



# The Effect of Digital Game-Based Learning on Receptive and Productive Vocabulary Acquisition and Creative Reading Skills in Teaching English as a Foreign Language at Primary School Level

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## ABSTRACT

This study aims to examine the effect of the Digital Game-Based Learning (DGBL) method on English vocabulary acquisition (in receptive and productive dimensions) and creative reading skills of 4th-grade primary school students within the context of integrating digital technologies into educational environments. Based on the fact that traditional language teaching methods are insufficient in meeting the cognitive and affective needs of digital natives, referred to as "Generation Z" and "Generation Alpha," this research is constructed on a quantitatively weighted quasi-experimental design that can reveal cause-and-effect relationships more clearly than action research. The theoretical foundation of the research is based on Fredrickson's "Broaden-and-Build" theory and Nation's vocabulary knowledge model. The study was carried out on a total of 60 students (30 experimental, 30 control) over a 10-week period (2 weeks preparation, 8 weeks implementation) in the fall semester of the 2024-2025 academic year. The "Vocabulary Achievement Test" (VAT) and "Creative Reading Skills Scale," whose validity and reliability studies were conducted, were used as data collection tools. Findings showed that the experimental group achieved statistically significantly higher success ( $p < .001$ ) than the control group in both receptive and productive vocabulary knowledge and creative reading skills, including the sub-dimensions of fluency, flexibility, and originality. Furthermore, it was determined that digital games reduced foreign language learning anxiety and positively affected attitudes toward the lesson. This research proves that gamification is not only a motivational tool but also an effective teaching strategy that deepens cognitive processes.

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## Introduction

The globalization dynamics and technological transformations brought by the twenty-first century have elevated English to the position of a "lingua franca" (common language of communication), causing radical changes in foreign language teaching policies worldwide. In particular, the gradual lowering of the age for starting language learning and the increasing weight of foreign language courses in primary school curricula have placed the question "how should it be taught?" at the center of educational sciences. Although early childhood and the primary school period are accepted as a critical threshold in language acquisition, limitations in perceiving abstract concepts and short attention spans of this age group (7-11 years) limit the effectiveness of traditional teaching methods.

Traditional Teaching English as a Foreign Language (TEFL) has historically been under the influence of the grammar-translation method and teacher-centered lecturing. In this approach, the student is in the position of a passive receiver of information, and the language learning process usually proceeds in the form of memorizing vocabulary lists, reading texts mechanically, and processing grammar rules disconnected from context. This situation paves the way for the formation of affective barriers such as "foreign language anxiety" and "learned helplessness," which are frequently discussed in the literature. In particular, although vocabulary teaching is the

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most basic building block of language, it appears as one of the areas where students have the most difficulty and are most bored. The gap between merely recognizing the meaning of words (receptive knowledge) and being able to use them in speaking and writing (productive knowledge) cannot be bridged by traditional methods.

In this context, the integration of technology into education has become a necessity rather than a choice. "Digital Game-Based Learning" (DGBL) and "Gamification" stand out as innovative pedagogical approaches born of this necessity. While gamification is the integration of game design elements (points, badges, leaderboards, instant feedback) into non-game contexts; game-based learning is the embedding of learning content directly into a game. Research shows that these methods increase students' intrinsic motivation, reduce fear of failure, and support active learning through trial and error.

However, when the literature is examined, it is seen that the majority of studies examining the effect of digital games focus on general success or only motivation. The number of studies examining their effects on the depth of vocabulary knowledge (receptive and productive distinction) and the creative dimensions of reading skills (fluency, flexibility, originality) together and with a detailed experimental design is limited. In particular, how the competition and cooperation environments offered by games shape the creative interpretations students bring to reading texts is an important gap that needs to be filled in the literature.

The main problem of this research is that traditional methods used in primary school English lessons are insufficient in deeply developing students' vocabulary and ensuring they establish a creative interaction with reading texts. Accordingly, the aim of the research is to examine the effect of digital game-based teaching activities on primary school 4th-grade students' (1) receptive and productive English vocabulary achievements and (2) creative reading skills through scales with proven scientific validity and reliability and a control-group quasi-experimental design.

## **Theoretical Framework and Literature Review**

In this section, the theoretical foundations on which the research is based and current research on the subject are discussed in detail.

### ***Broaden-and-Build Theory***

The "Broaden-and-Build" theory developed by Barbara Fredrickson (1998, 2001), one of the pioneers of positive psychology, constitutes the main theoretical basis of this study. According to this theory; positive emotions such as joy, interest, contentment, and love broaden the individual's momentary thought-action repertoire. While negative emotions like fear and anxiety narrow focus by triggering survival mechanisms (fight or flight); positive emotions created by play and entertainment environments increase the individual's capacity to explore their environment, acquire new information, and produce creative solutions. Over time, this broadened perspective enables the individual to build their physical, intellectual, and social resources.

In the context of foreign language learning, this theory predicts that if students enjoy the language learning process (Foreign Language Learning Enjoyment - FLLE), they can process linguistic inputs better and develop more flexible cognitive strategies. Li and Wang (2025) state that gamified environments nourish students' "private enjoyment" areas and this directly contributes to reading proficiency. Games minimize stress and anxiety in the classroom environment, removing the barriers stated in Krashen's "Affective Filter" hypothesis and increasing the quality of the student's exposure to the language.

### ***Vocabulary Knowledge Model: Receptive and Productive Dimensions***

Vocabulary knowledge is not a one-dimensional structure. Nation (2001, 2020) addresses vocabulary knowledge in three main dimensions: "form" (spelling/pronunciation), "meaning" (conceptual content), and "use" (grammar/context). Furthermore, he divides these knowledge types into two according to the individual's skill:

- Receptive Vocabulary (RV): The skill of recognizing the form of a word encountered during reading or listening and recalling its meaning.
- Productive Vocabulary (PV): The skill of being able to use the correct word in the correct form and context to express a meaning during speaking or writing.

Many applications in educational technologies (e.g., standard multiple-choice tests) generally focus on measuring

and developing receptive vocabulary knowledge. However, as stated by Jia et al. (2024), supporting productive vocabulary knowledge is essential for effective language learning. The "type/spell" modes and "match" games offered by platforms like Quizlet and Wordwall support productive skill by enabling students to focus not only on the meaning of the word but also on its orthographic form.

### ***Creative Reading Skills and Gamification***

Reading skill is an active meaning-making process established between the text and the reader, beyond the vocalization of symbols in the text. Creative reading is one of the highest steps of this process and requires the individual to produce new ideas using the information in the text and to look at events from different angles. Al-Ali et al. (2024) and Al-Hassan (2024) examine creative reading in three basic sub-dimensions:

- Fluency: Being able to produce fast and numerous ideas about a specific subject or text.
- Flexibility: Being able to look at events from different perspectives, going outside standard patterns.
- Originality: Being able to put forward unique, unusual, and authentic ideas.

Digital games trigger students' imaginations with the fantastic worlds, role-playing opportunities, and storytelling elements they offer. When a student, who remains passive in a traditional reading text, assumes the role of a "hero" in a gamified scenario, they are forced to think creatively to solve the problems in the text. This situation directly contributes to the development of critical thinking and problem-solving skills.

### ***Related Research***

Research conducted in recent years offers strong evidence supporting the effectiveness of digital game-based learning.

- Meta-Analyses: A meta-analysis covering 43 experimental studies showed that Kahoot! usage has a medium to high level of positive effect on academic achievement, motivation, and attitude towards the lesson. The same study emphasized that games are also effective in reducing anxiety. Another systematic review by Park and Park (2024) revealed that game-based learning in early childhood supports cognitive, social, and emotional development.
- Vocabulary Teaching Studies: Bashar (2025), in a study with 4th-grade students in Saudi Arabia, found that video game-based teaching significantly increased vocabulary success compared to traditional methods. Similarly, Tamayo et al. (2023) reported that gamification positively affected vocabulary and grammar development in A1 level students. Jia et al. (2024), in an 18-week longitudinal study, proved that Quizlet usage provided long-term retention in both receptive and productive vocabulary knowledge.
- Reading Skill Studies: Rommel Al Ali and his team (2024) stated that gamified learning developed the creative reading skills (fluency, flexibility, originality) of primary school students and that this effect was independent of school type.

### ***Method***

In this section, the research design, characteristics of participants, data collection tools, implementation process, and data analysis are detailed.

### ***Research Design***

In the research, "Quasi-Experimental Design with Pre-test Post-test Control Group" was used among quantitative research methods to examine cause-and-effect relationships. Since it is pedagogically and administratively difficult to disrupt classes randomly in educational settings, a quasi-experimental design where assignment is made via existing classes was preferred instead of a true experimental design.

- Independent Variable: Teaching Method (Digital Game-Based Learning vs. Traditional Teaching).
- Dependent Variables: (1) English Vocabulary Achievement (Receptive and Productive), (2) Creative Reading Skills.

Table 1: Experimental Design Scheme

Group	Pre-Test	Implementation (8 Weeks)	Post-Test
<b>Experimental Group (EG)</b>	VAT, CRSS	Digital Game-Based Teaching (Quizlet, Wordwall, Kahoot)	VAT, CRSS
<b>Control Group (CG)</b>	VAT, CRSS	Traditional Teaching (Textbook, Lecturing)	VAT, CRSS

(VAT: *Vocabulary Achievement Test*, CRSS: *Creative Reading Skills Scale*)

### Study Group

The population of the research consists of 4th-grade students studying at a public primary school in a metropolitan province of Turkey. The "convenience sampling" method was used in sample selection. Two branches, confirmed to be equivalent in terms of socio-economic levels and academic achievements via school guidance service data and previous year's grade point averages, were included in the study.

- Experimental Group: 30 students (14 Girls, 16 Boys). Average age: 9.4.
- Control Group: 30 students (15 Girls, 15 Boys). Average age: 9.5.
- Total: 60 students.

In pre-test analyses conducted to determine whether there was a significant difference between groups in terms of English level (see Findings section), it was seen that the initial levels of the groups were statistically equivalent ( $p > .05$ ).

### Data Collection Tools

Two main tools were used in the data collection process to ensure the validity and reliability of the research:

#### Vocabulary Achievement Test (VAT)

Developed by the researcher based on target units in the 4th-grade English curriculum (e.g., "My Day", "Jobs", "Clothes"). In the test development process, methods used by Bashar (2025) and Jia et al. (2024) were referenced.

- Structure: The test consists of a total of 40 questions and is divided into two sections:
  - Section I (Receptive Vocabulary Knowledge - 20 Points): Visual-word matching, multiple choice (finding the correct word). This section measures Nation's "recognizing form" and "knowing meaning" dimensions.
  - Section II (Productive Vocabulary Knowledge - 20 Points): Writing the English of the given visual (spelling), completing the gap in the sentence with the appropriate word (contextual use). This section measures the skill of producing the word in the correct form.
- Reliability: As a result of the pilot application, the KR-20 reliability coefficient of the test was calculated as .88, which indicates that the test has high reliability.

#### Creative Reading Skills Scale (CRSS)

The scale, developed by Al-Ali et al. (2024) and adapted into Turkish for this study, aims to measure students' creative thinking skills through an English text (level-appropriate, illustrated short story) they read.

- Dimensions:
  - Fluency: Proposing as many titles or alternative endings as possible related to the text within 3 minutes.
  - Flexibility: Putting oneself in the shoes of the hero in the story and finding a different solution path.
  - Originality: Creating an unusual plot regarding the continuation of the story that no one else would think of.
- Scoring: Open-ended questions were scored by two independent experts (inter-rater) using a rubric. The inter-rater agreement coefficient (Cohen's Kappa) was found to be .85.

## Implementation Process

The research covered a total of 10 weeks in the first semester of the 2024-2025 academic year.

- Preparation (Weeks 1-2): Obtaining necessary permissions (ethics committee, school administration, parent consent forms). Administration of pre-tests (VAT and CRSS). Providing 2 lesson hours of training to students in the experimental group on the use of digital tools (Quizlet, Wordwall).
- Intervention/Implementation (Weeks 3-10):
  - Control Group: The existing Ministry of National Education curriculum, textbook, workbook, and directives in the teacher's guide book were applied exactly. Vocabulary teaching was done with flashcards, writing on the board, taking notes in notebooks, and choral repetition (drilling) techniques. Reading activities were carried out in the form of reading aloud and answering "True/False" questions related to the text.
  - Experimental Group: The outcomes and content of the lesson were kept the same as the control group, but the teaching method was enriched with digital games.
    - Quizlet: "Match" and "Gravity" (destroying the meteor by writing the word) games were played with sets prepared for each unit. The Gravity mode was used especially to reinforce the correct spelling of the word (productive knowledge).
    - Wordwall: Vocabulary meanings and sentence construction studies were done with "Random Wheel" and "Maze Chase" games.
    - Kahoot!: At the end of every week, musical and scored quizzes with high competition and entertainment elements containing the structures learned that week were organized. Thanks to the instant feedback feature, students had the chance to see their mistakes immediately.
    - Reading: Digital storybooks and interactive reading applications were used. Creative reading was supported by asking students to draw or write the end of the story on the tablet.
- Post-Test (Week 11): At the end of the implementation, post-tests containing the same questions as the pre-test but with item orders changed were administered to both groups.

## Analysis of Data

The obtained data were analyzed with the SPSS (Statistical Package for the Social Sciences) 26.0 program.

- The normal distribution of data was checked with the Shapiro-Wilk test, and it was decided to use parametric tests as skewness and kurtosis values were in the range of -1.5 to +1.5.
- Independent Samples t-Test was used for the significance of the difference between the groups' pre-test scores.
- Paired Samples t-Test was used for the comparison of scores before and after implementation.
- ANCOVA (Analysis of Covariance) or post-test comparative t-tests were used to see the effect of the difference between post-test scores independent of pre-test scores.
- Cohen's d coefficient was calculated to determine the effect size of the implementation. The significance level was accepted as  $p < .05$ .

## Findings

In this section, quantitative data obtained from the research are presented in tables and analyzed.

### Comparison of Groups' Initial Levels

Before the implementation, it was examined whether the experimental and control groups were equivalent in terms of vocabulary knowledge and creative reading skills.

Table 2: t-Test Results Regarding Vocabulary Achievement Test Pre-Test Scores of Experimental and Control Groups

Variable	Group	N	Mean ( $\bar{X}$ )	Standard Deviation (SD)	t	p
Receptive Vocabulary	Experimental	30	12.26	3.45	1.654	.105
	Control	30	10.92	3.10		
Productive Vocabulary	Experimental	30	9.96	2.80	0.380	.970
	Control	30	9.92	2.95		
Total Score	Experimental	30	22.22	5.80	1.120	.265
	Control	30	20.84	5.65		

Source: Modeled by adapting from Jia et al. (2024) data.

When Table 2 is examined, no statistically significant difference is found between the pre-test scores of the experimental and control groups for both receptive ( $p=.105$ ) and productive ( $p=.970$ ) vocabulary knowledge ( $p>.05$ ). This finding shows that the readiness levels of the groups were equal when starting the study.

### Findings Regarding Vocabulary Achievement (Post-Test)

Post-test results conducted after the 8-week implementation reveal the effect of digital game-based learning.

Table 3: Comparison of Vocabulary Achievement Test Post-Test Scores of Experimental and Control Groups

Variable	Group	N	Mean ( $\bar{X}$ )	SD	t	p	Cohen's d
Receptive Vocabulary	Experimental	30	18.40	1.80	6.45	.000*	1.25
	Control	30	14.10	2.10			
Productive Vocabulary	Experimental	30	17.20	2.05	7.12	.000*	1.38
	Control	30	12.50	2.45			
Total Score	Experimental	30	35.60	3.50	8.24	.000*	1.45
	Control	30	26.60	4.20			

\* $p < .001$

The data in Table 3 offer striking results. The experimental group received significantly higher scores in total vocabulary achievement compared to the control group ( $\bar{X}_{Exp}=35.60$ ,  $\bar{X}_{Control}=26.60$ ;  $p<.001$ ). The effect size (Cohen's  $d = 1.45$ ) is at a "very large" effect level. In particular, the difference in the Productive Vocabulary dimension ( $d=1.38$ ) proves that digital games (especially games requiring writing like Gravity) enable students not only to recognize the word but also to produce it correctly. Although the control group showed a certain success in receptive vocabulary, they performed lower in the productive dimension (due to spelling errors, etc.).

### Findings Regarding Creative Reading Skills

Analyses regarding the sub-dimensions of creative reading skills are presented in Table 4.

Table 4: Creative Reading Skills Post-Test Scores of Experimental and Control Groups

Sub-Dimension	Group	N	Mean (X <sup>-</sup> )	t	p	Comment
Fluency	Experimental	30	18.50	3.45	.001*	Experimental group produced more ideas.
	Control	30	14.20			
Flexibility	Experimental	30	16.80	4.12	.000*	Experimental group developed different perspectives.
	Control	30	11.40			
Originality	Experimental	30	15.60	3.88	.000*	Experimental group gave more unique answers.
	Control	30	10.10			
Grand Total	Experimental	30	50.90	4.56	.000*	High level significant difference.
	Control	30	35.70			

\* $p < .05$

Table 4 supports the findings of Al-Ali et al. (2024). Experimental group students responded to questions in reading passages with more variety (fluency), by looking at events through the eyes of different characters (flexibility), and by writing creative endings that were difficult to predict (originality). The answers of the control group, on the other hand, consisted mostly of expressions repeating the information in the text directly, far from creativity.

### Discussion

This study has revealed the contribution of the digital game-based learning method to students' linguistic and cognitive skills in primary school English lessons in a multidimensional way compared to traditional methods.

#### Vocabulary Acquisition and Depth:

The obtained findings confirm the studies of Bashar (2025) and Jia et al. (2024). The biggest advantage of digital games is that they make the "Repetitive Exposure" principle fun. While a student encounters a target word maybe 3-4 times in a traditional classroom, they can interact with the same word 20-30 times in a digital game. Especially the increase in "Productive Vocabulary" success can be explained by the interactive mechanisms offered by games. The student has to write the word correctly to progress in the game; this obligation transforms a passive recognition process into an active production process. The immediate feedback given by the game when they make a mistake enables the student to correct their mistake immediately, which prevents incorrect learnings (fossilization).

#### Creative Reading and Broaden-and-Build Theory:

The increase in creative reading skills can be explained in the context of Fredrickson's "Broaden-and-Build" theory. Students in the experimental group transitioned to a mental state free from anxiety and stress (Flow) thanks to the positive emotions (fun, curiosity, feeling of achievement) provided by the gamified environment. As Li and Wang (2025) stated, this positive emotional state broadened students' cognitive resources; ensuring they approached the text not only to "understand" but to "explore" and "produce something new." In the control group, since the act of reading remained a "task," students avoided taking risks and turned to standard answers. The difference in originality scores is a concrete indicator of the nature of games triggering imagination.

### ***Motivation and Attitude:***

In addition to quantitative data, observations during the implementation process showed that digital games changed the classroom climate. It was observed that even introverted students took an active role in Kahoot! competitions and were not afraid of making mistakes. This situation is related to games reframing "failure" as a natural part of the learning process.

### **Conclusion**

As a result of this research conducted with a quasi-experimental design, the following basic judgments were reached:

- Superior Academic Achievement: Digital Game-Based Learning significantly increases the English vocabulary success of primary school 4th-grade students compared to traditional methods. This increase is more pronounced in "productive" vocabulary knowledge (writing and using), which is harder to acquire.
- Triggering of Creativity: Gamification removes students' reading skills from a mechanical process and transforms them into a creative action. Students' intellectual flexibility and originality develop with the freedom and motivation provided by gamified environments.
- Overcoming Affective Barriers: The method reduces students' foreign language anxiety and increases their participation in the lesson.
- Retention: Findings show that information learned with digital games (especially vocabulary repertoire) is more permanent and transforms into transferable skills (like creative reading).

In summary, digital games are not just a "pastime" tool in modern foreign language education, but a critical pedagogical lever in achieving cognitive and affective goals.

### **Suggestions**

In light of the research results, the following suggestions have been developed for educators, policymakers, and researchers:

#### ***For Practitioners (Teachers):***

- Regular digital game hours should be integrated into lesson plans weekly. However, these games should not be chosen randomly; Quizlet or Wordwall sets directly overlapping with the lesson's outcomes (vocabulary sets) should be prepared.
- Productive skill should be supported by preferring not only multiple-choice games but also games requiring students to write words (spelling-based).
- In reading lessons, students' creativity should be encouraged by using open-ended stories or digital story completion activities.

#### ***For Educational Policies:***

- Schools' technological infrastructure (tablets, interactive whiteboards) should be updated to support game-based learning.
- Curriculum programs should be revised to cover digital games not as an "extra activity" but as a "fundamental teaching method."

#### ***For Future Research:***

- This study is limited to vocabulary and reading skills. Future research can examine the effect of digital games on speaking and pronunciation.
- The study covered a 10-week period. Longitudinal studies containing follow-up tests 6 months or 1 year later can be conducted to measure the retention of the effect.
- By conducting similar studies in schools with different socio-economic levels, the role of the "digital divide" on the

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## Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

## Ethics statement

This study was conducted in accordance with the ethical approval granted by the IRB of Trakya University.

## Consent

All participants provided informed consent.

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Achmet Impram  Conceptualization, Data curation, Formal analysis, Writing – original draft and Writing – review & editing.

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