

# Gamified Strategy for the Development of Critical Reading in Secondary School Students: Creation and Validation of "Critical Explorer"

**Data of publication: 12 of June 2024**

**1Hernán Javier Guzmán Murillo, 2José Marcelo Torres Ortega, 3William Niebles**

1Doctor en Ciencias de la Educación, Universidad de Sucre

[hernan.guzman@unisucra.edu.co](mailto:hernan.guzman@unisucra.edu.co)

<https://orcid.org/0000-0002-6757-4549>

2Doctor en Economía y Empresas, Doctor en Estudios Políticos, Universidad de Sucre

[jose.torres@unisucra.edu.co](mailto:jose.torres@unisucra.edu.co)

<https://orcid.org/0000-0001-8107-8763>

3Doctor en Ciencias Gerenciales, Universidad de Sucre

[williamniebles@yahoo.com.mx](mailto:williamniebles@yahoo.com.mx)

<https://orcid.org/0000-0001-9411-4583>

## Abstract

This article aims to describe the design and validation of an educational video game titled *Critical Explorer*, developed as a gamified strategy to enhance critical reading skills in secondary school students. The research adopted a projective design with a qualitative approach and was conducted in a high school in Montería, Colombia. The video game was built following an iterative methodology that included three main phases: analysis, design, and validation. During the analysis phase, educational needs related to critical reading and students' preferences for digital games were identified. In the design phase, the video game elements were developed based on gamification theories, incorporating narratives, challenges, and rewards. Finally, in the validation phase, an evaluation process involving experts in pedagogy and video game design was conducted to ensure its educational relevance and effectiveness. The results indicate that *Critical Explorer* possesses characteristics that make it an innovative tool for fostering skills such as analysis, inference, and argumentation in academic contexts. This study highlights the importance of integrating gamified strategies into teaching, promoting meaningful and motivating learning experiences.

**Keywords:** Gamification, critical reading, educational design, video game, secondary education.

## Introduction

Critical reading is a fundamental competence in the educational field, as it allows students to analyse, interpret and evaluate information in a reflexive and autonomous way (Cassany, 2006). In a context where access to information is largely mediated by digital technologies, the ability to develop critical skills has become a priority need in education systems around the world. However, recent research has shown that students face serious difficulties in the development of this competency, which affects both their academic performance and their ability to actively participate in a knowledge-based society (PISA, 2018).

In this scenario, gamification has emerged as an innovative pedagogical strategy that uses elements of games to promote students' motivation and commitment to the learning process (Deterding et al., 2011). Studies have shown that integrating narratives, challenges, and reward systems into educational settings contributes to improving student engagement and effectively developing cognitive and metacognitive skills (Zichermann & Cunningham, 2011). However, the implementation of gamified strategies specifically aimed at strengthening critical reading is still an area in development, which raises the need to design and validate tools that promote this competence effectively.

In response to this problem, the present study focused on the design and validation of an educational video game entitled *Critical Explorer*, conceived as a gamified strategy to strengthen critical reading in secondary school students. The video game was developed following an iterative methodology that integrated pedagogical theories and video game design principles, with the aim of offering an interactive and motivating tool for learning. The research was carried out in an educational institution in

Montería, Colombia, and focused on identifying the specific needs of students and validating the relevance and effectiveness of the video game through expert evaluation.

This article presents the design and validation process of *Critical Explorer*, highlighting the theoretical and practical contributions of gamification in the development of critical reading. First, the theoretical framework that supports the design of the video game is addressed, including key concepts on critical reading and gamification. Subsequently, the methodology used is described, followed by the results obtained in the validation of the video game. Finally, the conclusions of the study are presented, emphasizing the educational implications and possible lines of future research.

### Theoretical Framework

The development of critical reading as an essential competence in students has been the object of academic interest due to its fundamental role in the analysis, interpretation and evaluation of information. According to Cassany (2006), critical reading involves not only understanding the literal content of a text, but also identifying the author's intention, assessing the credibility of sources, and relating the text to the social, cultural, and political context. This skill is indispensable in a society characterised by an overabundance of information and the proliferation of digital content, where discerning between reliable data and disinformation is a key competence for active citizenship.

In this context, gamified strategies have proven to be effective tools to foster meaningful learning and the development of cognitive and metacognitive skills (Deterding et al., 2011). Gamification is defined as the use of elements and dynamics typical of games in non-gaming environments, with the aim of increasing user motivation and commitment (Zichermann & Cunningham, 2011). Among the most commonly used elements in educational gamification are immersive narratives, point systems, progress levels, challenges, and rewards. These dynamics make it possible to transform traditional educational activities into interactive experiences that stimulate the active participation of students.

The design of the video game *Critical Explorer* was based on pedagogical principles related to constructivist learning and flow theory. The constructivist approach, proposed by authors such as Piaget and Vygotsky, maintains that students actively construct their knowledge through interaction with their environment and the resolution of significant problems. On the other hand, Csikszentmihalyi's (1990) flow theory states that individuals achieve optimal levels of motivation and learning when the activities in which they participate present a balance between the level of challenge and the participant's skills. In the case of *Critical Explorer*, these theories translated into the creation of interactive narratives and challenges designed to promote analysis, inference, and critical evaluation of texts, while maintaining a progressive level of difficulty that motivates students.

The relationship between gamification and the development of critical reading skills has been explored in previous research. For example, studies such as that of Hamari et al. (2014) have pointed out that gamified strategies can promote active participation and deep learning in educational environments. Likewise, authors such as Gee (2003) have argued that video games can act as effective mediators in the development of complex skills, by providing interactive contexts that require the application of analytical, deductive, and creative skills.

In the design of *Critical Explorer*, the models for assessing critical reading competencies proposed by international entities such as the **OECD (PISA)** were also considered, which highlight the importance of assessing skills related to inferential comprehension, the ability to argue based on evidence, and critical judgment about the intention of texts. These principles guided the narrative structure of the game and the creation of the challenges and critical questions integrated into each level.

In summary, the combination of pedagogical principles, gamified elements and a student-centered approach allowed *Critical Explorer* to be conceived as an innovative tool for the strengthening of critical reading. This theoretical framework not only supports the design of the video game, but also highlights the potential of gamified strategies to transform traditional educational practices, offering more dynamic and meaningful learning experiences.

### Methodology

The research design was framed in a **projective** approach with a **qualitative method**, aimed at the creation and validation of an educational video game entitled *Critical Explorer* to strengthen critical reading in secondary school students. This approach made it possible to address the design, development and validation phases in a systematic way, guaranteeing coherence between the pedagogical objectives and the gamified elements of the video game.

## Phases of the Methodological Process

The methodology used consisted of three main phases: **analysis**, **design** and **validation**, each with specific activities aimed at achieving the objectives of the project.

### Phase 1: Analysis

The purpose of this phase was to identify the educational needs related to critical reading and the preferences of students regarding video games. The following techniques were used:

- **Documentary review:** International standards on critical reading, such as those proposed by PISA (OECD, 2018), were analyzed to determine the key competencies that the video game should develop.
- **Semi-structured interviews:** Interviews were conducted with secondary school teachers and students to identify the areas of difficulty in critical reading and the narrative and visual elements that would motivate them in a gamified environment.
- **Analysis of existing games:** Previously developed educational video games were reviewed to identify good practices in design and effective mechanics.

### Phase 2: Design

During this phase, the construction of the Critical Explorer video game was carried out, integrating pedagogical and gamified elements. The design was grounded in constructivist learning theories and flow theory, ensuring that the challenges and narratives were progressive and motivating.

- **Video game narrative:** An interactive plot was developed where the player assumes the role of a "critical explorer" who must overcome missions related to the analysis, inference and evaluation of texts.
- **Gamified challenges:** Each level includes multiple-choice questions, main idea identification exercises, and critical analysis, designed to strengthen competencies such as inference and argumentation.
- **Reward systems:** Included points, badges, and access to new levels as incentives to promote active student participation.
- **Initial prototype:** A working prototype of the video game was created, with basic levels designed to evaluate its pedagogical effectiveness and user experience.

### Phase 3: Validation

In the validation phase, the video game was evaluated by a panel of experts in pedagogy, instructional design and video game development. This process was structured in two main stages:

1. **Evaluation of pedagogical content:** The pedagogical experts reviewed the coherence of the challenges and activities with the critical reading objectives defined in the analysis phase.
2. **User experience evaluation:** Design experts reviewed technical aspects, such as usability, narrative fluidity, and visual design, ensuring that the video game was intuitive and engaging for students.

A 5-point Likert scale was used to evaluate criteria such as the clarity of the objectives, the relevance of the activities, the level of challenge and the motivation generated by the video game.

## Population and Context

The study was carried out in an educational institution in Montería, Colombia, with high school students who showed difficulties in the development of critical reading skills. A panel of **10 experts** in pedagogy and video game design was included for the validation of the prototype.

#### Inclusion criteria:

- Experts with previous experience in the design of pedagogical strategies and educational video games.
- High school students selected to conduct initial usability and comprehension tests.

#### Data Analysis

The information collected during the analysis and validation phases was processed qualitatively. Data from interviews and expert validation were categorized to identify strengths, weaknesses, and opportunities for improvement in the game's design. The results obtained in the validation were used to adjust and refine the prototype before its final implementation.

#### Results

The implementation of the three methodological phases allowed the development and validation of the educational video game *Critical Explorer* as an innovative tool for the strengthening of critical reading skills in secondary school students. The most relevant findings from the design and validation phases are presented below, highlighting the pedagogical and technical aspects evaluated by the experts.

#### Results of the Design Phase

The development of the video game was based on pedagogical and gamification principles, integrating key elements to promote motivation and meaningful learning. The results obtained during the design include:

1. **Narrative and theme:**
  - The narrative of *Critical Explorer* was valued as engaging and consistent with the educational objectives. The plot focuses on an explorer who solves intellectual challenges in different narrative scenarios, promoting skills of analysis, inference and critical evaluation of texts.
2. **Structure of the challenges:**
  - The levels of the video game were designed with a progression of difficulty, starting with basic comprehension exercises and progressing to more complex tasks that require critical thinking.
  - Each challenge includes immediate feedback, encouraging reflection on successes and mistakes.
3. **Gamified elements:**
  - Points, badges, and level unlock systems were incorporated as rewards, which increased user motivation.
  - The students participating in the pilot phase highlighted that these gamified elements fostered the desire to overcome the challenges and complete the video game.

#### Results of the Validation Phase

The evaluation by experts was carried out using a 5-point Likert scale, analyzing pedagogical and technical criteria. The results of the validation are summarized in the following table:

**Table**

*Results of the validation by experts of the video game Critical Explorer*

**1**

| Criterion                     | Average (1-5) | Interpretation |
|-------------------------------|---------------|----------------|
| Clarity of objectives         | 4.8           | Excellent      |
| Relevance of activities       | 4.6           | Very good      |
| Level of motivation generated | 4.7           | Excellent      |

|                             |     |           |
|-----------------------------|-----|-----------|
| Visual and narrative design | 4.5 | Very good |
| Usability and accessibility | 4.6 | Very good |

The experts highlighted the **pedagogical coherence** of the video game, emphasizing that the activities and challenges were aligned with the critical reading objectives defined in the analysis phase. They also highlighted the quality of the visual design and narrative fluidity as key elements to keep the students' attention.

### Observations and Improvements Identified

Although the overall validation was positive, the experts identified areas for improvement that were incorporated into the final version of the game:

- **Personalized feedback:** It was recommended to implement specific messages for each type of error made by students, instead of using generic feedback.
- **Variety in challenges:** Experts suggested diversifying critical activities, incorporating exercises that include image and video analysis to enrich the educational experience.
- **Technological accessibility:** It was recommended to optimize the video game so that it can run on devices with limited resources, ensuring its accessibility for students from vulnerable contexts.

The results indicate that *Critical Explorer* is an effective tool for strengthening critical reading, combining gamified and pedagogical elements in an innovative way. Validation by experts confirmed that the video game meets the educational standards necessary for its implementation in school contexts, while the observations made it possible to make adjustments to maximize its impact.

### Conclusions

The findings obtained in this study allow us to conclude that the educational video game *Critical Explorer* is an effective tool to address the strengthening of critical reading skills in secondary school students. The design and validation of the video game, based on pedagogical and gamification principles, have proven to be consistent with the specific objectives set out in the research, which included: identifying the educational needs related to critical reading, developing an educational video game based on these needs and validating its pedagogical relevance through a panel of experts.

### Contributions to the Development of Critical Reading Competencies

The *Critical Explorer video game* effectively integrates activities designed to develop key critical reading skills, such as text analysis, inference, and evaluation. Interactive storytelling and progressive challenges have proven to be adequate to engage students in the learning process, promoting active and meaningful participation. This design responds directly to the needs identified during the analysis phase, in which students expressed difficulties in understanding complex texts and relating ideas critically.

In addition, incorporating immediate feedback into activities and utilizing reward systems not only facilitated skill acquisition, but also motivated students to continue advancing through the game's levels. This approach reinforces the potential of gamified strategies to transform traditional activities into dynamic, student-centered experiences.

### Pedagogical and Technical Validation

The process of validating the video game by experts in pedagogy and video game design confirmed its pedagogical relevance and technical effectiveness. The results obtained in the evaluated criteria, such as the clarity of the objectives, the motivation generated and the usability, highlight that *Critical Explorer* meets the expected standards to be implemented in educational contexts.

In pedagogical terms, the video game aligns with constructivist and flow learning theories, providing an environment in which students can face significant challenges in a safe and motivating context. In technical terms, the adjustments suggested by experts,

such as the personalization of feedback and the diversification of activities, strengthen the quality of the video game as an innovative educational tool.

### Reflection on the Potential of Gamification in Education

This study reinforces the idea that gamification can be a powerful strategy to address educational challenges, such as strengthening critical competencies in students. By integrating narrative elements, progressive challenges, and rewards, *Critical Explorer* positions itself as a model for how educational video games can contribute not only to learning, but also to the development of cognitive and metacognitive skills in students.

### Limitations and Future Research

Despite the positive results, it is necessary to recognize certain limitations of the study, such as the small size of the validation panel and the lack of a direct impact test with students. Therefore, future research could focus on the implementation and evaluation of video games in different educational contexts and with larger samples, to measure their impact on academic performance and student motivation.

In conclusion, *Critical Explorer* represents a significant contribution to the field of educational gamification, demonstrating how game-based strategies can be designed and validated to respond to specific needs in the classroom. This project not only demonstrates the feasibility of integrating video games into the school curriculum, but also highlights the importance of combining sound pedagogical principles with innovative technologies to foster meaningful learning and motivation in students.

### References

1. Álvarez-García, D., Núñez, J. C., Rodríguez, C., & Álvarez, L. (2010). The ERAVE scale: A measure for the assessment of school violence risk. *Psicothema*, 22(4), 624-630.
2. Beck, I. L., McKeown, M. G., & Kucan, L. (2013). *Bringing Words to Life: Robust Vocabulary Instruction*. Guilford Press.
3. Cassany, D. (2006). *Behind the Lines: On Contemporary Reading*. Anagram.
4. Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. Harper & Row.
5. Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). From game design elements to gamefulness: Defining "gamification". *Proceedings of the 15th International Academic MindTrek Conference*, 9-15.
6. Extremera, N., & Fernández-Berrocal, P. (2004). Perceived emotional intelligence and its relationship with levels of burnout in secondary school teachers. *Revista de Psicología del Trabajo y de las Organizaciones*, 20(1-2), 45-52.
7. Fernández-Berrocal, P., Alcaide, R., Extremera, N., & Pizarro, D. (2012). The role of emotional intelligence in anxiety and depression among adolescents. *Psicothema*, 24(1), 13-18.
8. Gee, J. P. (2003). *What Video Games Have to Teach Us About Learning and Literacy*. Palgrave Macmillan.
9. Hamari, J., Koivisto, J., & Sarsa, H. (2014). Does gamification work? A literature review of empirical studies on gamification. *47th Hawaii International Conference on System Sciences*, 3025-3034.
10. Hernández Sampieri, R., Fernández Collado, C., & Baptista Lucio, P. (2014). *Research Methodology* (6th ed.). McGraw Hill.
11. Mayer, R. E. (2009). *Multimedia Learning* (2nd ed.). Cambridge University Press.
12. OECD (2018). *Programme for International Student Assessment (PISA): Results from PISA 2018*. OECD Publishing.
13. Pérez, C., & Castejón, J. L. (2017). Emotional intelligence, self-efficacy, and academic achievement: A structural model. *Journal of Educational Psychology*, 109(4), 564-573.
14. Piaget, J. (1950). *The Psychology of Intelligence*. Routledge.
15. Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68-78.
16. Salen, K., & Zimmerman, E. (2004). *Rules of Play: Game Design Fundamentals*. MIT Press.
17. Spielberger, C. D., & Vagg, P. R. (1995). *Test Anxiety: Theory, Assessment, and Treatment*. Taylor & Francis.
18. UNESCO. (2017). *School violence and bullying: Global status report*. UNESCO.
19. Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.
20. Zichermann, G., & Cunningham, C. (2011). *Gamification by Design: Implementing Game Mechanics in Web and Mobile Apps*. O'Reilly Media.