Understanding the Impact of a Historical Video Game about Miguel Grau on Substantive Knowledge

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Abstract

This study investigates the impact of an educational video game on university students' substantive historical knowledge, focusing on the life of Miguel Grau. Thirty students were randomly assigned to a control group, which engaged with either a traditional text-based lesson or an experimental group, which played a video game designed to teach the same content. Their engagement, enjoyment and interest were measured after both stimuli. The results revealed significant improvements in substantive historical knowledge for both groups, with no notable

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differences between them. However, the video game group reported higher levels of enjoyment. Mediation analysis indicated that interest plays a significant role in mediating the relationship between engagement and enjoyment. These findings suggest that educational video games may offer greater enjoyment than instructional methods and can therefore increase motivation in learning environments.

Keywords: video games, motivation, history knowledge, education.

Comprender el impacto de un videojuego histórico sobre Miguel Grau en el conocimiento histórico

Resumen

El presente estudio aborda el efecto de un videojuego sobre la vida de Miguel Grau en el conocimiento histórico de estudiantes universitarios. Para ello, se asignaron 30 estudiantes de manera aleatoria a un grupo control (texto) o experimental (videojuego) donde se abordaba el mismo contenido temático. La variable dependiente medida fueron involucramiento (engagement), disfrute (enjoyment) e interés. Los resultados muestran que ambos grupos mejoraron significativamente el conocimiento histórico. No obstante, el grupo del videojuego reportó mayores niveles de disfrute. Los análisis de mediación indicaron que el interés cumple un rol importante como mediador entre el involucramiento y el disfrute. Lo encontrado sugiere que los videojuegos educacionales pueden ofrecer mayores niveles de disfrute que los métodos instruccionales y, por tanto, pueden incrementar la motivación en entornos de aprendizaje.

Palabras clave: videojuegos, motivación, conocimiento histórico, educación.

Compreendendo o impacto de um videogame histórico sobre Miguel Grau no conhecimento histórico

Resumo

Este estudo aborda o efeito de um videogame sobre a vida de Miguel Grau no conhecimento histórico de estudantes universitários. Para isso, 30 alunos foram divididos aleatoriamente em um grupo de controle (texto) ou experimental (videogame), onde o mesmo conteúdo temático foi abordado. As variáveis dependentes medidas foram envolvimento (engagement), desfrute (enjoyment) e interesse. Os resultados mostram que ambos os grupos melhoraram significativamente seu conhecimento histórico. No entanto, o grupo de videogame relatou níveis mais altos de desfrute. As análises de mediação indicaram que o interesse desempenha um papel importante como mediador entre o envolvimento e o desfrute. As descobertas sugerem que os videogames educacionais podem oferecer níveis maiores de desfrute do que os métodos instrucionais e, portanto, podem aumentar a motivação em ambientes de aprendizagem.

Palavras-chave: videogames; motivação; conhecimento histórico; educação.

1. Introduction

History teaching seeks to foster students' national identity, deepen their understanding of historical and cultural diversity, and empower them as agents in constructing collective identity and memory (Carretero and Montanero, 2008; Ministerio de Educación del Perú, 2016). To achieve these objectives, students must develop historical thinking, a set of analytical, interpretative and evaluative skills that enable them to engage critically with the past and create their own historical narratives (Seixas and Morton, 2013).

However, it is crucial to recognize that historical thinking involves procedural knowledge, which depends on a solid foundation of substantive knowledge. VanSledright and Limón (2006) distinguish between two types of knowledge: substantive and procedural. Substantive knowledge includes conceptual and narrative information, addressing the "who", "what", "where", "when" and "how" of historical events. Examples of this knowledge include recognizing names, facts, or concepts like "democracy", "socialism" or "capitalism". On the other hand, procedural knowledge focuses on understanding meta-concepts and analyzing the interpretations historians assign to the past. This includes certain core concepts: historical significance, continuity and change, cause and consequence, historical perspective taking and evidence-based interpretation (Gómez et al., 2024; Van-Drie & Van-Boxtel, 2008). Both types of knowledge are interdependent, as general historical information (substantive knowledge) is needed to formulate interpretations and critical judgments (procedural knowledge) (VanSledright & Limón, 2006). Together, these competences allow an active and critical citizenship, positioning history as a critical discipline for social sciences (Burgos-Videla et al. 2025).

Unfortunately, substantive historical knowledge is often underdeveloped in students due to an educational system that emphasizes memorizing over deeper understanding (Chávez, 2006). This poses significant challenges for developing procedural knowledge, which relies on a solid knowledge base (VanSledright & Limón, 2006). Furthermore, the limited use of innovative methodologies has negatively impacted students' perceptions of history, making the subject seem simplistic, dull or irrelevant (Barca, 2011; Barton, 2010).

To reverse this situation, teaching has introduced playful content. Historical games and simulations have been used in classrooms for over fifty years, (Hiriart, 2019), and more recently, video games have emerged as innovative tools for teaching (Corbeil, 2011, cited in McCall, 2016). Modern educational theories recognize games as essential learning tools (Boyle et al., 2016;

Subhash & Cudney, 2018). Sharp (2012) has suggested that transforming traditional learning into game scenarios significantly increases students' motivation for learning and enhances their cognitive development. Games are thus now being applied in different educational fields to improve learning effectiveness and provide a more stimulating learning experience (Hiriart, 2019; Prensky, 2003).

Compared with textbooks, video games allow for more complex representations of reality and offer the opportunity to play independently (McCall, 2016). Because of this, authors such as Clyde et al. (2012) have advocated for a "gamic mode of history", a form of teaching that uses video games to take advantage of software versatility and overcome the limitations of solely text-based teaching. Furthermore, historical video games provide a "systemic context for human action" by creating navigable virtual worlds and systems that players can manipulate and explore (McCall, 2016). This is particularly relevant since history teaching often focuses on details while neglecting the specific context in which historical figures operated (McCall, 2016), whereas historical video games can encourage players to consider the systems, opportunities and constraints within a complex historical context.

Research on historical video games suggests that they are a distinctive cultural medium for representing and mediating the past, because they combine historical representation with system modelling, player interaction and historically framed experiences that resemble practices of public history and historical sense-making (Chapman, 2016; Hartman et al., 2021; Li, 2025; Venegas-Ramos, 2020). The complexity of video games as a historical medium is centered on three areas.

1. Systemic and narratological logics

The past is represented as a system modelling medium, that disrupts the linear narrative of macro-historical processes through a set of simulated environments with their own set of rules and resource management (Li, 2025). By managing complex variables, video games teach players the relationships between different elements of the past, shaping the player's understanding of causality (McCall, 2016).

2. Player agency

Experience: Many historical games give the player a degree of agency, fostering historical empathy as a key dimension of engagement (Hartman et al., 2021). The player's choices and judgments within the game affect the historical interpretation, moving from a passive reception towards a participatory exploration of historical meanings, although the type and depth of historical

understanding produced depends on player practices rather than on interactivity alone (Hartman et al., 2021; Wright, 2022).

3. Counterfactual simulation

Many historical games incorporate the possibility of changing the course of historical events through player actions, offering alternative narrative structures that encourage players to imagine the past differently and to reflect on contingency (Li, 2025).

While these characteristics primarily address procedural historical skills, they are intrinsically linked to the acquisition of substantive knowledge, as the game's systemic and experiential demands force players to actively engage with, recall and apply specific historical facts, names and contexts in order to formulate critical judgments and successfully navigate the simulation (VanSledright & Limón, 2006). This all highlights the great potential of educational video games.

Furthermore, studies such as those by Alonso-Fernandez et al. (2020) and Yu et al. (2020) have identified that video games can improve learning outcomes, student motivation and academic engagement. At the same time, research suggests that historical video games are more effective as learning tools when they are designed with explicit pedagogical intentions (Kessner & McArthur Harris, 2022). Likewise, in Peru, some initiatives have been taken to include video games in history courses. Evaristo et al. (2016) for example, conducted a study with 561 high school students in Lima, using a video game as part of a history class. They found that historical knowledge improved significantly compared with that of a traditional class. However, this is still an isolated practice, and more evidence is needed to promote the use of video games in the classroom.

Video games can serve as powerful tools for learning history. This study recognizes that acquiring substantive historical knowledge is fundamental for developing more complex skills in history learning, and evaluates an educational video game designed to promote this type of historical knowledge. Using a quasi-experimental design, the study examines its effectiveness as an educational tool among university students.

2. Method

2.1. Participants

The sample consisted of thirty university students from the first to tenth semester (M = 6.20, SD = 2.80), aged between 18 and 26 (M = 20.6, SD = 2.06). Of the participants, 12 (40%) were men and 18 (60%) were women. Inclusion criteria required that students were enrolled in courses. Students majoring in history or social sciences were excluded, as the video game's content could be part of their degree program.

All participants read and accepted an informed consent form before being assigned to a condition. Their participation was anonymous, confidential and voluntary. The experimental group, which played the video game, consisted of fifteen students (M = 20.73, SD = 1.62). Among them, five were men and ten were women. The control group, which engaged with a text, included fifteen students (M = 20.47, SD = 2.47), seven men and eight women.

2.2. Measures

The following instruments were used for the experiment:

- *Video game. "Guardianes del Tiempo"* is a 2D video game developed by the Pontificia Universidad Católica del Perú that explores the life of Miguel Grau Seminario, a Peruvian military hero. The game begins with Sofia, a high school student who won a diploma in history class for having written the best essay about Grau's life. After receiving the award, she decides to visit Alexander, her school librarian and friend, to share the news with him. However, upon arriving, she witnesses a surprising scene: Alexander is struggling with a mysterious man who uses a device to teleport and disappear.

Once the stranger vanishes, Sofia approaches Alexander searching for answers. He reveals that he is a time guardian from the year 6009, who has to travel to the future to resolve urgent matters. Before departing, Alexander asks Sofia to take on his role temporarily as a time guardian. Despite her efforts to learn more about his mission, Alexander assures her that he will explain everything upon his return.

Figure 1. *Guardianes del Tiempo: Gameplay scene*

Note: Image from *Guardianes del tiempo*, an original historical video game project developed by the Pontificia Universidad Católica del Perú.

He entrusts her to communicate through the library's computer with Sebastian, another time guardian operating in the past. Sebastian has the tools needed to influence events related to Miguel Grau's life, and Sofia's task is to guide him to ensure that history unfolds as it should. Although Sofia is familiar with the key events thanks to her essay, she needs to gather additional information by consulting classmates and exploring library books and other written sources. The game features research mechanics and puzzles that challenge one to order historical events chronologically. It covers three missions based on important historical events in the life of Miguel Grau: (i) the uprising led by General Manuel Ignacio de Vivanco against President Ramón Castilla; (ii) the collective resignation of naval officers against the appointment of Rear Admiral John Tucker, and (iii) Grau's appointment as Deputy of Paita. The game takes about 90 minutes.

The player can make mistakes or alter historical events in each mission. At the end of the game, Sofia discovers that she and Alexander have a genealogical link to Miguel Grau. Alexander returns to the present and reveals his true intentions, and he tries to persuade Sofia to alter history so that Grau becomes president instead of deputy, achieving greater power. In addition, Alexander confesses that his original plan to change events to Grau's benefit turned him into a fugitive hunted by the council of time guardians. The user

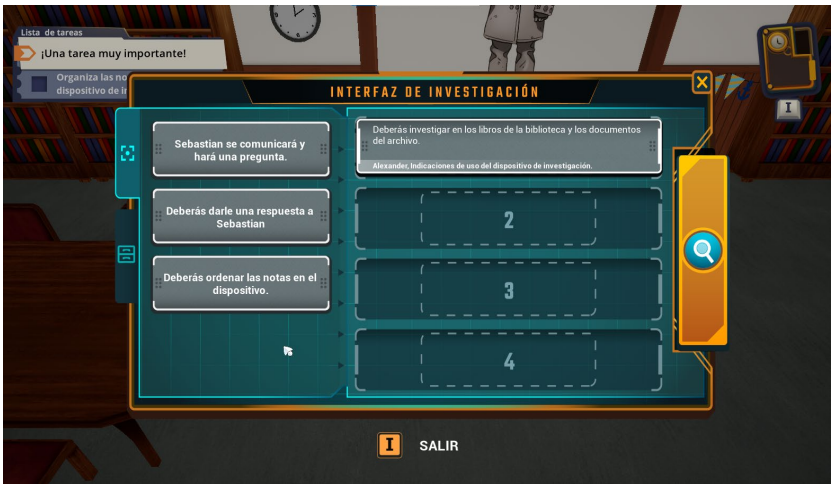
will have to make a crucial decision: will Sophia respect the historical events as they happened, or will she give in to the temptation to change them? Even though the player can make mistakes or alter historical events in each mission, the game provides feedback by highlighting the error and showing which would be the correct response, such as events that may have occurred if the events of the past were altered. To learn more about the game, you can watch the gameplay video here: Grau Gameplay.

- *Text with information about Grau's life.* The text addressed the same information presented in the video game about the three events in Grau's life: (i) the uprising led by General Manuel Ignacio de Vivanco against President Ramón Castilla; (ii) the collective resignation of naval officers against the appointment of Rear Admiral John Tucker, and (iii) Grau's appointment as Deputy of Paita. The text reading time was approximately 30 minutes.
- *Substantive historical knowledge test.* The instrument was designed and validated by educators specialized in history. This test evaluates substantive historical knowledge about Miguel Grau's life and is divided into four sections. The first section uses a single exercise to evaluate the participant's ability to identify three key historical events about Miguel Grau's life presented in the video game and text, regardless of chronological order. Participants had to write down the three main events they could identify, in chronological disorder. The second section includes three exercises that assess the participants' ability to sequence historical events chronologically. In each exercise, participants were given a list of three specific events presented both in the video game and in the text and asked to sequence them by numbering which occurred first and which occurred later. The third section includes three exercises that evaluate participants' ability to recognize the characters directly associated with the historical events presented in the video game and the text. In each exercise, participants were presented with a certain event and a list of historical characters and were asked to indicate those who were directly involved with the event. Finally, the fourth section includes three exercises that evaluate the participant's ability to identify the geographical contexts of the historical events presented in the video game and text. Participants were given a certain event and a list of locations and asked to identify where the event occurred.

Each question was scored on a scale from 0 to 2 (0 = did not answer satisfactorily; 1 = answered partially correctly, and 2 = answered satisfactorily). The average score for each dimension was calculated based on the experts' recommendations, and the total was obtained by summing the scores across dimensions.

- *Questionnaire on the educational experience*: A questionnaire was designed based on the studies of Molinari and Maneli (2018) and Ainley and Hidi (2014) regarding the student's experience with the educational experience, addressing their engagement, interest and enjoyment. A question was designed for each of these variables on a Likert scale of 1 ("totally disagree") to 5 ("totally agree").

Figure 2. *Guardianes del Tiempo: Gameplay scene showing the research interface.*



Note: Image from *Guardianes del tiempo*, an original historical video game project developed by the Pontificia Universidad Católica del Perú.

2.3. Procedure

The game was developed using a quasi-experimental design for this study. They conducted an experiment on different dates at a physical location within a private university. University students were invited via social networks to attend one of three sessions. Participants were randomly assigned to either the control group (text) or the experimental group (video game), and subsequently

all read and accepted an informed consent form. They then completed a data sheet and took an initial test (pre-test) to assess their knowledge of Miguel Grau's life.

Participants in the experimental group played an educational video game in a computer lab about Miguel Grau's life. Although the game allows participants to alter historical facts either by mistake or intentionally, they were instructed to play the game trying to respect historical facts as they occurred. This was to ensure that all the participants could complete the game up to the final mission and have the same outcome and playing time. Participants had approximately 90 minutes to complete the game. Afterward, they retook the knowledge test and answered three questions about their enjoyment, interest and engagement during the game.

Meanwhile, the control group remained in the same room after the initial knowledge test and studied a text regarding Miguel Grau's life for approximately 90 minutes. Afterwards, they retook the knowledge test (post-test) and answered the same three questions regarding their enjoyment, interest and engagement in the activity.

2.4. Data analysis

The study researchers conducted a descriptive analysis of the measurements to summarize the participants' performance and went on to use students' t-tests to compare the effects of the video game and the text-based method on historical knowledge, interest, engagement and enjoyment. They also carried out mediation analyses to explore the relationship between interest, engagement and enjoyment. Following the guidelines of Hayes (2017), they structured mediation paths using Ordinary Least Squares regressions for precise coefficient estimation.

3. Results

This section presents the study results. It reports descriptive analyses, followed by comparisons and a mediation model.

The descriptive findings are outlined below.

Table 1. *Descriptive statistics*

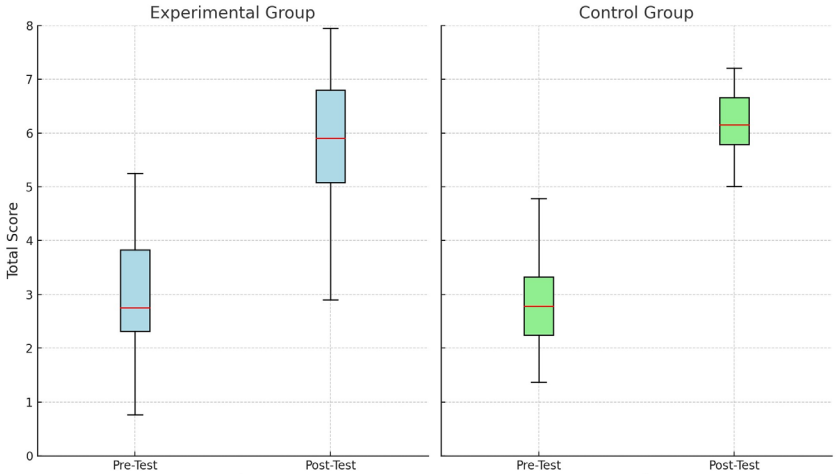
Group	Dimension	Mean	SD	Asymmetry	Kurtosis
Total	Entry score	2.611	1.240	-0.832	2.987
	Exit score	6.032	1.072	-0.219	2.324
	Engagement	5.366	1.351	-0.437	2.04
	Enjoyment	5.066	1.529	-0.642	2.499
	Interest in the activity	5.133	1.548	-0.737	3.258
Text	Entry score	3.090	0.868	.1.478	3.671
	Exit score	6.489	0.918	-0.187	-0.461
	Engagement	5.130	1.457	-0.264	-1.233
	Enjoyment	4.600	1.805	-0.145	-1.166
	Interest in the activity	4.730	1.792	-0.57	-0.096
Video game	Entry score	2.132	1.394	-0.294	-0.559
	Exit score	5.575	1.045	-0.085	-0.949
	Engagement	5.600	1.242	-0.65	-0.321
	Enjoyment	5.530	1.06	-0.93	1.158
	Interest in the activity	5.530	1.187	-0.387	-0.127

Within-group comparisons were conducted using paired samples t-tests to examine differences between entry and exit scores for each condition. Significant differences were found between the exit and entry scores of substantive historical knowledge in the experimental and control groups, with a large effect size. Exit scores were higher than the entry scores in both cases, indicating that the interventions improved students' substantive historical knowledge.

Table 2. *Within-group t-test*

Group	Entry Score (*M*, *SD*)	Exit Score (*M*, *SD*)	*t*(df)	p-value	Effect Size (*d*)
Experimental	2.132 (1.394)	5.547 (1.045)	6.396 (14)	<.001	2.812
Control	3.090 (0.868)	6.489 (0.918)	10.128 (14)	<.001	3.804

Figure 3. *Boxplot of the total score by group*



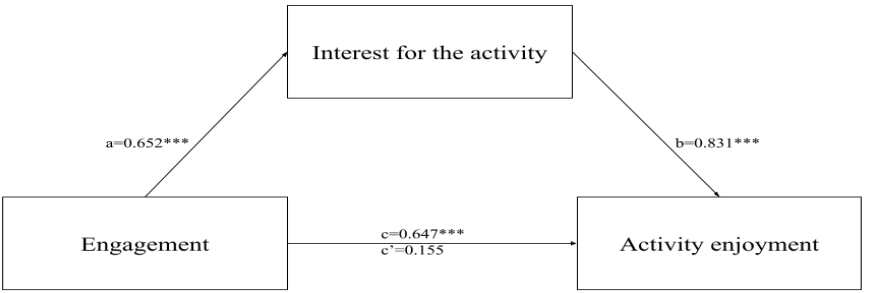
The study also performed comparisons between control and experimental conditions. To assess the potential improvement in substantive historical knowledge, exit test scores were subtracted from entry test scores, in order to identify improvement following the stimuli (video game or text). Independent samples t-tests revealed no significant differences in the improvement of historical knowledge, interest, or engagement between the groups. However, enjoyment was significantly higher in the experimental group, with a medium effect size.

Table 3. *Between-group t-test*

Variable	Control Group (M, SD)	Experimental Group (M, SD)	*t*(df)	p-value	Effect Size (*d*)
Improvement in historical knowledge	3.399 (1.299)	3.443 (2.085)	0.068 (23)	0.946	-
Interest	4.733 (1.791)	5.533 (1.187)	1.442 (24)	0.080	-
Engagement	5.133 (1.457)	5.600 (1.242)	0.944 (27)	0.177	-
Enjoyment	4.600 (1.805)	5.533 (1.060)	1.727 (22)	0.049	0.630

The study's specific objectives also included determining whether, regardless of the type of pedagogical tool, the participant's interest mediated the relationship between their engagement and enjoyment of the activity.

Figure 4. *Mediation model*



Note: $^{*}p < 0.05$, $^{**}p < 0.01$, $^{***}p < 0.001$

The mediation analysis was conducted using Hayes' guidelines (2017) for small samples, and therefore used a bootstrapping method with 5000 simulations. Results showed a significant total effect between engagement and enjoyment (c = 0.647, $p < 0.05$, CI = [0.343, 0.980]). The indirect effect was also significant (ab = 0.491, $p < 0.05$, CI = [0.264, 0.810]), while the direct effect was not (c' = 0.155, $p > 0.05$, CI = [-0.172, 0.380]). These findings suggest full mediation, consistent with the proposed model.

4. Discussion

This study aimed to identify the impact of an educational video game on university students' substantive historical knowledge, considering that this type of knowledge is essential for developing more complex types of knowledge and critical thinking skills. Two groups were considered: a control group that studied a text about the history of Miguel Grau, and an experimental group that played an educational video game. The hypothesis was that all students would improve their historical knowledge compared to the baseline, with those using the video game expected to show greater improvement.

The results indicated that playing an educational video game improved students' substantive historical knowledge. This finding aligns with previous research that suggests video games can enhance learning outcomes (Alonso-Fernandez et al., 2020; Clark et al., 2016; Fan et al., 2020; Green & Bavelier, 2012; Wang, 2020; Yu et al., 2020; Yu, 2018). However, no significant differences were observed between the control and experimental groups regarding their historical knowledge. Two potential explanations for this outcome are the nature of the game and the instructions provided during the experiment.

Regarding the former, it is important to emphasize that an important dynamic in the gameplay was for students to search for written sources with information on Miguel Grau's history, enabling them to tackle the challenges posed by the game. According to Ojha (2016), historical knowledge is created through inquiry, working with primary and secondary sources that historians use to learn about people, events and past daily lives. Reading written sources can thus be an effective dynamic for understanding history. Although the game dynamics may have improved historical knowledge, as demonstrated by the within-group comparisons of entry and exit scores, they may also have introduced significant similarities between the experimental and control conditions. In both cases, the main activity focuses on reading sources that recount Miguel Grau's history. This stands in contrast to research conducted by Evaristo (2016), where the control group attended a traditional class instead of reading a text. That study found a significant difference between the results of the participants who attended a class and those who were exposed to the video game.

Regarding the latter explanation, Taylor (2003) stresses that video games' potential for learning history lies in their ability to allow players to plan, manage and make complex decisions. Similarly, McCall (2016) notes that video games have significant potential for developing historical thinking by providing virtual worlds that students can manipulate and explore. The present study argues that the potential of historical video games as a medium for representing the past lies in the combination of player agency and counterfactual simulation (Chapman, 2016; Venegas-Ramos, 2020). In the experiment, participants were instructed to play the game while reproducing historical events as they occurred. This instruction directly constrained the enactment of these core affordances, affecting two key dimensions of the game experience.

1. Player Agency: By restricting participants from departing from historically "correct" decisions, gameplay became largely linear and predetermined. As a result, participants' role shifted from active decision-makers to guided observers, aligning their experience more closely with passive forms of historical consumption rather than interactive historical inquiry (Chapman, 2016; Hartman et al., 2021; Wright, 2022).

2. Contrafactual Reasoning: Similarly, preventing participants from exploring alternative outcomes limited engagement with causality, contingency and structural constraints. Without the possibility of testing divergent historical trajectories, the game's capacity to support

counterfactual reasoning was substantially reduced (Uricchio, 2005; Wright, 2022).

This hypothesis is in line with Clark et al. (2016), who point out that game design and mechanics significantly influence learning outcomes.

Additionally, the instructions may have affected students' engagement and interest in the activity. No differences were found between the groups in these variables. Molinari and Maneli (2018) suggest that autonomy is essential for engagement in learning environments, and this may have been constrained. Similarly, Muller and Louw (2004) note that autonomy is a key factor related to motivation and can influence interest in learning. Nevertheless, significant differences were found between the groups in terms of enjoyment, which may be attributed to the playful nature of the game. Previous studies have shown that transforming traditional learning into game scenarios can significantly increase students' motivation for learning (Sharp, 2012). Moreover, several studies have demonstrated that motivation increases in playful learning environments compared with traditional lectures or educational videos (Lin et al., 2012; Molins-Ruano et al., 2014; Zirawaga et al., 2017).

Finally, the study found that interest mediates the relationship between engagement and enjoyment. This suggests that engagement influences enjoyment only when there is a preexisting interest. While previous studies have demonstrated relationships between interest and enjoyment (Ainley & Hidi, 2014), and between engagement and enjoyment (Abuhamdeh & Csikszentmihalyi, 2012), the mediation role of interest in the relationship between engagement and enjoyment within an integrative model has not been thoroughly explored.

5. Conclusion

Students' perceptions of history as a subject have been negatively affected by the persistence of a teaching paradigm that rarely integrates innovative methodologies, leading students to think of it as simple, boring, or useless (Barca, 2011; Barton, 2010; Julien et al., 2018). The present study suggests that using video games in history teaching can help change this. While differences in learning outcomes were observed in the control and experimental conditions, enjoyment was positively affected. Consequently, this could improve the perception of learning history and, in the long term, foster engagement in history courses and the development of more complex historical knowledge.

The study also suggests that engagement and interest are crucial for students to develop a true appreciation for studying history. Therefore, when designing interventions to foster enjoyment of this topic, it is essential to ensure that students are engaged and genuinely interested. Even so, it is important to acknowledge some limitations in this study. One such is how the instructions for the experimental condition were provided, as they may have restricted participants' agency or autonomy and, consequently, influenced their performance in the exit test. In this regard, the findings highlight the importance of allowing free will in decision-making within the game environment, though further studies are recommended to verify this. The small sample may also have influenced the results and limited the generalization of the findings. However, these results provide a valuable starting point for future studies with larger samples.

A further limitation worth noting is that the study only measured substantive historical knowledge, and not procedural historical thinking. In future, it would be important to assess whether prolonged use of the game with teacher guidance could impact other aspects of historical thinking. For example, experiencing alternative endings by altering the original story could foster the dimensions proposed by Seixas and Morton (2013) of "cause and consequence" (understanding the relationship between various causes and their effects in history) and "continuity and change" (grasping that history comprises both continuities and changes without these being opposites). Moreover, using different sources of information for decision-making could enhance the "evidence" dimension of historical thinking (the use of information for critical and reflective analysis of history) (Seixas & Morton, 2013).

References

Abuhamdeh, S., & Csikszentmihalyi, M. (2012). The importance of challenge for the enjoyment of intrinsically motivated, goal-directed activities. *Personality and Social Psychology Bulletin*, *38*(3), 317-330. https://doi.org/10.1177/0146167211427147

Ainley, M., & Hidi, S. (2014). Interest and enjoyment. In R. Pekrun, & L. Linnenbrink-Garcia(Eds.), *International Handbook of Emotions in Education* (pp. 205-227). Routledge/Taylor & Francis Group.

Alonso-Fernández, C., Martínez-Ortiz, I., Caballero, R., Freire, M., & Fernández-Manjón, B. (2020). Predicting students' knowledge after playing a serious game based on learning analytics data: A case study. *Journal of Computer Assisted Learning*, *36*(3), 350-358. https://doi.org/10.1111/jcal.12405

Barca, I. (2011). Narrativas e consciência histórica dos jovens. *Enseñanza de las Ciencias Sociales: revista de investigación*, (10), 22-28. https://www.raco.cat/index.php/ensenanzacs/article/view/248889

Barton, K. C. (2010). Investigación sobre las ideas de los estudiantes acerca de la historia. *Enseñanza de las Ciencias Sociales: revista de investigación*, (9), 97-114. https://raco.cat/index.php/ensenanzacs/article/view/191362

Boyle, E. A., Hainey, T., Connolly, T. M., Gray, G., Earp, J., Ott, M., Lim, T., Ninaus, M., Ribeiro, C., & Pereira, J. (2016). An update to the systematic literature review of empirical evidence of the impacts and outcomes of computer games and serious games. *Computers & Education*, *94*, 178-192. https://doi.org/10.1016/j.compedu.2015.11.003

Burgos-Videla, C., Parada-Ulloa, M., & Martínez-Díaz, J. (2025). Critical thinking in the classroom: the historical method and historical discourse as tools for teaching social studies. *Frontiers in Sociology*, *10*, 1526437. https://doi.org/10.3389/fsoc.2025.1526437

Carretero, M., & Montanero, M. (2008). Enseñanza y aprendizaje de la Historia: aspectos cognitivos y culturales. *Cultura y Educación*, *20*(2), 133-142. https://doi.org/10.1174/113564008784490361

Chapman, A. (2016). *Digital games as history: How videogames represent the past and offer access to historical practice.* Routledge.

Chávez, T. (2006). *La enseñanza de la historia del Perú en la educación secundaria durante la segunda mitad del siglo XX*. Pontificia Universidad Católica del Perú: Lima.

Clark, D. B., Tanner-Smith, E. E., & Killingsworth, S. S. (2016). Digital Games, Design, and Learning: A Systematic Review and Meta-Analysis. *Review of Educational Research*, *86*(1), 79-122. https://doi.org/10.3102/0034654315582065

Clyde, J., Hopkins, H., and Wilkinson, G. (2012). Beyond the "Historical" Simulation: Using Theories of History to Inform Scholarly Game Design. *Loading… The Journal of the Canadian Game Studies Association*, *6*(9), 3-16. https://journals.sfu.ca/loading/index.php/loading/article/view/105/0

Corbeil, P. (2011). History and Simulation/Gaming: Living with Two Solitudes. *Simulation & Gaming*, *42*(4), 418-422. https://doi.org/10.1177/1046878108325440

Evaristo, I. S., Vega, M. V., Navarro, R., & Nakano, T. (2016). Uso de un videojuego educativo como herramienta para aprender historia del Perú. *RIED. Revista Iberoamericana de Educación a Distancia*, *19*(2), 35-52. https://doi.org/10.5944/ried.19.2.15569

Fan, M., Antle, A. N., & Warren, J. L. (2020). Augmented Reality for Early Language Learning: A Systematic Review of Augmented Reality Application Design, Instructional Strategies, and Evaluation Outcomes. *Journal of Educational Computing Research*, *58*(6), 1059-1100. https://doi.org/10.1177/0735633120927489

Gómez, C., Caridad, B., & Rodríguez, M. (2024). Historical Thinking as a Dynamic Vehicle for Teaching Through Key Competences. In A. Barbas, & A. I. G. Montero (Eds.), *CIED – UMinho* (pp. 177-189).

Green, C. S., and Bavelier, D. (2012). Learning, Attentional Control, and Action Video Games. *Current Biology*, *22*(6), 197-206. https://doi.org/10.1016/j.cub.2012.02.012

Hartman, A., Tulloch, R., & Young, H. (2021). Video games as public history: archives, empathy and affinity. *Game Studies, 21*(4).

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Publications.

Hiriart, J. (2019). Designing and Using Digital Games as Historical Learning Contexts for Primary School Classrooms. In A. Von Lünen, K. J. Lewis,B. Litherland, & P. Cullum(Eds.), *Historia Ludens: The Playing Historian* (pp. 37-53). Routledge. https://doi.org/10.4324/9780429345616

Julien, M., Stratton, M., & Clayton, R. (2018). History Is Not Boring: Using Social Media to Bring Labor History Alive. *Management Teaching Review*, *3*(3), 208-220. https://doi.org/10.1177/2379298117717257

Kessner, T. & McArthur Harris, L. (2022). *Opportunities to practice historical thinking and reasoning in a made-for-school history-oriented videogame*. SSRN. https://doi.org/10.2139/ssrn.4073128

Lee, P., & Ashby, R. (2000). Progression in historical understanding among students ages 7–14. In P. N. Stearns, P. Seixas, & S. Wineburg (Eds.), *Knowing, teaching, and learning history* (pp. 199–222). NYU Press.

Li, N. (2025). *The specter of the virtual: historical video games as complex public history. Digital Scholarship in the Humanities.* Advance article.

Lin, K. C., Wei, Y. C., and Hung, J. C. (2012). The Effects of Online Interactive Games on High School Students' Achievement and Motivation in History Learning. *International Journal of Distance Education Technologies*, *10*(4), 96-105. https://doi.org/10.4018%2Fjdet.2012100108

McCall, J. (2016). Teaching History with Digital Historical Games: An Introduction to the Field and Best Practices. *Simulation & Gaming*, *47*(4), 517-542. https://doi.org/10.1177/1046878116646693

Ministerio de Educación del Perú. (2016). *Currículo Nacional de la Educación Básica*. MINEDU. https://www.minedu.gob.pe/curriculo/pdf/curriculo-nacional-de-la-educacion-basica.pdf

Molinari, L., & Mameli, C. (2018). Basic psychological needs and school engagement: A focus on justice and agency. *Social Psychology of Education*, *21*(1), 157-172. https://doi.org/10.1007/s11218-017-9410-1

Molins-Ruano, P., Sevilla, C., Santini, S., Haya, P. A., Rodríguez, P., & Sacha, G. M. (2014). Designing videogames to improve students' motivation. *Computers in Human Behavior*, *31*, 571-579. https://doi.org/10.1016/j.chb.2013.06.013

Muller, F. H., and Louw, J. (2004). Learning environment, motivation and interest: Perspectives on self-determination theory. *South African journal of psychology*, *34*(2), 169-190. https://doi.org/10.1177/008124630403400201

Ojha, S. S. (2016). Using Sources in History Teaching. *MIER Journal of Educational Studies Trends and Practices*, *6*(1), 54-67. https://doi.org/10.52634/mier/2016/v6/i1/1454

Prensky, M. (2003). Digital game-based learning. *Computers in Entertainment*, *1*, 1-4.

https://doi.org/10.1145/950566.950596

Seixas, P., and Morton, T. (2013). *The Big Six Historical Thinking Concepts*. Nelson Education.

Sharp, L. (2012). Stealth learning: Unexpected Learning Opportunities Through Games. *Journal of Instructional Research*, *1*, 42-48. https://doi.org/10.9743/JIR.2013.6

Subhash, S., and Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature. *Computers in Human Behavior*, *87*, 192-206. https://doi.org/10.1016/j.chb.2018.05.028

Taylor, T. (2003). Historical simulations and the future of the historical narrative. *Journal of the Association for History and Computing*, *6*(2). http://hdl.handle.net/2027/spo.3310410.0006.203

Uricchio, W. (2005). Simulation, history, and computer games. In J. Raessens & J. Goldstein (Eds.), *Handbook of computer game studies* (pp. 327–338). MIT Press.

Van Drie, J., & Van Boxtel, C. (2008). Historical Reasoning: Towards a Framework for Analyzing Students' Reasoning about History. *Educational Psychology Review*, *20*(2), 165–190.

VanSledright, B., & Limón, M. (2006). Learning and Teaching Social Studies: A Review of Cognitive Research in History and Geography. In P. A. Alexander, & P. H. Winne (Eds.), *Handbook of Educational Psychology* (pp. 545-570). Lawrence Erlbaum Associates. https://doi.org/10.4324/9780203874790

Wang, Y. H. (2020). Exploring the Effects of Designing a Role-Playing Game with Single and Peer Mode for Campus Learning. *Educational Technology Research and Development*, *68*(3), 1275-1299. https://doi.org/10.1007/s11423-019-09726-8

Wineburg, S. (2001). *Historical thinking and other unnatural acts: Charting the future of teaching the past.* Temple University Press.

Wright, E. (2022). History, historians, digital games. *History & Theory, 61*(S1).

Yu, Z. (2018). Differences in serious game-aided and traditional English vocabulary acquisition. *Computers & Education*, *127*, 214-232. https://doi.org/10.1016/j.compedu.2018.07.014

Yu, Z., Gao, M., & Wang, L. (2020). The Effect of Educational Games on Learning Outcomes, Student Motivation, Engagement and Satisfaction. *Journal of Educational Computing Research*, *59*(3), 522-546. https://doi.org/10.1177/0735633120969214

Zirawaga, V. S., Olusanya, A. I., & Maduku, T. (2017). Gaming in education: Using games as a support tool to teach history. *Journal of Education and Practice*, *8*(15), 55-64. https://eric.ed.gov/?id=EJ1143830

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