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DIGITAL GAME-BASED LANGUAGE LEARNING IN PRIMARY EDUCATION: EXPLORING MOTIVATIONAL FACTORS AND EDUCATIONAL OUTCOMES

Abstract

The objective of this study was to assess the efficacy of Digital Game-Based Language Learning (DGBLL) in promoting greater pupil involvement in language acquisition at the primary school level. Three groups of grade four students were examined in this study: a control group that received conventional teaching strategies, an experimental group that utilized Kahoot and Quizizz, and a second experimental group that played digital games competitively. The researchers evaluated students' motivation and attitudes toward the use of gamification in language learning via pre-tests, post-tests, and questionnaires. The experimental groups showed superior performance and increased motivation, with the strongest performance experienced in the second experimental group which added competition to the learning process. The findings suggest that the integration of DGBLL and peer competition with gamified formative assessment tools significantly enhances language learning by introducing a captivating, efficient, and flexible method for language instruction. This study offers useful insights into the possibilities of gamification in language learning and evaluation, emphasizing its importance in modern educational practices.

Keywords: game-based, digital games, foreign language, education, motivation, competence.

Basic provisions. Digital Game-Based Language Learning (DGBLL) is a method that combines theory and practice to enhance language learning outcomes. The study assesses the efficacy of DGBLL in promoting greater pupil involvement in language acquisition at the primary school level. The current study reveals that DGBLL (Digital Game-Based Language Learning) significantly enhances motivation and educational outcomes in language acquisition through the integration of interactive and competitive elements. The integration of digital games into language instruction has the potential to convert tedious or repetitious content into engaging and interactive learning experiences. As the allure of games is frequently predicated on the interplay between triumph and defeat, it is critical that instructors effectively convey the instructional objectives of gamified language exercises. The principal advantage for pupils lies in the gain of fresh knowledge, specifically in domains like grammar and vocabulary.

Introduction. Kazakhstan's Ministry of Education has formulated pioneering instructional methodologies in response to the swift technological progress occurring on the global stage. Evidence of this is found in the address of the head of state which referred directly to improving digital literacy and supporting Kazakhstani teachers and student learning (Tokayev, 2023). Prior research has examined how learners' behaviors in Digital Game-Based Language Learning (DGBLL) environments affect their learning outcomes as teaching methods continue to evolve in tandem with scientific and technological progress (Lin et al., 2018; Chen et al., 2019; Wang et al., 2020), and the purpose of this research is to add to the body of knowledge through examining the impact of information literacy on the competitiveness of students who are studying English as a second language.

In primary education, DGBLL has emerged as a promising approach to teaching and learning foreign languages (Huang et al., 2013) and as educators and researchers aim to better understand the nature and processes of DGBLL's impact on language learning, the exploration of motivational factors and cognitive outcomes becomes essential. The current project investigates correlations

among the characteristics of two digital games, the perceived level of motivational support among learners, and the level of learner cognitive investment. In other words, this research seeks to enhance the comprehension of how DGBLL may efficiently facilitate language acquisition in elementary school.

Materials and Methods. Educators frequently implement Digital Game-Based Learning (DGBL) to alleviate the monotony of the classroom. The appeal of digital educational games lies in their engaging attributes, enjoyable setting, artistic excellence, well-organized structure, instructional objectives, and gameplay aspect. Modern learning tools and contemporary media are seen as means that enhance education to a higher level (Azïmova, 2022). When used effectively inside a well-organized educational system that includes specific goals, strategic planning, and assessment, digital educational games may be categorized as interactive learning environments.

Educational games are designed with specific educational outcomes in mind, offering structured environments for students to explore complex concepts and practice skills in real-life scenarios (Giannakoulas & Xinogalos, 2023). These games can be serious games or game-based simulations, allowing students to deepen their understanding of the subject matter. Recreational games, although not primarily designed for educational purposes, can still be potent learning tools, engaging users through compelling narratives, high-quality graphics, and immersive gameplay (Amanbay & Zəwirbekov, 2023). Educators can leverage these features to motivate and enhance learning by identifying elements within these games that align with educational goals.

Educational recreational games represent a hybrid approach, blending the immersive and engaging aspects of recreational games with intentional educational content and objectives (Borbotko & Yanch, 2021). As the digital gaming industry evolves, there is a growing interest in developing games that are enjoyable and have educational value (Hwang, Lin & Lin, 2023; Kolykhmatov, 2020). Understanding these categories is crucial for pedagogical strategy, engagement and motivation, customized learning experiences, and the future of education.

Table 1, as presented by Ulicsak and Williamson (2010), offers a classification system for digital games in education. It serves as a valuable tool for effectively incorporating gaming into educational environments. It highlights the potential of games as versatile tools for enhancing teaching and learning, emphasizing the need for strategic selection based on educational goals and learning outcomes.

Table 1. Category of digital educational games

Category	Description	Examples
Educational Games	Deliberately designed to enhance the teaching and learning processes by including certain educational goals.	«Serious games,» «edutainment,» «game-based simulations,» «epistemic games»
Recreational Games	Games that do not have the primary goal of promoting learning, however, may still be used to facilitate learning.	Commercial games are known as commercial off-the-shelf (COTS) games.
Educational Recreational Games	Games that are interactive activities are used inside educational settings, such as classrooms or laboratories. This area is consistently growing as digital gaming industry businesses see the potential future integration of digital games with education.	- (No specific examples provided)

DGBL in primary education has gained significant attention in recent years due to its potential to enhance students' motivation and educational outcomes. An extensive body of research has explored the pedagogical application of digital educational games in education (Sun et al., 2020; Manesis, 2020; Chen et al., 2021; Yi & Yunus, 2023; Hamzah

et al., 2019; Ghani et al., 2019; Belda-Medina & Calvo-Ferrer, 2022; Xu et al., 2019; Hung et al., 2018; Aziz et al., 2019; Al-Obaydi et al., 2023; Ghamdi & Alnajami, 2022; McNeil, 2019; Isa et al., 2022; Sykes, 2018; Yunus & Hua, 2021; Hui & Yunus, 2021; Gumartifa & Sirajuddin, 2021). These studies emphasize the effectiveness of using digital games for learning to enhance motivation among learners, promote language development, and improve educational outcomes, particularly in primary school. For example, the literature review by Sun et al., (2020) highlights the significance of attitude and motivation as significant learning outcomes of DGBL in primary education. More specifically, Chen et al., (2021) found that integrating DGBL positively impacted students' self-confidence, motivation to learn, and overall effectiveness in the learning process. Similarly, Manesis (2020) emphasizes the factors influencing the effectiveness of digital games in the learning procedure and the beliefs of primary school teachers about digital game-based learning. The studies by Hamzah et al., (2019) and Ghani et al., (2019) underscore the adoption of DGBL to achieve educational outcomes and bring an element of fun and entertainment to the learning process. Belda-Medina and Calvo-Ferrer (2022) extend that work to underscore the importance of considering future educators when researching DGBL. They stress the necessity of focusing on the attitudes and knowledge of preservice teachers about this instructional approach.

Regarding language acquisition specifically, Chen et al., (2021) and Yi & Yunus (2023) highlight the efficacy of digital educational games in vocabulary acquisition and English language education, respectively. These studies collectively support the positive impact of DGBL on language acquisition, also known as Digital Game-Based Language Learning (DGBLL), in primary education. Xu et al., (2019) and Hung et al., (2018) conducted scoping reviews of research on DGBLL to evaluate the content of digital games for language learning. Furthermore, Aziz et al., (2019) and Al-Obaydi et al., (2023) examined the necessity of creating substantial game-based evaluations for language proficiency and the obstacles associated with employing digital games for educational objectives, respectively. These studies shed light on the potential of serious games and the importance of designing digital games for educational purposes.

Earlier Cagiltay, et al., (2015) had already demonstrated that students' learning outcomes could be enhanced by integrating competitiveness into DGBLL, a feature available in gamified educational tools, including Quizizz, and virtual reality, as examined by Sykes (2018) about language learning. More recently, Yunus & Hua (2021), investigated the potential of novel strategies for DGBLL, and the studies by Hui & Yunus (2021) and Gumartifa & Sirajuddin (2021) revealed the positive impacts of board games and intrinsic motivational factors on language learning, providing insights into alternative approaches to DGBLL. Ghamdi and Alnajami (2022), McNeil (2019), and Isa et al., (2022) also offered valuable perspectives on the effects of digital games on the improvement of writing abilities in the English language, the utilization of entertainment-oriented digital games in language instruction and acquisition, and the approach to managing the life cycle of digital educational games, respectively.

Table 2. Key principles of DGBL

Principle Number	Principle Description	Implications for Learning
Principle 1	Pre-existing knowledge can aid or hinder learning.	Enables fast identification and correction of misconceptions.
Principle 2	Learners' motivations guide and support their learning process.	Encourages persistence and development of a productive mindset.
Principle 3	Acquisition and application of skills and abilities are necessary.	Creates an interactive environment that adjusts to the learner's pace.
Principle 4	Target-based practice is linked to feedback and quality learning enhancement.	Provides success-motivated feedback and a realistic environment for applying skills.

DGBL is a method that combines theory and practice to enhance language learning outcomes. Key principles of DGBL (see Table 2) by Shaffer (2006) include identifying and addressing misconceptions early on, focusing on learners' motivations, creating interactive learning environments that are responsive to individual learners' pace, and integrating target-based practice with feedback to improve learning quality. These principles are crucial for designing games that engage students and sustain their interest, fostering a resilient mindset toward language learning.

The use of gamified formative assessment tools, as examined in this study, adheres to these principles and exemplifies their practical application in enhancing language learning. DGBLL fosters a more nuanced and effective approach to language education, contributing to Kazakhstan's Ministry of Education's broader pedagogical goals and aligning with global advancements in educational technology.

By incorporating these principles into the design and execution of digital educational games, learners can enjoy and motivate their learning experiences while being pedagogically sound and effective in achieving educational objectives. This approach bridges the gap between theory and practice, highlighting the relevance of DGBL principles in enhancing language learning outcomes in primary education.

Digital games have shown a significant impact on motivational factors and educational outcomes in primary school language learning. Factors influencing students' engagement include game design, content, difficulty level, relevance to learning goals, and personal preferences. DGBLL enhances intrinsic motivation and enjoyment, leading to increased engagement. The integration of digital educational games has positive impacts on cognitive and affective outcomes in English language education. Additionally, the entertainment factor in digital games reduces anxiety in second language acquisition, positively influencing students' motivation and engagement in language learning (Chung & Chang, 2017).

Shehzad (2021) posits that digital mobile games may catalyse language acquisition, particularly during challenging periods such as the COVID-19 lockout. It has also been observed that these activities affect the anxiety and apprehension levels of participants who are studying English. Furthermore, empirical research has demonstrated that the implementation of DGBLL significantly improves students' scholastic achievements and instils in them a greater motivation to learn the English language. The incorporation of instructor intelligence into digital games has been demonstrated to increase students' motivation to learn in English as a Foreign Language (EFL) courses, as stated by Chu et al., (2023). Moreover, the process of learning a second language via gaming is influenced by several aspects, such as ecological factors, as highlighted by Ibrahim (2017). Regression analysis has indicated that digital games influence students' achievement and motivation in language learning (Wijanarko et al., 2021). DGBLL provides students with opportunities to actively acquire vocabulary, partake in educational activities, develop critical thinking and decision-making skills, and increase their enthusiasm for language learning, according to research (Ghani et al., 2022).

The use of digital games in language learning has become more popular, since they are now being integrated into task-based, project-based, and content-based approaches, showcasing their progress in educational settings. The educational value of digital games is recognized, and they have become a regular part of the curriculum. The potential of DGBL to enhance children's academic achievements, engagement, and interest renders it a viable approach for language instruction in primary school settings.

In sum, there is a strong body of literature that shows basic education, and language learning in particular, can be enhanced through the pedagogical incorporation of digital educational games. Learning occurs best when the game's design is customized to accommodate the individual learning rate of each player, offering a genuine and engaging setting for critical thinking, acquiring information, and putting it into practice. The game offers feedback to

players, catalysing motivation, and compelling them to persist until they achieve the game's objectives. Participants see gaming as a calming and inherent pursuit, promoting the notion of "I engage to acquire knowledge". Teachers also play a vital role in guaranteeing effective problem-solving during gaming activities and facilitating acceptable engagement and digital educational games and gamification to enhance student motivation, increase skills, and optimize information acquisition using key principles (table 1).

The current research attempts to extend the extant literature and provide articulation of the motivational and cognitive elements that impact language acquisition utilizing DGBLL within the primary education sector of Kazakhstan. It is hoped this study's results will enhance the field by offering empirical data on the correlation between game characteristics, motivational support, and cognitive involvement in language acquisition via digital games (Plass et al., 2015).

Furthermore, the results will guide the design and implementation of DGBLL interventions in primary schools through the identification of effective game incentives and an understanding of how they affect the motivation and cognitive engagement of students (Laine & Lindberg, 2020). In addition, this study aims to serve as a practical toolkit for educational game designers and researchers by providing educational game design principles in the context of DGBLL.

Results. A four-week research was conducted with 64 fourth graders from six primary schools in Almaty, Shymkent, Turkestan, and Kyzylorda. Four experimental groups used the "Kahoot" and "Qizizz" games for 10 minutes every week, whilst the control group employed books or e-books for the same duration each week to facilitate individual learning. Table 3 provides a summary of the study's groups, their learning approaches, and the structure of the experimental procedure, including durations for each part of the process.

Table 3. The experimental settings, participants, and technique

Group	Description	Learning Approach	Pre-test Duration	Intervention Duration	Post-test & Questionnaire Duration	Interview Duration
Control Group	32 students learned the course through a conventional approach using textbooks or PowerPoint.	Conventional Learning Approach	10 min	-	10 min	-
Experimental Group 1	16 students learned by a digital game without competition.	Digital Game-Based Learning (DGBL)	10 min	15 min	15 min	5 min
Experimental Group 2	16 students learned through a digital game with the added structure of competing with classmates.	DGBL + Competition	10 min	15 min	15 min	5 min

This research included three instruments to assess the impact of Kahoot and Quizizz on learners. The first instrument used was English proficiency assessments, which were utilized to ascertain the impact of the digital game, Kahoot and Quizizz, on the language aptitude of learners. The other two assessments (pre-test and post-test) were written examinations specifically intended to assess the student's proficiency in grammar and vocabulary. Each set of students was mandated to take these assessments.

Discussion. The study examined three approaches to instruction in improving grade four students' motivation and learning related to binary language conversion. Baseline results demonstrated no statistically significant difference in English language competence between the control group, experimental group 1, and experimental group 2, indicating that they had a comparable level of prior knowledge. However, after the implementation of digital gaming, significant disparities were noted

between the control group and the experimental groups. Disparities between the control group and experimental group 2 were found to be extremely statistically significant. In other words, the academic performance of students in experimental groups 1 and 2, which engaged in DGBL, was significantly superior to that of their peers who utilized a traditional learning approach (control group), and students who engaged in DGBLL in a competitive environment (experimental group 2) demonstrated the greatest academic achievement.

Table 4. Student Feedback on Digital Game-Based Language Learning (DGBLL)

Question		EG1 (%)	EG2 (%)
How much did you enjoy using DGBLL tools like Kahoot and Quizizz for language learning?	- A lot	93.75	100
	- Somewhat	6.25	0
	- Not much	0	0
	- Not at all	0	0
How confident do you feel in using English after participating in DG-BLL activities?	- Much more confident	81.25	87.5
	- Somewhat more confident	6.25	12.5
	- About the same	0	0
	- Less confident	12.5	0
Do you think DGBLL has helped improve your English vocabulary?	- Yes, significantly	100	100
	- Yes, but only slightly	0	0
	- No, it has not helped	0	0
	- I'm not sure	0	0
What aspect of DGBLL did you find most engaging?	- The competitive element	0	25
	- The interactive exercises	37.5	18.75
	- The game-like environment	62.5	56.25
	- I did not find it engaging	0	0
Did the DGBLL activities make learning English more interesting?	- Much more interesting	100	100
	- Somewhat more interesting	0	0
	- No change in interest	0	0
	- Less interesting	0	0
Would you recommend DGBLL methods to other students learning English?	- Definitely	100	100
	- Probably	0	0
	- Not sure	0	0
	- Probably not	0	0

A substantial majority of students (81.25%) in experimental group 1 saw a boost in their self-confidence in obtaining information in the domain of learning English due to their involvement with a digital game. Some students incorrectly answered in the test that they knew more about the subject than they did (How confident do you feel in using English after participating in DGBLL activities? – less confident 12.5%). In contrast, a substantial majority (87%) of students in experimental group 2 reported a gain in self-confidence after acquiring binary conversion abilities through involvement in a digital game and engaging in rivalry games with their classmates (Table 4). A select group of pupils achieved victory in the game, thereby demonstrating a complete comprehension of the idea. Several students reported a lack of confidence in their abilities and apprehension about their abilities to study at the same level as their peers. The study found that while DGBLL methods improved student confidence, some students still felt uncertain about their language learning abilities and compared themselves negatively to their peers. This could be due to personal insecurities, previous educational experiences, or the competitive nature of the gamified learning environment.

Quantitative analysis performed on the students' surveys revealed insights into their perspectives on the games, classroom activities, and the impact of these elements on their learning. Findings indicate that every participant achieved a notably elevated average score in response to all inquiries (see Table 5 in which ER = Emotional Resilience, CC = Communicative Competence, AE = Ability Enhancement, and GA = Goal Achievement. A p-value below 0.05 is denoted by an asterisk [*], implying the presence of statistical significance). The table contains the mean scores of the pretest and post-test, standard deviations for each group (EG1, EG2, and CG), and F-values utilized in the covariance analysis.

The DGBLL study reinforces the pedagogical transition towards student-centred learning environments, aligning with the research on flipped learning approaches conducted by Chen et al., (2021) and other scholars. Both bodies of research support the idea that learners should actively participate in their educational processes, which helps to increase their intrinsic motivation and engagement. This study enhances the discussion by showing that digital games can effectively provide knowledge in a way that matches modern educational demands, as outlined in Kazakhstan's progressive educational reforms.

Table 5. The elements that motivate students and the impact on their educational achievements in primary school by analysing the average scores.

Factor (Test)	Group	Pre-test Mean (M)	Pre-test SD	Post-test Mean (M)	Post-test SD	Adjusted Post-test Mean (M*)	F-Value (F)
Overall	EG1	2.26	0.57	2.68	0.64	2.65	
	EG2	2.05	0.96	2.27	0.84	2.38	
	CG	2.32	0.62	2.48	0.67	2.41	2.01
ER	EG1	2.31	0.67	2.81	0.66		3.30*
	EG2	2.13	1.04	2.28	1.04		
	CG	2.42	0.67	2.63	0.83	2.54	
CC	EG1	2.52	0.80	2.84	0.61		2.03
	EG2	2.52	1.06	2.68	1.03		
	CG	2.68	0.63	2.62	0.86	2.54	
AE	EG1	2.22	0.81	2.54	0.87		0.60
	EG2	1.85	1.13	2.21	1.01		
	CG	2.16	0.86	2.46	1.01	2.42	
GA	EG1	2.11	0.85	2.46	0.63		1.66
	EG2	1.68	1.01	2.00	1.00		
	CG	2.12	1.00	2.30	0.99	2.24	

The research supports the findings of Cagiltay et al., (2015) addressing the beneficial impacts of including competitive elements in educational frameworks. Both studies demonstrate that competition can greatly enhance engagement and accomplishment, especially in gamified learning contexts. The DGBLL study provides a distinct contribution to the existing narrative by demonstrating how competition can be organized in digital games to improve language acquisition in primary school pupils. This study focuses on an aspect that has received less attention in the broader research on competition in education and in so doing, adds substantively to the body of knowledge.

In contrast to the broad educational technology applications examined in previous research, such as those conducted by Hui & Yunus (2021), which explore the use of board games to enhance language skills, the present

study focuses on a detailed analysis of particular digital platforms, namely Kahoot and Quizizz. The specificity of this study is essential because it offers comprehensive insights into the impact of various game designs and user interactions on language acquisition. This level of precision is not as common in broader educational technology research.

This study addresses a vacuum in digital learning research by specifically focusing on primary school, an area that is generally overlooked as most research in this field primarily targets adults or higher education students. The study provides useful educational insights that are immediately transferable to early school settings by customizing research methodologies and analyses to align with the cognitive and developmental phases of primary learners. The study's methodological rigor and empirical data make a substantial contribution to the academic knowledge of the impact of DGBLL on primary education. The study confirms and quantifies the usefulness of digital games in educational contexts through systematic assessments of motivational and cognitive results using standardized pre-tests, post-tests, and questionnaires.

The trials conducted by Akhmetsapa et al., (2024) validate the positive impact of digital tools on educational accomplishments. They stress the significance of incorporating technology into educational settings to enhance student engagement and comprehension, by present educational standards.

The current study reveals that DGBLL (Digital Game-Based Language Learning) significantly enhances motivation and educational outcomes in language acquisition through the integration of interactive and competitive elements. However, the study also provides useful insights into how characteristics like gender and the use of additional resources can impact learning outcomes in web-assisted environments. This suggests that while DGBLL can have a broad positive impact, the impact of web-assisted tools may require more tailored approaches depending on the learner's existing knowledge and additional learning materials.

The study incorporates and applies Shaffer's (2006) fundamental concepts of Digital Game-Based Learning in the primary educational context. This serves the purpose of not only testing these ideas but also modifying and broadening them based on fresh data. This theoretical contribution is highly beneficial for the development and execution of the next educational games, guaranteeing that they are academically rigorous and customized to improve specific learning objectives.

This comprehensive analysis of the DGBLL study, about the current body of literature, emphasizes its crucial contribution to the progress of educational practices through the use of technology. It strengthens the case for incorporating gamified learning tools more extensively in primary school, by connecting them with strategic educational goals to optimize both student engagement and learning results. Subsequent studies should expand upon these existing principles by investigating the long-term effects of digital game-based language learning (DGBLL) and broadening the range of participants in terms of demographics and geographic locations. This would improve the potential to apply and generalize the findings to educational settings worldwide.

Conclusion. An extensive body of literature shows that pedagogical integration of digital game components such as challenges, controls, interaction, and feedback, improves the academic performance of students and enhances their short-term and long-term memory. This is especially advantageous for students in elementary education, specifically those acquiring English as an additional language. DGBLL is widely recognized as an efficacious methodology for augmenting vocabulary acquisition, bolstering comprehension, and introducing complex subject matter. This study supports previous research with explicit benefits for grade four students in Kazakhstan regarding English vocabulary proficiency.

The current research emphasizes the beneficial impact that gamification has on both student engagement and academic performance. The integration of digital games into language instruction has the potential to convert tedious

or repetitious content into engaging and interactive learning experiences. As the allure of games is frequently predicated on the interplay between triumph and defeat, it is critical that instructors effectively convey the instructional objectives of gamified language exercises. The principal advantage for pupils lies in the gain of fresh knowledge, specifically in domains like grammar and vocabulary.

Although the benefits of incorporating gamification into language instruction have been established, there remain several unanswered inquiries that set up opportunities for additional research. For example, comparative research across multiple grades could provide potential insights as to the impacts of chronological age, emotional maturity, and additional academic progression and experience in school learning, as would comparisons across gender. Determining the ideal duration of student engagement with gamified activities before their disinterest is another area critical for consideration. Investigation is also warranted to evaluate the efficacy of additional complementary digital activities to enhance linguistic proficiency. Fourth, comparative research can be utilized to determine which games are appropriate for future courses to assess the effect of game quantity on student achievement, and which game is most suitable for particular instructional materials.

This study's small sample size, which can restrict the generalizability of the results, is a recognized limitation. Additional student participants should be incorporated into future studies to collect more dependable and precise data and statistics. Enhancing the feedback system's comprehensiveness can yield a more profound comprehension of students' viewpoints and the efficacy of gamification tactics. In addition, qualitative research approaches such as in-depth interviews have the potential to offer a more holistic comprehension of the pedagogical importance of gamification in the context of language learning.

This research offers substantiation for the efficacy of DGBLL methodologies in enhancing the proficiency of grade four students in Kazakhstan regarding learning English vocabulary. These findings, in combination with the extant literature, suggest that incorporating gamification components into language teaching might potentially enhance engagement, improve knowledge retention, and boost academic accomplishment for other primary students as well. However, additional investigation is required to tackle unresolved inquiries and constraints of the research. Further investigation into the potential of gamification in language instruction can enable educators to design learning experiences that are both more captivating and efficacious for students of other grades as well.

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