Exploring the effects of a serious game on 11th graders' perceptions of their reading comprehension skills: An action research study in Colombia[1]

Explorando los efectos de un Juego Serio en las percepciones de los estudiantes de 11° grado sobre sus habilidades de comprensión lectora: Un estudio de investigación-acción en Colombia

Autores:
Willinton Martínez González[2]
Yeisson Reyes Colorado[3]
Paola Julie Aguilar-Cruz[4]

Abstract

This research paper presents an action-research study exploring 11th graders' perceptions of a Serious Game (SG) designed to support English as a Foreign Language (EFL) reading comprehension skills in a state school in Florencia, Caquetá, Colombia. The study involved 33 students from Jorge Eliécer Gaitán high school and adopted a qualitative and descriptive approach for its methodological design. Data collection methods included surveys and focus group interviews, analysed through grounded theory and data triangulation. Findings revealed that students perceived the SG as beneficial for their reading comprehension process, particularly in fostering contextual vocabulary acquisition and providing clear instructional guidance. They also emphasized the positive role of the SG's graphic design in maintaining engagement and motivation. The study highlights how the students perceived that the SG contributed to creating a motivational and interactive learning environment for reading comprehension improvement. In conclusion, students perceived that the SG enhanced their reading comprehension, engagement, and motivation, fostering active participation in learning activities.

Keywords: Serious Games, Reading Comprehension, EFL.

Resumen

Este artículo de investigación presenta un estudio de investigación-acción que explora las percepciones de los estudiantes de grado 11 sobre un Juego Serio (SG, por sus siglas en inglés) diseñado para apoyar las habilidades de comprensión lectora en inglés como lengua extranjera (EFL) en un colegio estatal de Florencia, Caquetá, Colombia. El estudio involucró a 33 estudiantes del colegio Jorge Eliécer Gaitán y adoptó un enfoque cualitativo y descriptivo en su diseño metodológico. Los métodos de recolección de datos incluyeron encuestas y entrevistas en grupos focales, analizados mediante la teoría fundamentada y la triangulación de datos. Los hallazgos revelaron que los estudiantes percibieron el SG como beneficioso para su proceso de comprensión lectora, especialmente en el fomento de la adquisición de vocabulario contextual y en la provisión de instrucciones claras. También destacaron el papel positivo del diseño

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[1] This article is the result of undergraduate research conducted for graduation purposes.
[2] English Language Teacher, Facultad de Educación, Universidad de la Amazonia, Florencia, Colombia. https://orcid.org/0009-0008-8892-3278 - Email: willintonmg@gmail.com
[3] English Language Teacher, Facultad de Educación, Universidad de la Amazonia, Florencia, Colombia. https://orcid.org/0009-0007-2689-1947 - Email: yeissonreyes12@gmail.com
[4] English Language Teacher and researcher, Universidad de la Amazonia and Jorge Eliécer Gaitán High School in Florencia, Caquetá, Colombia. Holds a master's in education and specialist degree in pedagogy. She is currently a PhD student in Educational Technology at Central China Normal University. https://orcid.org/0000-0001-8386-9104 - Email: paolaaguilarcruz@gmail.com

gráfico del SG en el mantenimiento del compromiso y la motivación. El estudio resalta cómo los estudiantes percibieron que el SG contribuyó a crear un entorno de aprendizaje motivador e interactivo para la mejora de la comprensión lectora. En conclusión, los estudiantes percibieron que el SG mejoró su comprensión lectora, compromiso y motivación, fomentando una participación activa en las actividades de aprendizaje.

Palabras clave: Juegos Serios, Comprensión Lectora, EFL (Inglés como Lengua Extranjera).

Introduction

Throughout the early twenty-first century, Serious Games (SGs) have emerged as a significant tool for enhancing communication skills among English as a Foreign Language (EFL) students across different educational contexts. This trend stems from students' favorable reception of SGs, and the positive outcomes observed in EFL teaching-learning environments (Aguilar-Cruz & Álvarez-Yaguara, 2021). SGs play a crucial role in reinforcing the learning process by focusing on the development of the communicative skills. Moreover, they inspire both students and teachers to explore innovative methods for acquiring and teaching the foreign language effectively (Aguilar-Cruz & Álvarez-Yaguara, 2021; Sun et al., 2023). Consequently, both students and teachers actively engage in the learning process, thereby enhancing their performance and demonstrating promising prospects for the integration of technology into educational practices.

In Colombia, the National Ministry of Education (MEN) has introduced audiovisual didactic materials, including textbooks and videos, as part of its efforts to bolster EFL teaching and learning. Additionally, the MEN has encouraged the adoption of SGs and gamification as technological didactic strategies in state institutions. However, research in this area remains limited, particularly regarding the influence of these strategies on students' reading comprehension processes.

Additionally, the results from the standardized test "ICFES Saber 11" in 2021 at Jorge Eliécer Gaitán High School highlighted a concerning trend of low performance in reading comprehension and a notable lack of vocabulary among 11th graders. Furthermore, the results of the test "Pruebas Evaluar para Avanzar (EVA)" 2022 reaffirmed this issue, indicating persistent challenges in reading comprehension among students at this grade level. These findings underscored the urgent need for research in the area of reading comprehension to identify effective strategies for improving this critical skill necessary for students graduating from 11th grade.

In addition to these academic assessments, our observations as teachers revealed a disheartening reality: students appeared to be disengaged and demotivated by traditional instructional methods employed in the school context. During our observation practice, it became apparent that students showed minimal participation in class activities, likely due to finding the classes uninspiring and demotivating. Recognizing this significant challenge, we realized the need to implement strategies that not only fostered engaging and enjoyable learning environments but also facilitated meaningful and effective learning outcomes. Therefore, integrating SGs into instruction emerged as a promising approach to address these multifaceted challenges and enhance students' reading comprehension skills.

Against this backdrop, our qualitative action research study aimed to design a SG to explore 11th graders' perceptions of its potential to support reading comprehension at Jorge Eliécer Gaitán High School in Florencia, Caquetá. The central research question guiding our study was: *How do 11th graders at Jorge Eliécer Gaitán High School perceive the implementation of a SG in fostering their reading comprehension?* Through this research process, we sought to understand students' views on how a SG could address the identified challenges in reading comprehension and vocabulary development at this grade level. The methodology section outlines the two subsequent research questions that delve deeper into specific aspects of student perceptions and the game's role in their learning process.

This manuscript comprises different sections. Firstly, we provide an overview of the research issue, its background, and the stakeholders involved. Subsequently, we articulate the rationale for the study, and formulate the research question. Then, we present the theoretical framework underpinning our research, including a review of existing literature and the identification of relevant variables. Later, we outline our methodology, encompassing research design, participant selection, data collection tools, research stages,

and instructional design. Then, we detail the data analysis procedures, including data triangulation and research categories. Finally, we offer conclusions, pedagogical implications, and limitations of the study.

Literature Review

In discussions surrounding reading comprehension, many scholars emphasize its significance and offer different perspectives. Perfetti et al. (2005) define comprehension as the process wherein readers construct mental representations of text messages. Similarly, Kanmaz (2022) asserts that reading and comprehension are essential for understanding daily life, acquiring information, and developing critical perspectives. Building on this, Pickren et al. (2021) underscore the lifelong importance of reading comprehension in students' ability to grasp information across different subjects. Therefore, fostering proficient reading comprehension skills is vital for students' educational advancement.

In the realm of EFL learning, mastering reading comprehension holds particular significance. Pardede (2019) emphasizes reading comprehension as the cornerstone of EFL education, especially in environments where English is not a native language. Moreover, it serves as a fundamental skill that supports learners in acquiring new vocabulary, understanding grammatical structures, and developing critical thinking abilities. Furthermore, Pardede (2019) highlights reading as a crucial means for learners to receive language inputs, particularly in contexts lacking English speech interaction. This exposure to written texts not only enhances linguistic proficiency but also enriches students' cultural knowledge and awareness of different perspectives. Consequently, reading comprehension in EFL contributes substantially to learners' cognitive development and their ability to navigate diverse intellectual landscapes. The ability to comprehend and analyze texts equips learners with the skills needed to succeed in academic and professional settings where English is the primary medium of communication.

However, addressing reading comprehension challenges requires effective instructional strategies. Alyousef (2006) advocates for the implementation of motivating and engaging teaching strategies to enhance reading comprehension. These strategies should be designed to accommodate different learning styles and cognitive abilities, ensuring that all students can benefit from the instruction. Sun et al. (2023) further support this by highlighting the importance of teacher scaffolding in Game-Based Learning (GBL) environments, which plays a critical role in guiding students through complex tasks and maintaining their engagement. Additionally, integrating technology and multimedia resources can make reading activities more interactive and appealing, thereby increasing students' motivation to engage with texts. As Aguilar-Cruz et al. (2023) note, the effectiveness of GBL is influenced by factors such as cultural relevance, educational context, and student motivation, which are crucial in modifying instructional strategies to meet the specific needs of learners in different regions. Collaborative learning, where students work together to decode and interpret texts, can also foster a deeper understanding and retention of information. Thus, exploring strategies that foster student engagement in reading comprehension improvement is essential in EFL education.

Turning to SGs, these innovative tools offer promising avenues for enhancing learning experiences. Ritterfeld et al. (2009) define SGs as tools that align educational content with gameplay to facilitate learning. Tlili et al. (2021) corroborate this, highlighting the effectiveness of educational games in enhancing the learning process, especially for second language learners. Moreover, Kiili (2005) stresses the importance of balancing educational goals and gameplay in designing meaningful educational games.

In the context of EFL education, SGs have emerged as powerful tools for achieving learning objectives and enhancing student motivation (Aguilar-Cruz et al., 2023). Al-Azawi et al., (2016) note the significant value of educational games in promoting enjoyment and skill development among EFL students. Similarly, Chen and Hsu (2019) emphasize the enjoyable and formative properties of educational games, which appeal to both teachers and students. Aguilar-Cruz et al. (2023) also note that the integration of GBL in classrooms has shown significant potential in engaging students and improving their academic performance. Despite this potential, the integration of educational games into EFL teaching requires thoughtful management and adaptation to students' technological proficiency (Solano et al., 2017).

When applied to reading comprehension, SGs offer promising outcomes. Chen and Hsu (2019) found that SGs significantly improved reading comprehension by helping students interpret unknown vocabulary and instructions within a gaming context. Similarly, Godwin-Jones (2014) argues that SGs promote

reading comprehension by stimulating cognitive engagement through exposure to unfamiliar vocabulary and task-based instructions. Additionally, Pardede (2019) suggests that SGs align with the digital reading habits of contemporary students, making them an effective strategy for developing reading comprehension skills in digital environments.

Research conducted in the Latin American context, specifically in Colombia, offers valuable insights into the implementation of SGs for EFL education. Aguilar-Cruz et al. (2023) conducted a mixed-methods study in Colombia to investigate the factors influencing the effectiveness of GBL in this context. Their research highlights the importance of aligning SGs with the local educational environment, addressing challenges such as technological access and cultural relevance. The study found that SGs, when appropriately implemented, significantly enhance students' motivation and engagement, particularly in disadvantaged regions such as Caquetá. Similarly, Aguilar-Cruz and Álvarez-Guayara (2021) explored the impact of Bethe1Challenge, a SG designed for learning English in Colombia. They observed that students not only improved their language skills but also demonstrated higher levels of collaboration and critical thinking. These findings underscore the need for more SGs tailored to Latin American learners, emphasizing cultural familiarity and accessibility.

Further studies in Colombia delve into the dynamics of student engagement with SGs in EFL classrooms, offering insights into their potential benefits and challenges. Aguilar Cruz (2022) analyzed students' interactions with a SG through a sociocultural lens, emphasizing how these tools foster collaborative learning and deepen linguistic understanding. However, the study also noted barriers such as uneven digital literacy among students and the need for teacher training to optimize game-based methodologies. These findings suggest a research gap in the development and application of SGs in Latin America that consider technological disparities and culturally specific content.

Despite extensive studies on Serious Games (SGs) in EFL contexts, few have focused on their implementation in high school settings in Latin America, particularly in addressing reading comprehension challenges. In addition, research conducted in the Colombian context often overlooks high school settings, where the application of SGs remains underexplored. A thorough review of existing literature reveals a scarcity of studies focusing on high school EFL students and the use of SGs to enhance reading comprehension in such contexts. This gap underscores the need for targeted research in this area, addressing the specific educational challenges and opportunities within secondary education. Hence, investigating the use of SGs in these contexts can provide valuable insights into their potential to foster meaningful language acquisition and engagement among adolescent learners in Latin America.

In summary, the integration of SGs into EFL education presents a multifaceted approach to addressing reading comprehension challenges. By leveraging the engaging and interactive nature of games, educators can create meaningful learning experiences that enhance students' reading comprehension skills and foster a deeper understanding of the English language.

Methodology

This study incorporated a qualitative research methodology to explore the use of a SG as a means to enhance reading comprehension among eleventh-grade students at Jorge Eliécer Gaitán High School in Florencia Caquetá. Qualitative research emphasizes observation, data collection, and interpretation of behavioral descriptions within a given phenomenon setting (Vasilachis et al., 2009). Unlike quantitative research, qualitative methods prioritize the recognition of textual data and opinions over numerical data, allowing for a deeper understanding of social issues (Creswell, 2012). By focusing on individuals' experiences, worldviews, and the meaning they attribute to their backgrounds, qualitative research seeks to uncover rich insights into complex phenomena (Merriam & Tisdell, 2015).

This approach was used to investigate how 11th-grade students at Jorge Eliécer Gaitán High School in Florencia, Caquetá, perceive the use of a Serious Game (SG) in supporting their reading comprehension process, addressing the first research question: *What are the students' perceptions of using a SG to improve their reading comprehension skills?* Furthermore, it allowed for the exploration of students' perceptions regarding the use of SG to enhance their reading comprehension skills, including how these perceptions influence their engagement and motivation, as posed in the second research question: *How does the use of a SG influence students' engagement and motivation to participate in reading*

comprehension activities? Through these qualitative inquiries, the study sought to uncover the lived experiences of the students, providing a comprehensive understanding of the potential benefits and challenges associated with GBL.

Action Research Design

This study adopted an action research approach, aimed at developing practical solutions to real-world problems within a specific context, as described by Creswell (2012). Action research typically follows a community development philosophy, engaging all stakeholders in problem identification and solution implementation (Kumar, 2018). Commonly undertaken in educational settings, action research enables educators to collect data and innovate their teaching methodologies to address challenges encountered in traditional approaches (Creswell, 2012). The steps followed in this action research design are illustrated in the following figure.
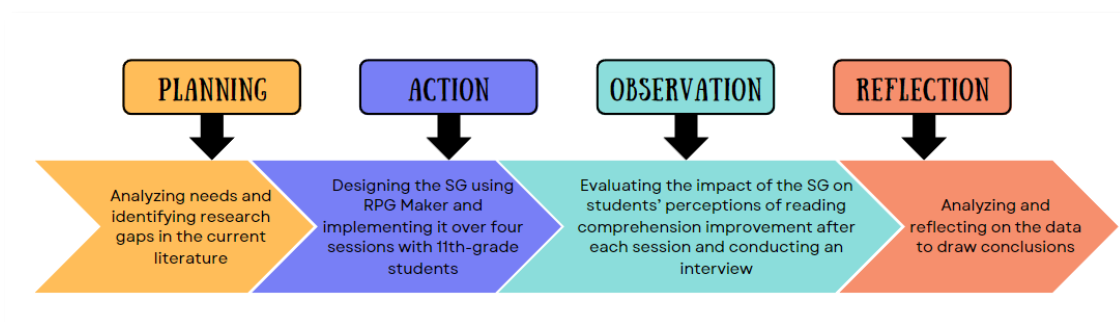

Figure 1. Workflow of the Action Research process.
Source: own work.

Participants and Context

The study was conducted at Jorge Eliécer Gaitán High School, located in the urban area of Florencia, Caquetá, within the Colombian Amazon region. Participants consisted of 30 11th-grade students enrolled in the English Emphasis program offered by the school. Despite demonstrating proficiency in English learning, students had difficulties with reading tasks delivered by the teacher. The group consisted of 20 female and 10 male students, aged between 15 and 18 years.

Data Collection Instruments

We implemented two data collection instruments to gather data during the research intervention: surveys and focus group interviews. Surveys, as defined by Creswell (2012), are tools used to collect data that can be statistically analyzed to test hypotheses and identify trends within a specific population. In our study, surveys were used to inquire students' preferences regarding reading comprehension topics and their attitudes toward using games in the classroom. Additionally, surveys enabled us to monitor students' reading comprehension progress throughout the implementation of the SG.

The statements for the surveys used in this study were adapted from the works of Gu (2018) and Haruna et al. (2019). These statements were framed as affirmative statements, asking students to rate their agreement on a scale from 1 to 5, where 1 represented "strongly disagree" and 5 represented "strongly agree". Gu's (2018) survey focused on ESL learners' vocabulary learning strategies, while Haruna et al.'s (2019) framework assessed the effectiveness of game-based learning and gamification, providing a basis for the evaluation of engagement, motivation, and learning outcomes in the context of SGs.

Focus group interviews, on the other hand, provide a platform for participants to express their perceptions, interests, and opinions on specific issues (Vaughn et al., 1996). According to Creswell (2012), focus group interviews facilitate interaction among participants, allowing researchers to uncover both expected and unexpected results from the participants' perspectives. These interviews helped us delve deeper into students' reading comprehension learning processes and understand their

engagement with the educational games. Focus group interviews provided valuable insights into students' attitudes and experiences, enhancing our comprehension of the research intervention's effectiveness. The interview protocol contained 4 questions focused on students' self-perceptions of their reading comprehension development through the use of the SG. These questions were designed to explore how the students felt about the effectiveness of the SG in improving their reading comprehension, focusing on both their cognitive and motivational responses. The questions aimed to address: Students' perceived improvements in reading comprehension, impact of game design on comprehension, motivation to engage with reading tasks and students' reflections on their learning experience.

The research intervention process

According to Al-Azawi et al., (2016), the primary objective of SGs centered on GBL approaches is to facilitate learning and enrich students' experiences while developing specific skills. In line with this perspective, the SG we designed and implemented during the research intervention, using RPG MAKER, aimed to enable students to progress through all levels until completing each step of the game. The subsequent table provides an overview of the research intervention in the classroom environment.

Table 1.
Pedagogical design.

Stages	Intervention 1	Intervention 2	Intervention3	Intervention 4
Pre	Introducing the RPG MAKER program to the participants. Asking students to sign informed consent with their guardians and taking the participants to the computer lab. Explaining the content of the game, the type of vocabulary, and the number of players allowed per desktop.	Taking the participants to the computer lab. Explaining the content of the game, the type of vocabulary, and the number of players allowed per desktop.	Taking the participants to the computer lab. Explaining the content of the game, the type of vocabulary, and the number of players allowed per desktop.	Taking the participants to the computer lab. Explaining the content of the game, the type of vocabulary, and the number of players allowed per desktop.
While	Asking students to play the first game called My grandpa's farm, which involves the development of several farm tasks.	Asking students to play the second game called My first house, which involves the exploration and acquisition of a house according to the player's choice.	Asking students to play the third game called Amazonian warrior, which involves defeating enemies to free the captive animals, in the jungle.	Asking students to play the fourth game called Diamond Hunter, which involves stealing diamonds from relatives in several locations.
Post	Surveying students to assess the effectiveness of the game implementation.	Surveying students to assess the effectiveness of the game implementation.	Surveying students to assess the effectiveness of the game implementation.	Surveying students to assess the effectiveness of the game implementation.

Source: own work.

The intervention took place in the school's Technology Room, where we ensured the proper installation of the game on each computer before proceeding with the research intervention. Each level of the game corresponded to one class intervention, covering vocabulary topics taught from sixth to eleventh grade. Students were instructed to follow game instructions and ask teachers for clarification if needed. They evaluated the game after each level using a rating scale survey. In the first intervention, students played "My Grandpa's Farm", completing farm tasks to earn diamonds and advance through the game, which reinforced vocabulary related to animals, colors, vegetables, fruits, and numbers (see Figure 2).

Figure 2. Example of game-level 1, at the backyard of the farm.
Source: own work.

During the second intervention, students engaged with the game level "My First House". They helped a seller to explore three houses, ultimately choosing one to become their property. The game introduced more complex English structures and vocabulary related to household items and parts of the house. Students interacted with the seller, following her directions, and answering questions about vocabulary as they explored each house (see Figure 3).

Figure 3. Example of game-level 2, the neighborhood.
Source: own work.

During the third intervention, students engaged with game level three, "Amazonian Warrior", in the RPG MAKER game. Their mission was to liberate different animal species from animal traffickers in the jungle. This level introduced vocabulary related to animals, jungle locations, and game instructions. Students defeated traffickers while navigating the jungle, freeing animals as they progressed. The game's design facilitated understanding of instructions and dynamics, allowing students to apply their reading and pragmatics skills effectively (see Figure 4).
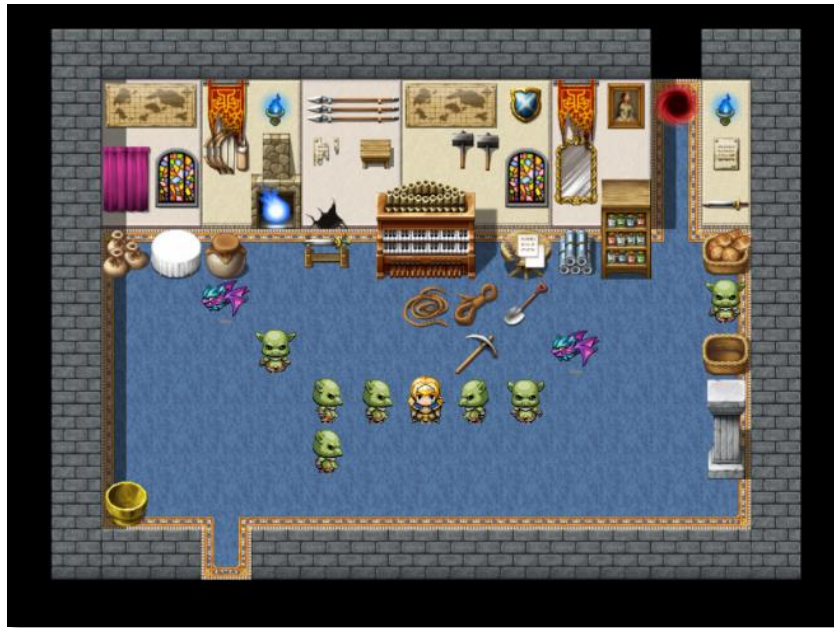
Figure 4. Example of game-level 3, second location.
Source: own work.

In the fourth and final intervention, students engaged with the fourth game level, "Diamond Hunter" in the RPG MAKER game. This level focused on vocabulary related to family members, locations, directions, and transportation. Students' objective was to reunite the main character with his family by collecting diamonds from relatives across different locations such as cities, floating castles, and islands. To succeed, students had to comprehend game instructions and navigate challenges while avoiding detection. Upon completion, the main character expressed gratitude, and family members reunited, emphasizing students' application of vocabulary and reading skills acquired in previous levels (see Figure 5).

Figure 5. Example of game-level 4, at the cousin's apartment.
Source: own work.

Through these four interventions, students had the opportunity to engage with different levels of the game, each designed to reinforce specific vocabulary and reading comprehension skills. As students progressed through increasingly complex levels, they were exposed to a variety of real-world contexts, such as farm life, household management, the Amazonian jungle, and family dynamics. This progression not only allowed them to enhance their vocabulary but also provided opportunities for practical application, critical thinking, and reading comprehension. The integration of GBL through RPG MAKER thus served as a tool to both motivate and challenge students, thus fostering their language development in an interactive and dynamic environment.

Data Analysis

For the analysis of the data collected, we used the grounded theory approach for its systematic and qualitative methodology, as outlined by Creswell (2012). This approach enabled the development of new theories through the exploration and reflection of specific processes or interactions within a given context. In addition to the grounded theory approach, we also employed data triangulation as a method of analysis to enhance the credibility and efficacy of our research findings. Triangulation, as described by Merriam and Tisdell (2015), involves analyzing data collected from multiple sources or methods to validate research outcomes.

Furthermore, the analysis of data from the survey involved the use of descriptive statistics to quantify students' responses. This allowed us to identify patterns and trends within the data, providing a clear picture of students' perceptions and experiences. Descriptive statistics, such as means, and standard deviations, were calculated to summarize the survey responses, helping to interpret the results in a meaningful way. The combination of qualitative analysis through grounded theory and triangulation, alongside the quantitative analysis from the survey, offered a robust framework for understanding students' perceptions of the impact of the SG on their reading comprehension and engagement. After applying these methods to our analysis, we successfully categorized the data, resulting in the creation of Table 2.

Table 2.
Research results

Research question	Category	Subcategory
What are the students' perceptions of using a SG to improve their reading comprehension skills?	Students' perceptions of the SG in enhancing reading comprehension	Students' opinions on how the game helped improve their ability to understand texts.
		Perceived relationship between game graphic design and reading comprehension development.
	Students' perceptions of the SG impact on engagement and motivation towards reading comprehension	Perceived improvements in engagement and focus related to reading comprehension.
		Innovative teaching strategies increased students' motivation in reading comprehension

Source: own work.

Results and Discussion

This section presents the analysis of the data collected during the research process, focusing on two key questions: *What are the students' perceptions of using a SG to improve their reading comprehension skills?* and *How does the use of a SG influence students' engagement and motivation to participate in reading comprehension activities?* The findings are discussed in relation to how the use of the game affected students' perceptions of their learning, as well as its students' perceptions of the SG impact on their overall engagement and motivation in reading tasks.

Students' perceptions of the SG in enhancing reading comprehension

This category explored how the mechanics of educational games supported 11th graders in understanding texts and progressing through game levels. Drawing on insights from Godwin-Jones (2014), the mechanics of digital games were found to encourage player effort and commitment to interpret unfamiliar information to advance. This cognitive input translated into learning, as players

needed to memorize and internalize vocabulary to improve their performance within the game. Additionally, the repetitive nature of vocabulary throughout the gameplay facilitated recall, enabling students to better understand subsequent missions or tasks. Moreover, the visual organization of the game aided students in making inferences, allowing for easier comprehension of unknown vocabulary and enhancing the efficiency of their mental processes. Overall, the immersive and visually stimulating nature of educational games helped students navigate through gameplay without feeling frustrated by unfamiliar words, thus supporting their learning process.

Students' opinions on how the game helped improve their ability to understand texts. This subcategory explored how students perceived the role of keywords in facilitating their comprehension of instructions to understand texts. According to Chen and Hsu (2019), vocabulary within game texts serves as cues to understand unfamiliar terms and comprehend game tasks. In the SG used, instructions included vocabulary that acted as cues to guide participants through interactions and phases. This approach aligns with Guillén-Nieto and Aleson-Carbonell's (2011) findings, which highlight that serious games can improve learning effectiveness by using contextual clues, such as keywords, to enhance comprehension. Student feedback collected from focus group interviews confirmed the effectiveness of using keywords in instructions for improving reading comprehension. Students expressed that the clarity of game instructions, reinforced by the use of specific vocabulary, aided their understanding and contributed positively to their learning process:

"I think I learned because the game instructions were understandable" (SPK 07).

"In my opinion, I think the game helped me improve my reading comprehension because I could understand the instructions given by the game, and I also improved thanks to the vocabulary the game had" (SPK 02).

This feedback highlights the significant role that keywords played in guiding students through the game tasks and enhancing their comprehension. Additionally, the students' comments support the positive impact of clear instructions and relevant vocabulary on their learning experience.
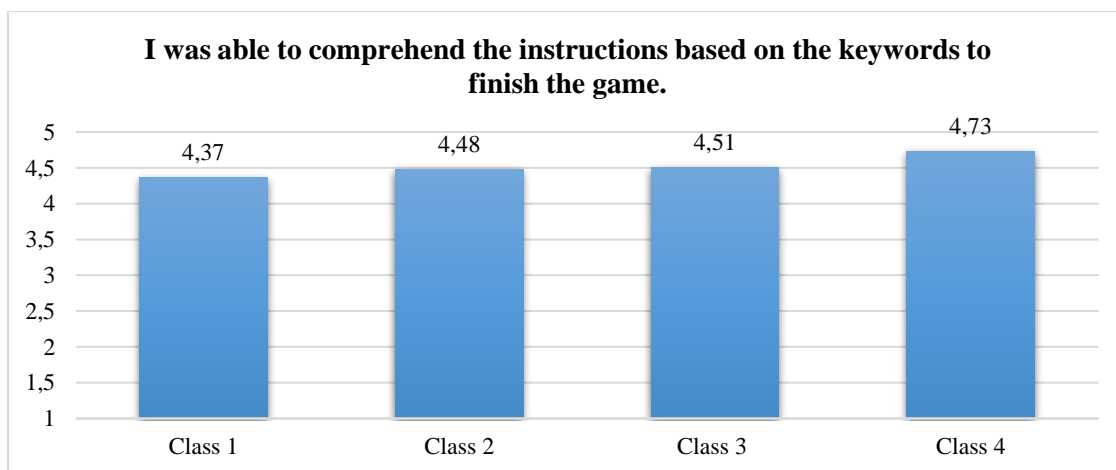

I was able to comprehend the instructions based on the keywords to finish the game.

	Class 1	Class 2	Class 3	Class 4
	4,37	4,48	4,51	4,73

Figure 6. Exit Survey question 7.
Source: own work.

Based on the Figure 6, it is clear that keywords were an effective resource for helping students overcome hesitation in understanding game instructions. The data indicates that students successfully used strategies to internalize and adapt to the language used in the game. As evidenced by the trend in the Figure 6, students' fluency in the game increased as they progressed through different levels, thanks to their familiarity with the game's terminology. This familiarity enabled them to think quickly and advance more rapidly.

In this regard, the following Figure presents the average level of acceptance regarding the use of educational games to enhance reading comprehension skills among EFL students (see Figure 7).
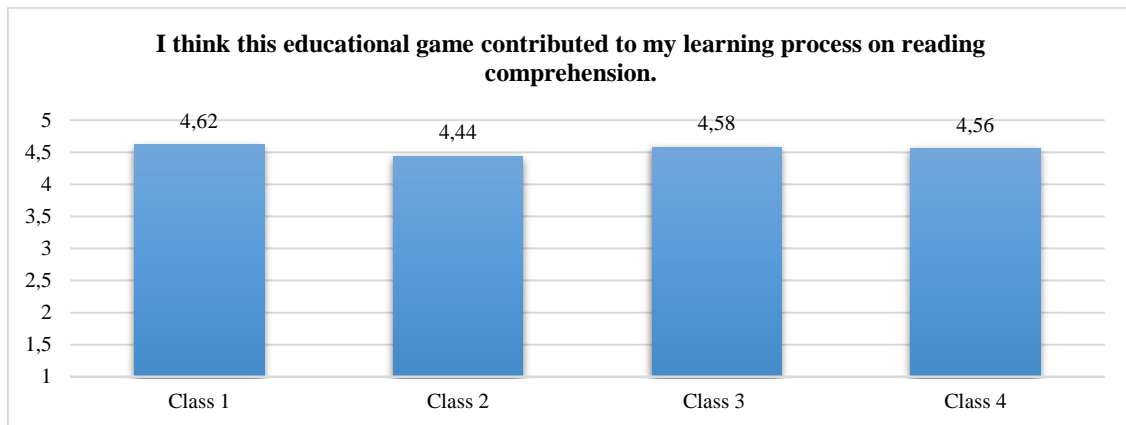
I think this educational game contributed to my learning process on reading comprehension.

Figure 7. Exit Survey question 4.
Source: own work.

According to the information displayed in the figure, students provided overwhelmingly positive feedback regarding the effectiveness of the educational games in strengthening their foundations for future reading in the foreign language. This sentiment was echoed in the insights shared by students during the focus group interviews:

"Truthfully, I believe that the strategy helped me a lot with my reading comprehension because the game almost always relied on short writings that aided me and gave me clues about what I had to do, and it also had many key words" (SPK 31).

"I think the game does help improve reading comprehension in people who have less knowledge of English because of the vocabulary" (SPK 29).

"Yes, it helped me improve my reading comprehension because in the game, I found a lot of key vocabulary, and also, the instructions were easy to understand, so the game is very good" (SPK 09).

Others expressed similar sentiments, noting that the game's use of key vocabulary and easy-to-understand instructions greatly facilitated their comprehension and ability to complete tasks.

In summary, students' comments strongly supported the notion that incorporating keywords into game texts significantly enhanced their reading comprehension process. This approach facilitated their cognitive processes and increased their willingness to tackle the challenges presented in the game. Aligning with Pardede's (2019) suggestion, using familiar language for EFL learners proved crucial in maintaining their engagement and ensuring successful completion of the game.

Perceived relationship between game graphic design and reading comprehension development. The subcategory emphasizes the importance of the graphic design of educational games in aiding students' comprehension of game texts. According to Godwin-Jones (2014), engaging with the game prompts students to pragmatically navigate through it, even if they do not fully grasp the keywords. This suggests that the graphical design allows students to comprehend vocabulary and instructions by using contextual cues. Additionally, Hanandeh et al. (2018) highlight that visual aspects, storyline, and challenges in educational games captivate students, drawing them into the content. Thus, visual effects in game design play a crucial role in connecting textual content with graphical elements to facilitate understanding. The subsequent table displays the average acceptance among students regarding the use of graphic context in games for better comprehension of instructions (see Figure 8).
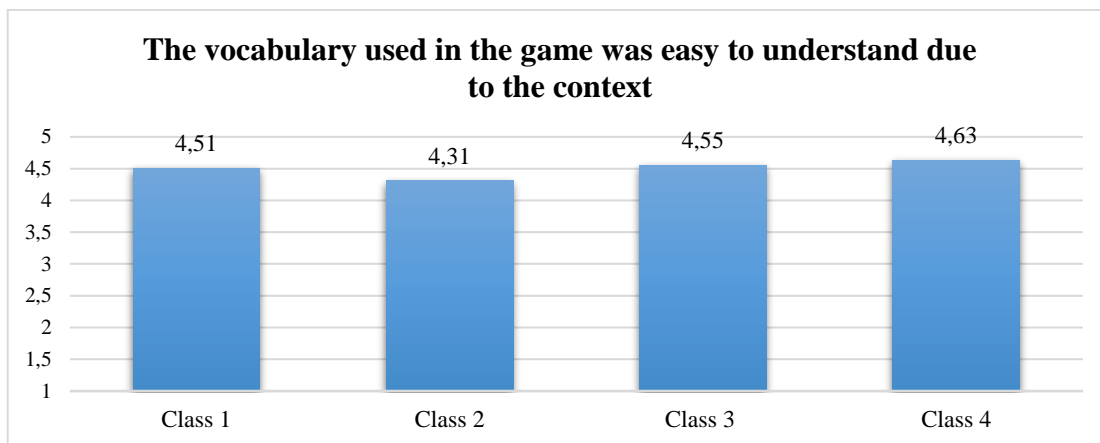
The vocabulary used in the game was easy to understand due to the context

Figure 8. Exit Survey question 6.
Source: own work.

Based on the data presented in the Figure 8, it is evident that students relied heavily on graphical elements within the game as an additional resource to navigate through the gameplay, especially when they struggled to identify keywords. To further support this subcategory, we provide the following table showcasing students' assessments of the difficulty they faced in understanding game instructions (see Figure 9).
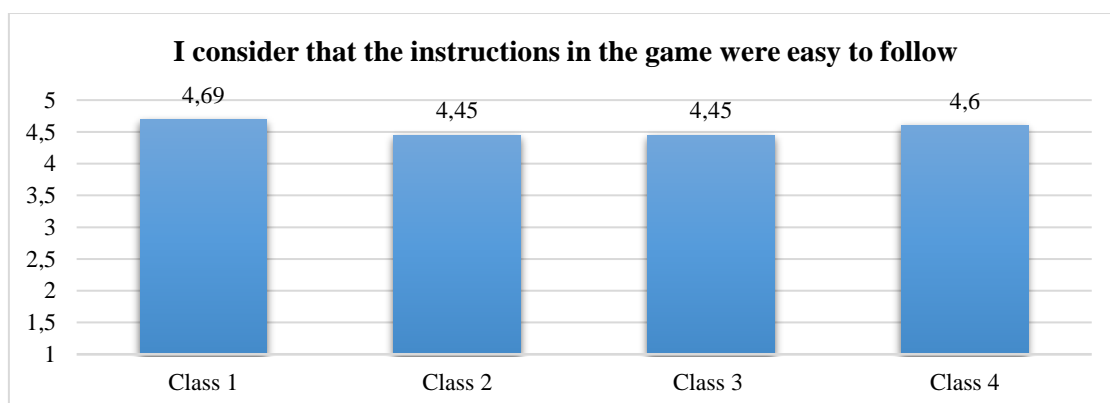

I consider that the instructions in the game were easy to follow

Figure 9. Exit Survey question 1.
Source: own work.

Based on the data provided in the Figure 9, it is evident that students did not face significant difficulties in understanding the game instructions. This was attributed to the effective graphic design of the game, which supplemented the instructions and allowed students to navigate the game confidently. These findings were corroborated by insights from student focus group interviews:

"I believe the game helped me improve my reading comprehension because even if there were words I didn't know, they weren't many, and with the context of the other visual instructions, it was easier to understand the meaning of each unknown word" (SPK 08).

"If one didn't understand something, the context of the game guided you. For example, if it said go north to the left, the game showed you where you could go" (SPK 16).

"The context provided by the game was really fun, so you feel motivated to keep playing and learn more, I mean, to learn more vocabulary" (SPK 11).

"Everything in the game became very intriguing, the interactions, what happened in each place we moved to in the game" (SPK 23).

"I also liked the implementation of the characters, the dragons, the plants, and the scenarios to better understand the game" (SPK 38).

Moreover, some students expressed how the graphic design of the educational games piqued their interest to play, even if they were not typically interested in video games:

"I'm not someone who plays video games, but seeing vocabulary in a different context on a board is a quick way to learn because some people learn visually" (SPK 28).

Overall, students judged the incorporation of graphic elements in the games as highly effective in facilitating their cognitive interpretation processes. This aligns with Godwin-Jones's (2014) suggestion that incorporating visual aids into game interfaces can enhance reading skills and stimulate curiosity and enjoyment during gameplay.

Students' perceptions of the SG impact on engagement and motivation towards reading comprehension

The implementation of digital games for educational purposes has emerged as a powerful strategy to enhance student motivation and facilitate learning, particularly in the context of reading comprehension. According to Chen and Hsu (2019), integrating educational games into classroom activities significantly boosts student motivation by offering engaging and interactive learning experiences. This category underscores the transformative impact of educational games on students' motivation and learning outcomes, emphasizing their potential to change traditional teaching approaches. Using the natural draw of digital games, teachers can design exciting learning environments that captivate students' interest and encourage them to actively engage in reading comprehension tasks.

Perceived improvements in engagement and focus related to reading comprehension. Tlili et al. (2021) highlight the draw of educational games in seamlessly integrating reading tasks into engaging gameplay experiences. Aguilar-Cruz et al. (2023) emphasize the critical role of engagement in GBL, noting that "strong engagement in a game significantly enhances learning outcomes and fosters meaningful learning experiences" (p.13). In particular, 11th-grade students exhibited a high level of acceptance and engagement when interacting with textual content within the SG. The interactive nature of the SG enabled students to actively participate in reading activities in real-time, fostering deep concentration and sustained engagement throughout the class. This subcategory underscores the transformative potential of digital interfaces in enhancing student motivation and enjoyment of reading tasks, thereby facilitating meaningful learning experiences. Moreover, the survey results presented in Figure 10 indicate a consistently high level of preference for reading texts within the game environment compared to traditional non-interactive media, which supports students' perceptions of the positive impact of educational games on student engagement and motivation in reading comprehension tasks.
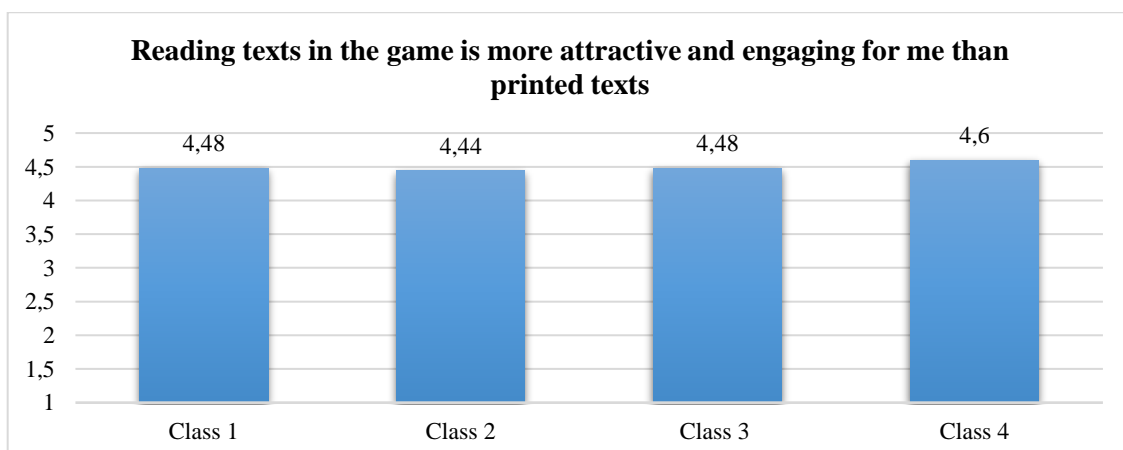

Figure 10. Exit Survey question 5.
Source: own work.

The student's perspective highlighted in the focus group interviews further corroborates the positive impact of reading texts through educational games on student engagement and learning outcomes. As explained by the student (SPK 10), traditional classroom activities, characterized by passive learning and rote tasks, were perceived as dull and uninspiring. In contrast, the interactive nature of educational games was praised for its ability to captivate student interest and provide a stimulating learning environment. The student's enthusiastic endorsement of educational games underscores their effectiveness in fostering active participation, interaction, and enjoyment among learners. By immersing students in engaging gameplay experiences, educational games offer a compelling alternative to conventional teaching methods, driving motivation and enhancing the development of EFL skills (Aguilar-Cruz & Álvarez-Yaguara, 2021; Deng et al., 2023). Ultimately, the incorporation of SGs into reading comprehension activities not only promotes student engagement but also cultivates a conducive learning atmosphere leading to the acquisition of essential language skills.
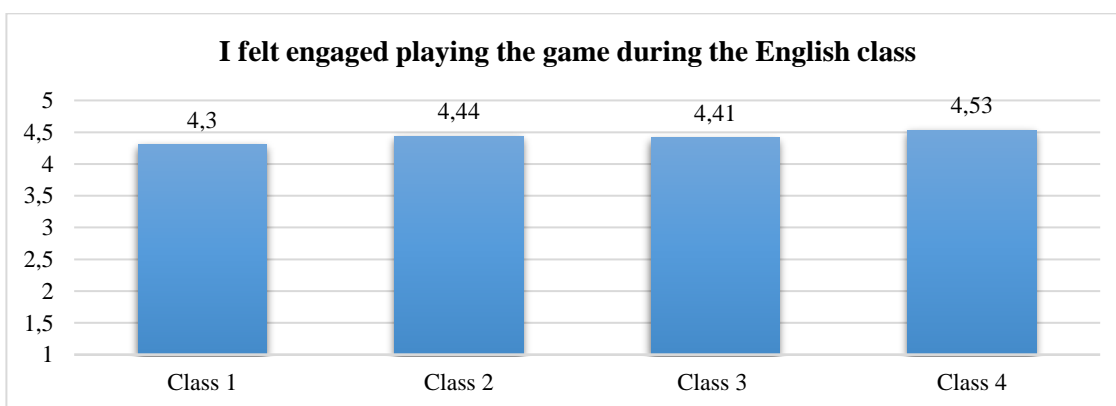

I felt engaged playing the game during the English class

Figure 11. Exit Survey question 2.
Source: own work.

As mentioned earlier, incorporating reading texts into educational games received significant approval from the research participants, as reflected in the survey results. Additionally, the viewpoints shared by students during the focus group interviews further corroborated these findings. One participant expressed their perspective, stating, "In my opinion, it's very boring to just sit there, listening to the teacher talk and occasionally doing a reading activity on paper. That's very dull, very monotonous, and doesn't grab the student's attention much. On the contrary, through these games, it's more interactive, I think it's very good because you get entertained, it seems very cool... for me, practical is better than theoretical".

This student's viewpoint underscores the lack of engagement experienced with traditional non-interactive reading activities in the classroom. However, they highlighted the positive impact of SGs, emphasizing their interactive nature and the enjoyment they provide. This sentiment underscores the value of incorporating gaming elements into learning activities, as it fosters a more engaging environment conducive to learning and enhances the development of EFL skills.

Innovative teaching strategies increased students' motivation in reading comprehension.

Innovative teaching approaches have proven to be instrumental in enhancing students' motivation, particularly in the realm of reading comprehension. This subcategory underscores students' eagerness to embrace novel instructional methods that integrate technology. Kumar (2018) affirms that students exhibit a pronounced affinity for technology-enabled learning experiences, as evidenced by their enthusiastic participation in activities that leverage digital tools. Indeed, the eleventh-grade students in our study demonstrated a marked preference for such approaches, readily engaging with instructional materials delivered through technological mediums. Moreover, Godwin-Jones (2014) highlights the allure of educational games among teenagers, attributing it to the pervasive presence of technology in their daily lives. This sentiment was echoed by a student during a focus group interview, who remarked, "Nowadays, we all use a computer, a cell phone, a

tablet. Furthermore, when told that we're going to play a game on these electronic devices, one becomes more interested because we're more accustomed to using them".

In light of these observations, it is evident that innovative pedagogical strategies, particularly those leveraging technology, resonate strongly with students. This alignment between instructional methods and students' technological preferences not only enhances motivation but also fosters a favorable learning environment. The successful adoption of these strategies underscores their effectiveness in promoting engagement and underscores the importance of incorporating technology into educational practices. Furthermore, our survey data (see Figure 12) revealed positive sentiments among students regarding their willingness to continue engaging with educational games in the future, further emphasizing the value of innovative teaching approaches in cultivating motivation and facilitating learning.
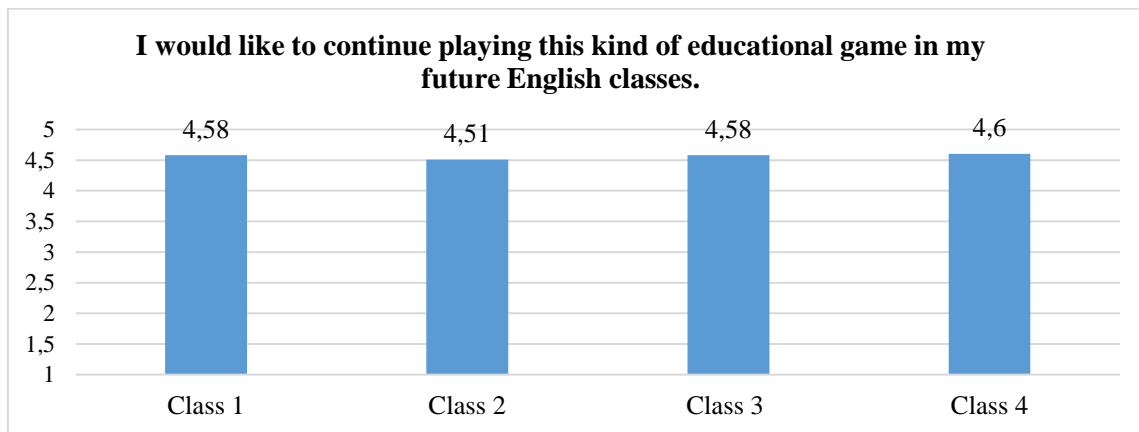

I would like to continue playing this kind of educational game in my future English classes.

Figure 12. Exit Survey question 3.
Source: own work.

The evidence presented in Figure 12 supports the notion that students highlight that innovative teaching methods have a tangible impact on enhancing their motivation in the context of EFL learning. This assertion is further demonstrated by the findings from the survey, wherein participants acknowledged the efficacy of these approaches in fostering growth in reading proficiency (see Figure 13).
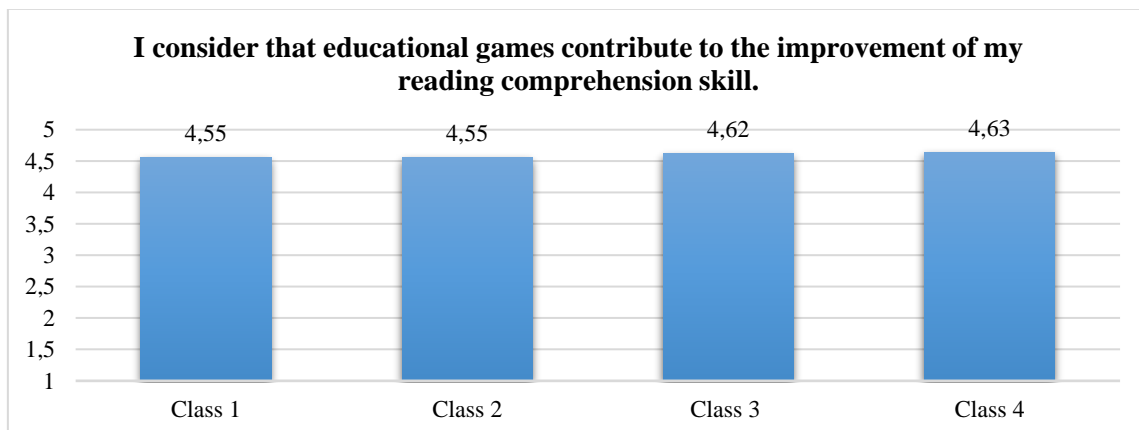

I consider that educational games contribute to the improvement of my reading comprehension skill.

Figure 13. Exit Survey question 8.
Source: own work.

Therefore, the consistently high averages observed in both Figures 12 and 13 underscore the efficacy of innovative teaching strategies, particularly the integration of educational games, in fostering students' motivation and advancing their reading comprehension skills. This innovative approach not only contributed to the development of students' reading proficiency but also underscored the

effectiveness of educational games as a motivational tool. This sentiment is further echoed by insights from the focus group interviews, where students expressed enthusiasm and engagement with the games. For instance, one participant noted that playing the games made the learning experience more enjoyable, with the challenge of overcoming in-game tasks fueling their excitement and motivating them to engage with the content (SPK16). Another student highlighted how the immersive and entertaining nature of the games incentivized them to continue playing, thereby facilitating the acquisition of new vocabulary (SPK20). Similarly, another participant emphasized how the interactive nature of the games enhanced their understanding and motivation, ultimately leaving them eager to continue playing and learning (SPK05).

These testimonies not only reveal the positive impact of educational games on students' motivation but also highlight their effectiveness in enhancing language learning engagement. By providing a dynamic and enjoyable platform for language practice, educational games effectively fostered students' involvement and participation, facilitating meaningful interactions with the target language. Consequently, this approach aligned more closely with students' technological lifestyles, maximizing their affinity for technology to create engaging learning experiences. Ultimately, the integration of innovative teaching methods, particularly educational games, represents a promising avenue for promoting language learning and engagement among young learners, offering a compelling alternative to traditional instructional approaches.

Conclusions

This study reveals valuable insights into students' perceptions of the use of a SG to support reading comprehension among 11th-grade students. Based on the research questions, the findings suggest that students' perceptions of the game were largely positive, particularly regarding its impact on reading comprehension. Many students expressed that the game helped improve their ability to understand texts, particularly by contextualizing vocabulary and reinforcing learning in an interactive environment. These findings align with research highlighting the benefits of GBL in improving language acquisition. Additionally, the game's graphic design was perceived to facilitate comprehension, as the visual elements allowed students to better connect with the content, supporting the idea that multimedia tools can enhance cognitive processing

Furthermore, students' perceptions indicated that the SG had a significant impact on their engagement and motivation. Students reported increased engagement and focus during reading comprehension activities when using the game, highlighting the positive effects of interactive and challenge-based learning. The integration of innovative teaching strategies, such as game mechanics and rewards, led to greater motivation for students' participation in reading activities. This supports the assertion that gamification can transform traditional teaching methods by fostering intrinsic motivation and active learning

Overall, students perceived that the use of the SG in this study was a valuable tool for enhancing their reading comprehension skills and fostering higher levels of student engagement and motivation. These findings underscore the potential for Serious Games to serve as a valuable pedagogical resource in language learning, offering both immediate and long-term benefits for student participation and learning outcomes.

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