accomplishment and resilience. This enhancement in buoyancy is crucial, as it can lead to greater engagement and sustained effort in language learning.

The increase in engagement levels among the experimental group further underscores the benefits of DGBVL. The significant difference in engagement post-intervention indicates that digital games can effectively capture learners' interest and motivate them to participate actively in language learning activities. This finding highlights the motivational aspects of game-based learning. By incorporating elements of fun and challenge, DGBVL likely made the learning process more appealing, thereby increasing overall student engagement.

Finally, the study confirmed the positive impact of DGBVL on vocabulary learning. The experimental group significantly outperformed the control group in the posttest, indicating that digital games are a powerful tool for enhancing vocabulary acquisition. The interactive and repetitive nature of digital games likely facilitated better learning of vocabulary items by providing learners with multiple exposures to the target words in various contexts. This finding supports the notion that DGBVL can be more effective than traditional methods in promoting vocabulary learning.

Our study revealed a significant reduction in foreign language anxiety among learners in the experimental group following the DGBVL intervention. This is consistent with Horwitz et al. (1986), who emphasized the multifaceted nature of language anxiety, including communication apprehension, fear of negative evaluation, and test anxiety. The reduction in anxiety can be attributed to the interactive and engaging nature of digital games, which create a less intimidating learning environment, as Reinders (2012) suggested. The findings support that DGBVL can alleviate situation-specific anxiety in controlled classroom environments, making language learning more enjoyable and less stressful.

The significant increase in academic buoyancy among the experimental group aligns with the positive psychology framework underpinning this construct. Martin and Marsh (2020) highlighted the importance of buoyancy in navigating and overcoming challenges in academic contexts. Our results suggest that DGBVL not only aids in vocabulary acquisition but also fosters learners' resilience and optimism, which are crucial for tackling the inherent difficulties of language learning. This finding resonates with the work of Jahedizadeh et al.

(2019), who linked buoyancy to positive outlooks and the ability to confront academic challenges. The interactive nature of digital games, which encourages persistence and provides immediate feedback, likely contributes to this enhanced buoyancy.

The increase in engagement levels among learners exposed to DGBVL aligns with the findings of Fredricks et al. (2004), who conceptualized engagement in behavioral, emotional, and cognitive dimensions. Our study supports the notion that digital games can effectively capture learners' interest and motivate active participation, which is crucial for effective learning. The interactive and immersive elements of digital games make learning more appealing, thereby increasing overall engagement. This is consistent with Chen et al. (2018), who emphasized the motivational aspects of game-based learning and its ability to sustain learners' interest.

Our study confirmed the positive impact of DGBVL on vocabulary learning, with the experimental group significantly outperforming the control group. This supports the findings of Chiu et al. (2012) and Tsai and Tsai (2018), who reported substantial effect sizes for digital games in vocabulary learning. The interactive and repetitive nature of digital games facilitates multiple exposures to target vocabulary in various contexts, enhancing retention (Schmitt, 2000). The results indicate that DGBVL can be more effective than traditional methods in promoting vocabulary learning.

The findings of this study suggest that incorporating DGBVL into language instruction can significantly reduce learners' foreign language anxiety, enhance their academic buoyancy, and increase their engagement. This implies that integrating digital games into the curriculum could create a more supportive and motivating learning environment for language teachers. Teachers should consider using commercial digital games that are enjoyable and relevant to the language content. By doing so, they can cater to diverse learning styles and needs, making language learning more interactive and less intimidating. Additionally, training sessions for teachers on effectively implementing DGBVL in their classrooms would be beneficial in maximizing the potential of these digital tools.

For materials developers, the positive impact of DGBVL on various learner outcomes underscores the importance of designing educational digital games that are engaging and pedagogically sound. Developers should focus on creating games that balance entertainment with educational value, ensuring that language learning objectives are seamlessly integrated into the gameplay. This study highlights the need for games to address emotional factors such as anxiety and buoyancy, suggesting that features promoting self-efficacy and resilience should be incorporated. Furthermore, materials developers should collaborate with educators to create content that aligns with curricular goals and language proficiency levels, ensuring that digital games are effective tools for language acquisition.

Policymakers should recognize the potential of DGBVL to enhance language learning outcomes and consider supporting the integration of digital games into educational frameworks. This study proves that DGBVL can significantly improve learners' vocabulary learning, reduce anxiety, and increase engagement and academic buoyancy. Consequently, policymakers should advocate for funding and resources to develop and implement digital game-based learning initiatives in schools and language institutes. Policies should also support teacher training programs focused on digital literacy and the pedagogical use of games in the classroom. By prioritizing technology integration in education, policymakers can help create more effective and engaging learning environments that cater to the needs of modern learners.

Conclusion

This study aimed to investigate the impact of DGBVL on EFL learners' foreign language anxiety, academic buoyancy, engagement, and vocabulary learning. The findings revealed that DGBVL significantly reduces foreign language anxiety, enhances academic buoyancy, increases engagement, and improves vocabulary learning outcomes. These results align with previous research, underscoring the potential of DGBVL to create a more dynamic and supportive language learning environment. The study highlights the importance of integrating digital game-based approaches into language instruction, offering compelling evidence that such methodologies can address both the affective and cognitive aspects of language acquisition. Consequently, educators, materials developers, policymakers, and syllabus designers are encouraged to consider the incorporation of DGBVL in their practices to foster more effective and engaging language learning experiences. This study contributes to the growing literature on digital game-based learning, providing a strong case for the continued exploration and application of digital technologies in language education. Future research should further explore the long-term effects of DGBVL and its impact on different language skills and proficiency levels.

Despite the valuable insights gained from this study, several limitations must be acknowledged. Firstly, the study was conducted within a specific context with lower-intermediate EFL learners, limiting the generalizability of the findings to other contexts and learner populations. Secondly, the study employed a relatively short intervention period, and the long-term effects of DGBVL on language learning and anxiety were not explored. Additionally, the study relied on self-report measures for assessing variables such as foreign language anxiety and academic buoyancy, which may introduce response biases. Furthermore, the study did not consider individual differences among learners, such as prior gaming experience or learning preferences, which could influence the effectiveness of DGBVL.

Several avenues for further research are proposed to address the limitations and extend our understanding of the effects of DGBVL on language learning. Firstly, future

studies could replicate the current research in diverse educational settings and with different learner populations to ascertain the generalizability of the findings. Longitudinal studies are warranted to investigate the sustained impact of DGBVL on vocabulary retention, anxiety reduction, and academic buoyancy over time. Additionally, mixed-methods approaches incorporating qualitative data collection methods could provide deeper insights into learners' experiences and perceptions of DGBVL. Furthermore, research exploring individual differences, such as cognitive styles, gaming preferences, and cultural backgrounds, may elucidate the moderating factors influencing the effectiveness of DGBVL. Finally, comparative studies examining the efficacy of various digital games and their specific features in language learning could inform the design of more tailored and effective interventions. Future research can contribute to refining DGBVL practices and their integration into language education pedagogy by addressing these avenues.

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