



IMPLEMENTATION OF GAME-BASED ENGLISH LEARNING FOR JUNIOR HIGH SCHOOL STUDENTS USING GODOT ENGINE 4

Wahyu Cahyo Agung¹, Valentina Dyah Arum Sari²

^{1, 2}Universitas Mercu Buana Yogyakarta, Indonesia

Email: ¹221310002@student.mercubuana-yogya.ac.id, ²valentina@mercubuana-yogya.ac.id

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Corresponding Author:

Wahyu Cahyo Agung

Email Corresponding:

221310002@student.mercubuana-yogya.ac.id

ABSTRACT

The aim of this study was to investigate students' perceptions of an interactive Game-Based Learning (GBL) application developed using Godot Engine 4, as well as to identify the challenges encountered during its implementation in the classroom. A mixed-methods research design was employed with 29 seventh-grade students as participants. Quantitative data were obtained through questionnaires, while qualitative data were gathered through semi-structured interviews. The quantitative findings revealed that students demonstrated highly favorable perceptions of the application, particularly in terms of their learning experience, as reflected in a positive response rate of 89.27%. In contrast, the Challenges in Using the Game dimension received a considerably lower positive response rate of 45.45%. Qualitative findings further indicated that students perceived the application as engaging, user-friendly, interactive, and accompanied by clear instructions. Nevertheless, several technical issues were identified, particularly occasional system freezing that disrupted the continuity of the learning process. Overall, the findings suggest that the Godot Engine 4-based GBL application provides a positive and engaging learning experience for English vocabulary instruction. However, further improvements to the application's technical stability and performance are necessary to ensure more effective and seamless classroom implementation.

Keywords: *Game-Based Learning, Student Perceptions, Godot Engine, English Vocabulary, Cognitive Load Theory*

1. INTRODUCTION

Education plays a fundamental role in developing human resources and strengthening national competitiveness, while English proficiency remains increasingly important for participation in global communication (Rafsanjani & Rozaq, 2024; Isadaud et al., 2022). In Indonesia, however, English education has experienced several policy shifts that have

affected students' exposure to the language. Under the 2013 Curriculum, English was removed from the elementary school curriculum, while instructional time at the secondary level was also reduced (Alfarisy, 2021; Hamidah et al., 2020; Rudini & Khasanah, 2022). The implementation of the Merdeka Curriculum in 2022 subsequently positioned English as an elective subject in

elementary schools and a compulsory subject at the secondary level (Ndari et al., 2023; Kurniawan, 2024). These policy conditions may contribute to limited English proficiency among students entering Grade 7, particularly in vocabulary and basic grammatical knowledge such as nouns, verbs, adjectives, and adverbs.

Limited English proficiency is also associated with difficulties in literacy and classroom learning. Literacy constitutes an essential foundation of learning because it enables learners to interpret, process, and construct meaning (Norris & Phillips, 2003; Rahmi & Cerya, 2020; Dorn & Jones, 2023). Nevertheless, seventh-grade students may encounter difficulties understanding English instructions, retaining newly introduced vocabulary, and maintaining motivation. The integration of educational technology offers a potential response to these challenges. Technology can support English language learning while increasing students' confidence in using digital tools for educational purposes (Hidayat et al., 2022; Akour & Alenezi, 2022; Rabani et al., 2023). When combined with appropriate instructional strategies and attention to learners' diverse learning needs, technology-mediated instruction can also foster more meaningful and engaging learning experiences (Ardiana & Arum Sari, 2025; Widiastuti et al., 2022; Zulfikar Ikrom & Dimyati, 2025). Previous research similarly indicates that innovative online learning platforms can enhance students' motivation and academic performance (Setiadi et al., 2024; Al-Bahadli et al., 2023; Abdelrahman, 2020). Therefore, English

learning materials need to be continuously adapted to students' learning needs and contemporary technological developments (Dewi et al., 2024).

Although technologies such as PowerPoint, instructional videos, and online quiz platforms have become common in English classrooms, their use does not always provide sufficiently immersive or engaging learning experiences. For junior high school learners, the incorporation of attractive multimedia, visual elements, and interactive activities has been recommended to increase engagement and support learning (Hanifa, 2018). One approach that can address these needs is Game-Based Learning (GBL), which integrates educational content with game elements to promote active participation and meaningful learning. GBL is theoretically informed by constructivist and flow perspectives, emphasizing active involvement, experiential learning, and sustained engagement (Breien & Wasson, 2021; Sari & Octaviani, 2022; Pelangi et al., 2025). By incorporating game mechanics such as clear goals, immediate feedback, interaction, and positive competition, GBL can stimulate learners' attention, motivation, and self-efficacy (Chen & Tu, 2021; Ismail et al., 2023).

GBL is particularly relevant to English vocabulary instruction because vocabulary is a fundamental component of foreign language acquisition. In contrast to conventional vocabulary learning, which frequently depends on memorization, game-based activities can provide contextualized and communicative experiences that encourage deeper engagement and longer-term retention

(Yudha & Mandasari, 2021). Interactive game-based media can also connect classroom content with meaningful contexts, allowing students to encounter and practice vocabulary through active participation (Omolu et al., 2022). Problem-solving and interactive game activities further encourage learners to process new vocabulary actively rather than merely memorize isolated words (Adipat et al., 2021). In addition, the affective dimension of learning should be considered. Krashen's Affective Filter Hypothesis suggests that anxiety, stress, and other negative emotional factors can hinder language acquisition, whereas a supportive and low-anxiety environment may facilitate learning (Gidman, 2025). Consequently, well-designed educational games may create an enjoyable and less intimidating environment that encourages students to participate more actively in English learning.

Empirical studies have provided further support for the use of GBL in English education. Recent research indicates that game-based instruction can reduce language anxiety, encourage active participation, and create more positive learning environments (Yulistiyan et al., 2025). Game elements have also been reported to improve vocabulary recall among seventh-grade students when compared with conventional memorization approaches (Rahmah et al., 2025). From a technological perspective, Godot Engine has emerged as a potentially suitable platform for developing interactive educational games because of its accessibility and capacity to support applications on relatively low-performance Android devices (Kusheryanto et al.,

2024). These characteristics make Godot-based applications potentially applicable in classroom contexts where device and infrastructure limitations need to be considered.

Despite these potential benefits, the successful implementation of GBL cannot be assumed solely from its instructional effectiveness. Students' perceptions and the practical challenges they encounter during classroom use are equally important for evaluating the quality and feasibility of a learning application. Cognitive Load Theory emphasizes that learners' working memory is limited and that excessive visual information, time pressure, or unnecessarily complex game mechanics can impose additional cognitive demands and interfere with learning (Rasti-Behbahani et al., 2026). Thus, educational games should balance interactivity and challenge with clarity, usability, and cognitive accessibility. While previous studies have predominantly examined the effectiveness of GBL and its influence on vocabulary acquisition, limited attention has been given to students' perceptions of applications specifically developed with Godot Engine 4 and the difficulties they experience during actual classroom implementation. Addressing this gap is important because students' responses can provide practical evidence for evaluating the usability, engagement, and technical readiness of game-based applications.

Accordingly, this study investigates students' perceptions of an interactive Game-Based Learning application developed using Godot Engine 4 and examines the challenges encountered during its classroom implementation for English vocabulary learning. By

combining quantitative evidence from student questionnaires with qualitative insights from semi-structured interviews, the study seeks to provide a more comprehensive understanding of students' learning experiences and the practical constraints associated with the use of a Godot Engine 4-based GBL application. The findings are expected to contribute to the development and refinement of technology-enhanced English vocabulary learning, particularly for seventh-grade students.

2. METHOD

This study employed a mixed-method research design to examine students' perceptions of and challenges toward the implementation of game-based English learning using Godot Engine 4 (Creswell & Creswell, 2018). The participants were 29 seventh-grade students from a junior high school in Yogyakarta, Indonesia. Prior to the implementation, students' learning preferences were identified using the VARK (Visual, Auditory, Reading/Writing, and Kinesthetic) questionnaire to determine their dominant learning styles (Fleming & Baume, 2014).

Quantitative data were collected through a student response questionnaire administered via Google Forms using a four-point Likert scale ranging from *Strongly Disagree* to *Strongly Agree*. A four-point scale without a neutral option was adopted to minimize central tendency bias and encourage more decisive responses (Garland, 1991). Qualitative data were collected through semi-structured interviews with five purposively selected students to explore their learning

experiences and the operational and technical challenges encountered during the implementation of the Godot Engine 4 application.

Quantitative data were analyzed using descriptive statistics, including percentages and mean scores, to describe students' perceptions. Meanwhile, qualitative interview data were analyzed using thematic analysis (Braun & Clarke, 2006) to identify recurring themes related to students' learning experiences and implementation challenges.

3. RESULTS

3.1 *Students' Perceptions of Game-Based English Learning Implementation*

Regarding the first research question on students' perceptions of the implementation of game-based English learning using Godot Engine 4, data were collected from 29 seventh-grade students using a four-point Likert scale questionnaire covering five assessment aspects. This section presents the results for the four positive perception aspects, while the Challenges in Using the Game aspect is discussed separately under the second research question.

As presented in Table 1, students reported positive perceptions across all four aspects of the game-based learning implementation. Learning Experience received the highest positive response (89.27%, Mean = 3.16), followed by Interface Usability (88.79%, Mean = 3.13), Game Mechanics (88.97%, Mean = 3.16), and Student Engagement & Motivation (87.07%, Mean = 3.17). Overall, the positive response percentages for these four aspects ranged from 87.07%

to 89.27%, indicating consistently positive perceptions of the implementation of

game-based English learning using Godot Engine 4.

Table 1. Students' Perceptions and Challenges in Game-Based Learning

No.	Assessment Aspects	Positive Responses (%)	Mean Score
1	Student Engagement & Motivation	87.07	3.17
2	Game Mechanic	88.97	3.16
3	Usability Interface	88.79	3.13
4	Learning Experience	89.27	3.16
5	Challenges in Using the Game	45.45	2.42

This quantitative assessment is supplemented by qualitative data from semi-structured interviews that further illuminate four aspects of assessment. The interactive nature of the app increased the participants' motivation to learn, and the game features offered clear objectives. They also pointed out the ease of navigation and stressed that the overall experience was advantageous in terms of retention of vocabulary. The qualitative quotes below exemplify the reported perceptions of these four aspects:

Student Engagement & Motivation

Interviewee 1:

Saya senang sih, gamenya seru banget bisa ngerjain cepet-cepetan sama kelompok lain. Saya suka belajarnya kayak gini. (I really enjoyed it. The game was really fun, being able to compete against other groups. I love learning like this.)

Game Mechanics

Interviewee 2:

Jawab soal-soalnya gampang, soalnya di level 1 udah ada kosakatanya. (The questions are easy

to answer, because at level 1 there is already vocabulary.)

Interface Usability

Interviewee 3:

Petunjuknya udah bagus dan jelas sih. Waktu muncul soal-soal juga saya bisa memahami dan bisa menjawab. (The instructions were good and clear. When the questions came up, I could understand them and answer them.)

Learning Experience

Interviewee 4:

Main gamenya nggak ngebosenin, saya bisa ngerjain dengan mudah dan masih ingat nama-nama benda di sekolah. (Playing the game doesn't feel boring, I can do it easily and still remember the names of objects at school.)

The interview findings support the questionnaire results, indicating that the competitive aspect of the game increased their motivation in learning naturally. Furthermore, from the aspect of game mechanics, the strategy of introducing vocabulary from the first level was of great

Vol 9, No 2 (2026): ESTEEM

help to students who were learning at a comfortable and gradual pace. The app is simple to use and the instructions are clear so students don't waste time guessing. Instead, they can instantly start memorizing English vocabulary, which makes the whole learning process much more effective and more fun.

3.2 Challenges Encountered During the Implementation

To answer the second research question, about the practical challenges faced in the classroom rollout, the data of the questionnaire and interviews were assessed. Table 1 shows a much lower positive response rate of 45.45%, with an average score of 2.42 for the aspect of Challenges in Using the Game. This indicates that while the learning experience was well-received, students faced a host of operational and technical problems during gameplay.

Interview transcripts were thematically analysed to group reported difficulties into four distinct areas:

Technical Glitches

Some students encountered occasional freezes or lag on their device while attending live sessions which led to a brief disruption in their work and they had to restart the application.

Interviewee 5:

Kesulitan yang saya alami itu, ada bagian game yang macet tidak bisa dipencet. Tapi kalau keluar terus masuk game lagi, bisa dimainkan lagi. (The difficulty I experienced was that there was a part of the game that

was stuck and I couldn't press it. However, if I exited and re-entered the game, I could play it again).

This interview revealed that the biggest obstacle for students was not the content of the learning, but tech issues with their devices. Every time the game crashed or lagged it broke their concentration for a second. The survey scores for the challenge aspect were significantly lower than for positive learning experience, which can be attributed to these minor glitches, but these issues could be overcome just by restarting the app.

DISCUSSION

This chapter presents the findings of the study in terms of the students' perceptions on the implementation of game-based learning with Godot Engine 4. It covers the positive perceptions and the operational challenges faced during the classroom activities.

The evaluation indicated a very positive response among the seventh grade students with the average percentage score of 87.07% to 89.27% for all aspects of the assessment. The students were very active in the vocabulary exercises and had a wonderful learning experience. This success can be explained through the lens of Constructivist learning theory (Vygotsky, 1978) which states that students construct knowledge best through direct, active experience rather than passive acquisition. With the students playing the game they were actively learning, and not passively memorising a list of words. Also the underlying theory of Game-Based Learning supports the

Vol 9, No 2 (2026): ESTEEM

results. Game features such as immediate feedback when included in the learning process become a very stimulating activity for students (Gee, 2003). This finding is in line with the study of Chen and Tu (2021) which revealed that interactive media is more effective in improving vocabulary retention than traditional memorisation methods. The results show that educational games are more than fun and exciting, they are powerful cognitive tools that can actively support language learning.

As for the interface user-friendliness, the study results show that the app meets the students' different learning preferences well. The visual design of the game, simple text and interactive controls create an inviting context for learning. According to the VARK model (Fleming, 2001), the reason why the app was well received is because it provides multimodal sensory input. On-screen explicit vocabulary text is helpful for students learning to read and write, and on-screen animations and physical actions when navigating the game's mechanics stimulate visual and kinaesthetic learners. Integrated technology strategies that accommodate different learning styles result in more meaningful learning experiences (Ardiana and Arum Sari, 2025). Therefore, designing educational apps with multimodal interfaces is necessary to ensure inclusive learning for students with different cognitive preferences.

The game mechanics, especially the progressive levels and competitive aspects, also help to engage and motivate students. Students felt that they were playing and not studying and that difficult vocabulary subjects became more approachable as noted in qualitative

interviews. The theoretical underpinning for this motivation is based on the Affective Filter Hypothesis (Krashen, 1982). High anxiety and fear of failure often hinder language acquisition. The provision of the vocabulary from the first level is a support mechanism which reduces this affective filter. The simple directions, and the fact that students can try again without a severe penalty, go a long way toward alleviating their anxiety. Progressive game mechanics enhance learner concentration (Ismail et al., 2023). Furthermore, gamified environments are effective in reducing foreign language anxiety (Gidman, 2023). The practical implication is that emotional comfort in digital learning is as important as the cognitive design of the material.

The positive feedback was received for the challenging aspect which had a significantly lower positive response rate (45.45%). Qualitative data indicated this was because of system freezes and device lags that sometimes interrupted the students' workflow. Cognitive Load Theory (Sweller, 1988) may be of assistance in studying these disruptions. This theory is based on the assumption that learners' working memory is very limited. As the application lags, students must transfer their mental energy from processing English vocabulary (relative load) to troubleshooting their devices (external load). This unnecessary cognitive load breaks their concentration and disrupts their learning flow. Technical inefficiencies in digital learning increase external cognitive load and hinder performance (Rasti-Behbahani et al., 2026). One of the main implications of these findings is that stable software

performance is a necessary prerequisite to avoid cognitive overload in game-based learning.

4. CONCLUSION

The conclusion that can be drawn is that the implementation of game-based English learning using Godot Engine 4 for seventh-grade students showed very positive perceptions toward the implementation of game-based English learning. The results showed that the interactive media successfully catered students' learning preferences, attracted students' attention, reduced language anxiety, and also made vocabulary practice much more enjoyable. However, despite this high level of engagement and acceptance, students faced minor technical issues during implementation that momentarily interrupted their flow of learning. This study finally demonstrates that Godot Engine 4 is a feasible and effective pedagogical tool to facilitate English vocabulary learning in junior high schools. For future development, stability and performance optimization of the software should be prioritized to deliver an even smoother learning experience.

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Vol 9, No 2 (2026): ESTEEM

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