Teacher-Created Serious Games for Heritage Education: A Case Study in Primary Social Sciences Learning Through RPG MAKER MV

Jesús Ramos , Pilar Merchán * , Mario Corrales-Serrano , María José Merchán

Posted Date: 9 February 2026

doi: 10.20944/preprints202602.0644.v1

Keywords: cultural heritage; heritage education; primary education; educational technology; digital learning; video game; social sciences

Article

Teacher-Created Serious Games for Heritage Education: A Case Study in Primary Social Sciences Learning Through RPG MAKER MV

Jesús Ramos [1], Pilar Merchán [2,*], Mario Corrales-Serrano [1] and María José Merchán [1]

[1] Facultad de Educación y Psicología, Universidad de Extremadura, 06006 Badajoz, Spain

[2] Escuela de Ingenierías Industriales, Universidad de Extremadura, 06006 Badajoz, Spain

* Correspondence: pmerchan@unex.es

Abstract

Digital serious games are increasingly recognised as valuable tools for fostering student engagement and supporting active learning processes in formal educational contexts. Within the field of heritage education, however, empirical evidence concerning teacher-created games and their pedagogical effects remains limited. This study examines the educational impact of a digital serious game designed by teachers using RPG Maker MV to support the teaching of Social Sciences and local cultural heritage. The game, *Misterios de Olivenza*, integrates historical, geographical, and cultural content related to the municipality of Olivenza (Extremadura, Spain) through exploratory gameplay and problem-based activities. The research involved 86 primary education students aged 10–13 and employed a validated questionnaire to analyse gameplay experience, motivation, and self-perceived learning, with attention to age and gender differences. Results indicate high levels of enjoyment, motivation, and perceived learning, with no statistically significant differences by gender and limited age-related variation. A moderate positive correlation was identified between motivation and self-perception of learning, suggesting that engagement plays a key role in students' educational experience. The findings highlight the pedagogical potential of teacher-created serious games for heritage education, while underscoring the importance of careful curricular integration and adequate scaffolding to maximise educational effectiveness.

Keywords: cultural heritage; heritage education; primary education; educational technology; digital learning; video game; social sciences

1. Introduction

The use of video games in educational contexts as a tool for didactic innovation has been widely discussed and examined in the academic literature [1–3], with the ultimate aim of revitalising teaching and learning processes and transforming them into experiences that naturally engage students [4]. Like many other pedagogical resources, these tools are intended to operate holistically within formal and regulated learning environments, integrating into classroom planning and seeking to foster not only curricular knowledge but also the development of essential basic competences that enable students to become citizens of the twenty-first century.

However, the use of video games in classrooms entails both benefits and potential drawbacks, as well as external and inherent challenges associated with the tool itself [5]. When considering commercial video games produced by major companies and marketed under well-known titles, their selection must be undertaken with particular care. It is essential to clearly identify which games are most suitable for students' educational level, the curricular content to be addressed, and the ways in which students will interact with them, considering factors such as gender, age, and gaming habits [6]. Consequently, teachers' competence in the use of these technologies and their prior conceptions

 doi:10.20944/preprints202602.0644.v1

are also decisive [7] in determining whether their judgement will be effective or, conversely, whether they will be unable to exploit the full potential of these programmes.

In this context, serious games emerge as fundamental allies for teachers. In contrast to the recreational purpose and artistic-commercial intent of mainstream video games, this category is characterised by a clear educational vocation [8], placing emphasis on teaching–learning processes, with gameplay serving as a means to that end. Their interfaces, mechanics, tutorials, game modes, and objectives [9], when implemented in classrooms, are situated within formal educational contexts, thereby strengthening the set of tools available to teaching teams.

In this way, serious games facilitate learning processes and reduce the effort required of educational institutions. According to Laamarti et al. [10], functioning as a convergence of experience, entertainment, and multimedia interfaces, this medium is employed across a wide range of disciplines, from science [11] and mathematics [12] to geography [13] and even foreign languages [14], yielding promising results and numerous benefits derived from their implementation and subsequent evaluation [15]. Among these positive aspects are students' active engagement and the development of skills in a multi-competence manner. Nevertheless, there are also limitations and challenges, such as difficulties in integrating serious games and video games into classrooms due to curricular or material constraints, limited opportunities for interactivity beyond the tool itself, or issues related to addiction and violence stemming from the content of certain video games [16,17].

Considering both their potential and their risks, it is necessary to address the effective role of digital serious games in preparing and educating students. Although the foundations of learning depend on the subject area, discipline, and specific topic addressed in each teaching unit or classroom session, the core upon which this structure is currently based is the instruction and education in twenty-first-century skills [18,19]. These skills include, as central pillars, ethical and civic competences, creativity, critical thinking, digital and media literacy, and entrepreneurial capacity. Collectively, they aim to foster adults who can analyse their environment, resolving problems peacefully, and communicating effectively [20].

In this regard, Gürbüz and Çelik [21] observe that serious games, through their design, objectives, and interactivity, promote the acquisition of these skills, with a focus on future integration into the digital labour market. Checa-Romero and Giménez-Lozano [22] point in a similar direction, identifying that certain genres and mechanical aspects of commercial video games support the metacognitive development of these skills through active decision-making and collaborative problem-solving—key elements of meaningful learning methodologies [23]. McGowan et al. [24] reinforce these findings; through a gamified video game, they demonstrated that confronting the challenges posed by serious games enhanced soft skills related to twenty-first-century competences, such as creative problem-solving, teamwork, stress management, and effective communication.

Parallel to the acquisition of these competences, the motivational potential of these tools is also noteworthy. Beyond their playful dimension, Horban and Maletska [25] found that video games, when used in a planned and structured manner, can enhance various psychological factors that increase student motivation (curiosity, belonging, empowerment, and affiliation) through basic interactivity and gameplay. This idea is reinforced by the studies of Moradi and Noor [26] and Vahlo et al. [27], who confirmed not only the positive effect of educational video games on intrinsic motivation related to problem-solving, but also the extension of this motivation beyond the classroom among autonomous learners.

Nevertheless, such outcomes require teachers to identify digital and interactive products that are well suited to their classroom contexts, including the potential educational needs of their students, while also considering the resources available to the institution and the expectations of parents and learners [28]. Indeed, when teachers' technological knowledge is limited, video games—whether serious or commercial—are likely to generate resistance and disinterest among educational staff, preventing them from realising their full potential [29].

One of the most effective ways to overcome technological challenges and to integrate general and global resources into the specific reality of a classroom is through the creation of original video

 doi:10.20944/preprints202602.0644.v1

games tailored to that context. This task, however, requires an understanding that developing a digital game necessitates a minimum level of technical knowledge and technological proficiency, artistic ability, and basic programming skills [30]. Teachers must therefore decide whether it is more beneficial to undertake training in this area, to search for suitable existing serious games, or to forgo the integration of such tools altogether. The first option—training in video game creation, even at an educational level—can itself function as a learning experience for educators [31].

It should be noted, however, that such training requires an investment of time and material resources. To this end, a range of useful and intuitive tools for video game creation is currently available, such as Scratch or Genially, both of which are free and flexible options for adapting curricular (or other) content to students' needs, including assessment features [32,33]. Thanks to these tools, teachers have sufficient means to plan sessions in which the serious games they design are used to achieve learning objectives, develop twenty-first-century skills, and sustain student motivation [34,35], both remotely and in face-to-face classroom settings [36].

Alongside these examples, there are other software programmes, such as the video game creation engine RPG Maker MV [37] and previous versions, which enables teachers to create simple scenarios, situations, and adventures that can be reused multiple times and that include a rich library of resources for content adaptation [38]. Dewi and Sujana [39] demonstrated its applicability in mathematics education with concrete classroom implementations, while Rasyid et al. [40] found that the use of RPG Maker led to better outcomes compared with groups in which it was not employed.

This creative effort not only contributes to methodological dynamization but can also serve as an excellent means of raising awareness of students' immediate environment through the cultural dimension of twenty-first-century skills [41]. In this way, RPG Maker emerges as a tool for collecting and digitally storing diverse forms of knowledge and texts, as well as for representing maps, images, and worlds that students can explore through game-based learning [42], including content related to heritage and history [43–46]. Such experiences have a well-established trajectory using this tool, as evidenced by projects documented by Gufhron and Usman [47] at the North Sumatra State Museum, or by Xue et al. [48] in relation to geography learning connected to local culture. These projects and experiences articulate the essential pedagogical foundations of creating educational video games with RPG Maker for the educational dissemination [49] of cultural heritage and its appropriate communication [50].

Accordingly, considering the state of the art and the projects reviewed, as well as the potential of RPG Maker as a tool for adapting both curricular content and sociocultural elements, this research developed, between August 2024 and April 2025, a digital serious game using RPG Maker MV. This game compiled information and curiosities about the municipality of Olivenza (Extremadura, Spain), including geographical, historical, and cultural data.

Olivenza's cultural heritage is distinguished by an eclecticism that is unparalleled in the Iberian Peninsula. This Luso-Spanish singularity is the result of centuries of Portuguese sovereignty (Treaty of Alcanices, 1297), followed by its definitive incorporation into Spain in 1801. Consequently, its historical and artistic legacy serves as a living testament to this cultural hybridization.

The historic centre, which holds the highest heritage protection status (Asset of Cultural Interest), is characterized by the preeminence of the Castle and its Keep, next to the Church of Santa María del Castillo, which houses the remarkable altarpiece of the Tree of Jesse. However, the synthesis of Portuguese and Spanish influences is most evident in the Manueline style. This variant of late Gothic art was developed during the reign of Manuel I (1495-1521). It is distinguished by its exuberant decorative motifs inspired by the era of the Great Maritime Expeditions, which served as a symbol of royal power. The church of La Magdalena and the ornate door of the current Town Hall are exceptional examples of this artistic style.

As a border town, its bastioned walls and historic gates enclose a civic centre where traditional Portuguese tiles coexist harmoniously with the vernacular architectural traditions of Extremadura.

The educational video game incorporated visual references to emblematic heritage sites (churches, fountains, façades, etc.), as well as guidance to inform players where to go and what

 doi:10.20944/preprints202602.0644.v1

actions to undertake at each stage, to support teachers, and even to provide access to solutions for the riddles and questions posed.

In this context, the following main objective is proposed:

MO. To evaluate the effects of using teacher-created serious games for the teaching of Social Sciences and heritage.

To assess and analyse these effects, the main objective has been subdivided into three secondary objectives that specifically articulate each of the variables under examination:

SO1. To analyse the gameplay experience and performance demonstrated by students during the gaming session, according to gender and age.

SO2. To examine the motivation generated by the video game, considering reported levels of satisfaction and enjoyment, according to gender and age.

SO3. To evaluate students' self-perception of the knowledge acquired through the gaming experience, according to gender and age.

The focus on age and gender within each category will not only enable a more precise understanding of the effects, but also provide a comprehensive view of the actors and variables that influence knowledge acquisition through video games.

2. Materials and Methods

The present study involved 86 students aged between 10 and 13 years from educational centres in the city of Badajoz (Spain). This sample of primary education students was selected through intentional non-probabilistic sampling, owing to the convenience it offered to the research team.

The participants were divided into three groups comprising 24, 30, and 32 students, corresponding respectively to two sixth-grade classes and one fifth-grade class of Primary Education. From a sociodemographic perspective, the sample consisted of 60.5% male students, 38.4% female students, and one student who identified as "other" (1.2%). In terms of age distribution, seventeen students were 10 years old, forty-four were 11 years old, twenty-four were 12 years old, and one student was 13 years old. Table 1 summarises the main demographic characteristics of the sample.

Table 1. Sociodemographic characteristics of the sample.

Variables	$\bar{x}$ *(SD) [Min – Max] or N (%)*
Age of students (years)	11.1 (*.720*) [10–13]
10 years	17 (19.8%)
11 years	44 (51.2%)
12 years	24 (27.9%)
13 years	1 (1.2%)
Student gender	–
Female	33 (38.4%)
Male	52 (60.5%)
Other	1 (1.2%)
Cross-tabulation (age by gender)	–
Female gender (age)	11.12 (*.820*) [10–12]
Male gender (age)	11.12 (*.646*) [10–13]
Female (10 years)	8 (50.0%)
Male (10 years)	8 (50.0%)
Female (11 years)	14 (31.8%)
Male (11 years)	30 (68.2%)
Female (12 years)	10 (41.7%)
Male (12 years)	14 (58.3%)
Female (13 years)	1 (100%)
Male (13 years)	0 (0%)
Gender by school grade	–

 doi:10.20944/preprints202602.0644.v1

5th grade Primary Education (female)	10 (31.3%)
5th grade Primary Education (male)	21 (65.6%)
6th grade Primary Education (female)	23 (46.2%)
6th grade Primary Education (male)	31 (57.4%)

The participating students travelled to the Faculty of Education and Psychology at the University of Extremadura to take part in the two hour gameplay with *Misterios de Olivenza* (*Mysteries of Olivenza*) (Figure 1) and, afterwards, completed the data collection instrument: a previously validated Likert scale questionnaire (final Cronbach's α = .638, Appendix A.1) divided into three categories: gameplay and accessibility of the video game, perceived enjoyment and motivation during play, and perceived learning acquired through video games as an educational tool. This internal consistency value is considered optimal according to the criteria of Hair et al. [51], given that this is an exploratory study. Likewise, the research and observations of Hulin et al. [52] and Ursachi et al. [53] support the functionality of this measurement model due to the influence of the low number of items and sociodemographic factors as justifications for its Cronbach's α. At the end of the questionnaire, students were able to respond openly to two questions:

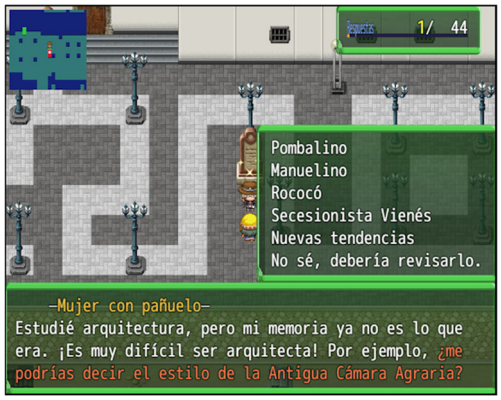
1.- What did you think of the experience? Did you enjoy it? Would you change anything?

2.- What did you think of the video game you played? Would you improve anything? Did you encounter any error or problem?

The serious game Misterios de Olivenza was developed using using the RPG Maker MV engine, between August 2024 and April 2025. It is based on El Juego de las Torres (The Towers Game), originally created by the "González Santana" Ethnographic Museum. The game focuses on the tangible and natural cultural heritage of Olivenza. It comprises seven maps featuring a total of forty-four questions, mixing multiple-choice and short-answer formats, each paired with an informational panel located virtually adjacent to the referenced monument or landmark. For teachers, a digital guide is provided, which includes the answers to all questions, a game map, and a proposed didactic unit.

Key features of the game include a simplified multicolor built-in minimap to guide students through the areas available for exploration, an introductory tutorial, a narrative for each character that introduces the questions, a counter of correct answers, and digital recreations of the town's representative monuments. Upon completing the questions distributed across the various maps, players unlock a final assessment comprising ten multiple-choice questions, randomly selected from six different versions of the exam.

(**a**)



(**b**)

 doi:10.20944/preprints202602.0644.v1

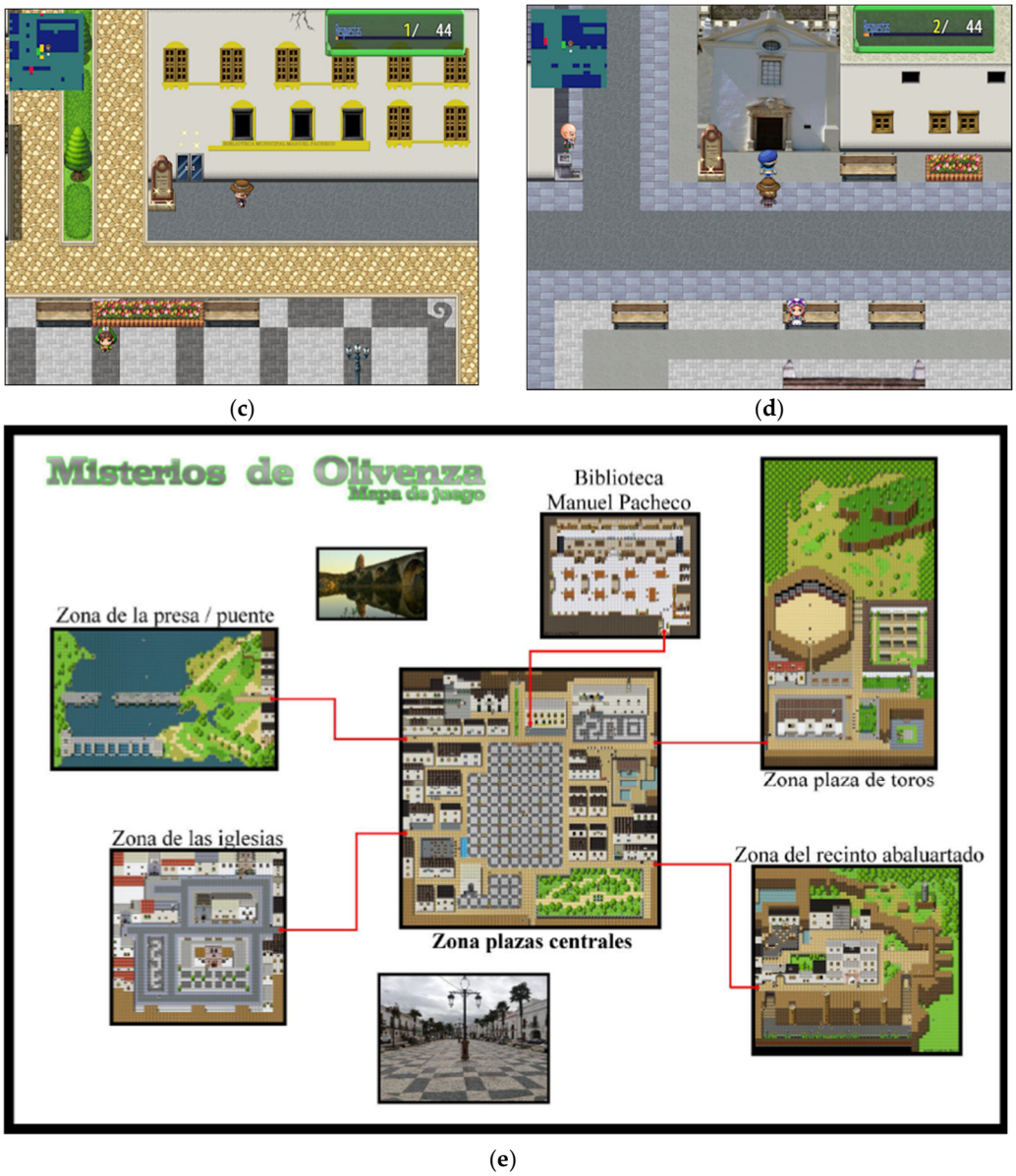


Figure 1. Screenshots from the game *Misterios de Olivenza*. (a) Example of text presenting didactic information about locations in the town; (b) Example of a multiple-choice question to be answered; (c) Representation of and entrance to the Manuel Pacheco Municipal Public Library; (d) Façade of a religious building; (e) Full map of the game areas offered in the digital guide.

Quantitative data were analysed using SPSS version 25 for Windows, conducting the relevant tests to demonstrate the reliability of the questionnaire and descriptive analyses of the collected results.

Firstly, continuous variables for each of the questions posed to the participating students were evaluated through descriptive statistics. These are presented as means ($\bar{x}$), standard deviations (SD), and maximum and minimum values where necessary. Frequencies and percentage values were calculated for nominal and ordinal variables.

To explore differences across each of the relevant categories and questions, Student's t tests, and Mann–Whitney U tests were conducted, aiming to identify potential differences associated with participants' gender. Meanwhile, the three major age groups were compared using the Kruskal–Wallis test. To avoid over representation in the results, cases of students aged 13 and those self-identifying as "other" gender were excluded from both analyses. Finally, Spearman's correlation coefficients (ρ) were calculated to assess possible associations between continuous and ordinal variables. Nonparametric tests were selected because the sample did not meet statistical normality

 doi:10.20944/preprints202602.0644.v1

criteria, as verified through the Kolmogorov–Smirnov test, which yielded asymptotic significance values of 0.049 for the first dimension and 0.00 for the second and third; normality was therefore rejected, as the asymptotic significance was below 0.05.

Lastly, frequency analyses were conducted for the open-ended questions, which, through qualitative examination, serve to reinforce the quantitative analysis of the participating sample and to identify recurring structures and words in participants' discourse using ATLAS.ti version 24.

3. Results

The first analysis conducted concerns the participating students' perceptions regarding the game's playability, their performance while using it, and any problems encountered in relation to SO1. To this end, three questionnaire items related to difficulty and potential issues identified were considered. The descriptive results are presented in Table 2, with means compared using Student's t test, assuming equal variances following Levene's test and, in all cases, revealing no statistically significant differences.

Table 2. Playability and Student Performance (First Dimension) and Student's t-Test by gender.

			Student Gender	
Variable		***Total Sample (n=84)***	**Male (n=52)**	**Female (n=32)**
Q1. I believe the video game I tried is easy to play.	$\bar{x}$	**3.42**	3.48	3.33
	SD	***1.169***	*1.111*	*1.267*
Q2. I had some difficulty discovering information in the game.	$\bar{x}$	**2.82**	2.81	2.85
	SD	***1.457***	*1.522*	*1.372*
Q3. I had some difficulty answering the questions in the game.	$\bar{x}$	**2.91**	2.79	3.09
	SD	***1.368***	*1.460*	*1.208*

Test for Equality of Means	**Levene's Test**		**Student's t-Test**	
	F	**p-value**	**t**	**p-value (two-tailed)**
Q1.	.403	.527	.564	.574
Q2.	1.550	.217	-.125	.901
Q3.	1.705	.195	.993	.324

As can be observed, the students did not report any significant difficulties in using the tool, rating it as easy to use. This can be seen, by gender, in Figure 2, where the female group rated all aspects related to the tool slightly lower. A clear common trend between genders is also evident, with the female group indicating that they had experienced problems when responding to the questions posed by the video game. Figure 3 illustrates how this perception varies by age, showing that older students encountered fewer problems or difficulties in the game.

Preprints.org (www.preprints.org) | NOT PEER-REVIEWED | Posted: 9 February 2026 doi:10.20944/preprints202602.0644.v1

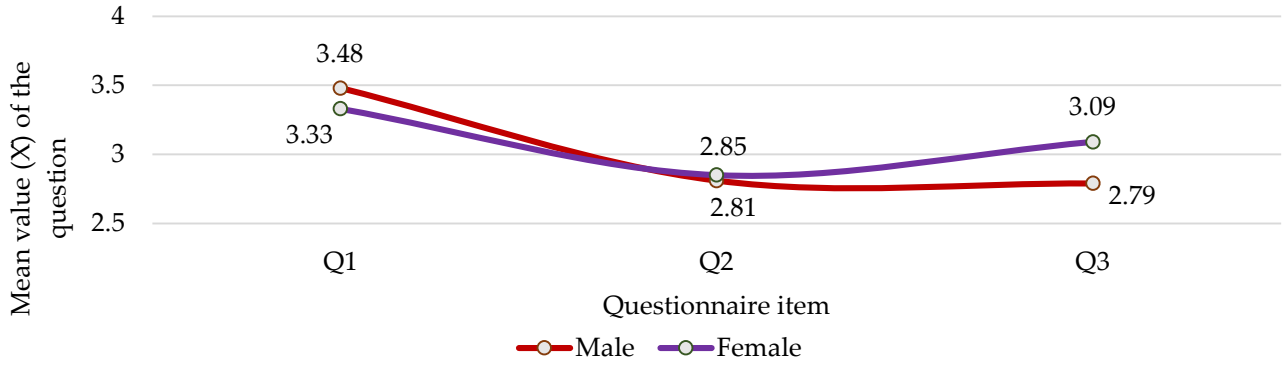


Figure 2. Average results per question (first dimension) in relation to student gender.

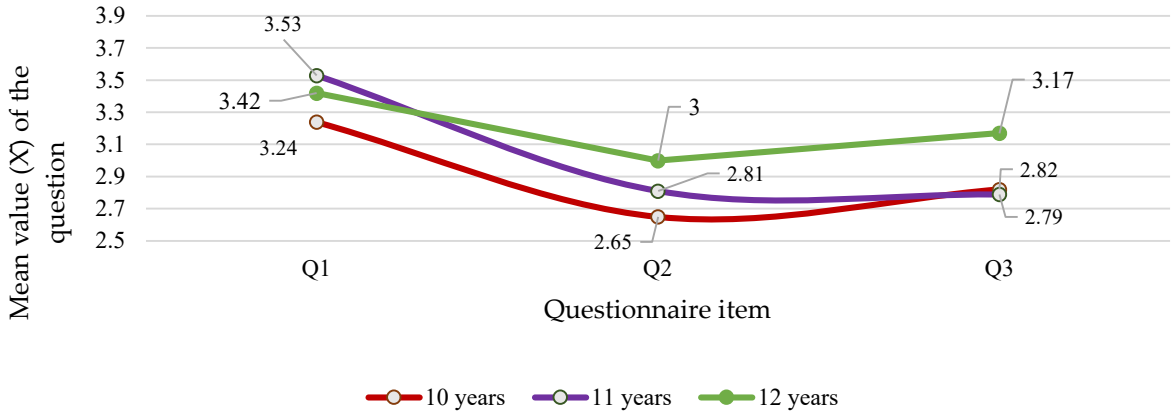


Figure 3. Average results per question (first dimension) in relation to student gender.

Table 3 was applied to the questions within this dimension, using gender as the grouping variable, and the Kruskal–Wallis test was used to compare the effect of each age group on the results. In both cases, non-parametric tests were employed.

Table 3. Playability and Student Performance (First Dimension) and Student's t-Test by gender.

		Student Gender *(Mann-Whitney U Test)*		***Student Age*** *(Kruskal-Wallis H Test)*		
Variable		**Male**	**Female**	**10 years**	**11 years**	**12 years**
Q1	Value U/H (*p-value*)	818.0 (*.708*)		.960 (*.619*)		
Q2	Value U/H (*p-value*)	842.0 (*.883*)		.582 (*.747*)		
Q3	Value U/H (*p-value*)	741.5 (*.282*)		1.266 (*.531*)		

The results indicate that no statistically significant differences exist for these groups, suggesting that neither gender nor age are variables that determined perception, playability, or the difficulties experienced when using the video game. Similarly, no statistically significant correlations were

 doi:10.20944/preprints202602.0644.v1

observed when applying Spearman's ρ test to the results of the first dimension and the variable of age (Table 4).

Table 4. Spearman's ϱ Tests for Bivariate Correlation Between First Dimension and Student Age.

Variable		*Student Age*
Q1	Spearman's ϱ (*p-value*)	.051 (*.646*)
Q2	Spearman's ϱ (*p-value*)	.083 *(.453)*
Q3	Spearman's ϱ (*p-value*)	.104 *(.343)*

Although no statistically significant differences or correlations were found, the descriptive results relating to performance and playability do appear to be consistent when analysed alongside the responses to the second qualitative question, in which participants were asked about the video game and whether they had encountered any errors or problems. Most indicated that the video game was "*very good*," that it "*teaches a lot to people who know nothing about Olivenza*," and that it is "*a very complete video game in terms of information. Very educational […].*" Moreover, almost all participants reported having found no errors, aside from occasional difficulties in knowing the correct answer to certain questions.

To examine the motivation generated by the video game within SO2, participants were asked how they perceived the video game as a tool, whether they would have liked to continue playing after the session ended, and whether the requirement to find information within the game at their own pace was mechanically and pedagogically satisfactory. Table 5 presents the items in this section, as well as their means by gender and overall, including the comparison of means and the necessary prior homoscedasticity test.

Table 5. Motivation and Satisfaction with the Video Game as a Didactic Tool (Second Dimension) and Student's t-Test by Gender.

			Student Gender	
Variables		***Total Sample* (*n=84*)**	**Male (n=52)**	**Female (n=32)**
Q4. I believe the video game I tried is visually appealing.	$\bar{x}$ *SD*	**3.91** ***1.087***	3.94 *1.056*	3.85 *1.149*
Q5. I believe the video game I tried is fun and entertaining.	$\bar{x}$ *SD*	**4.25** ***1.122***	4.25 *.988*	4,24 *1.324*
Q6. I wish I had played the video game longer.	$\bar{x}$ *SD*	**3.99** ***1.286***	3.98 *1.229*	4,00 *1.392*
Q7. I like being able to find information at my own pace, even if I must search for it.	$\bar{x}$ *SD*	**3.91** ***1.087***	3.79 *1.160*	4.09 *.947*

 doi:10.20944/preprints202602.0644.v1

Q8. I enjoyed learning through video games.	$\bar{x}$ *SD*	**4.26** ***1.114***	4.17 *1.133*	4.39 *1.088*

Test for Equality of Means	**Levene's Test**		**Student's t-Test**	
	F	**p-value**	**t**	**p-value (two-tailed)**
Q4.	.406	.526	.386	.701
Q5.	2.474	.120	.030	.976
Q6.	.361	.549	-.067	.947
Q7.	1.296	.258	-1.254	.213
Q8.	.099	.754	-.889	.376

As can be seen, the generally high scores point to a positive interaction not only with the video game as a didactic tool, but also to a tendency among students to enjoy problem-based learning and to apply constructivist principles to their own knowledge acquisition strategies. Figures 4 and 5 illustrate both trends, separated by gender and age respectively.

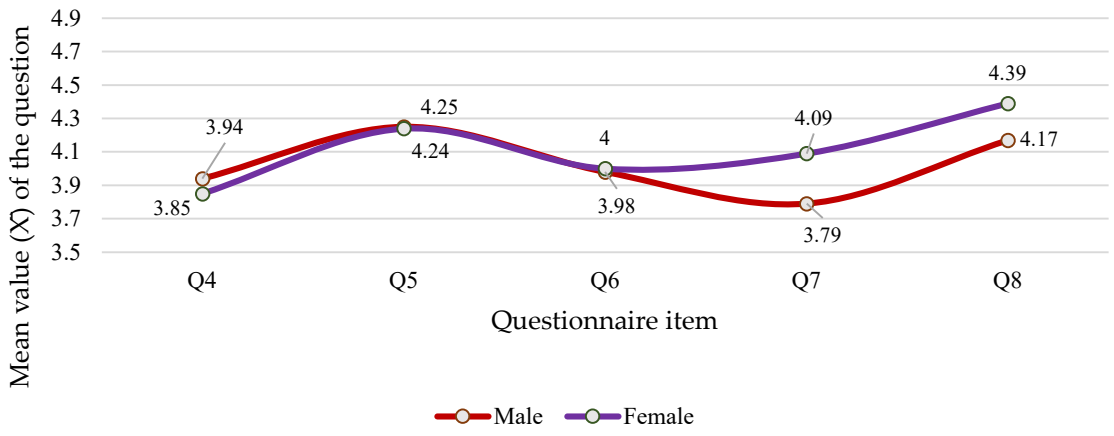


Figure 4. Average results per question (second dimension) in relation to student gender.

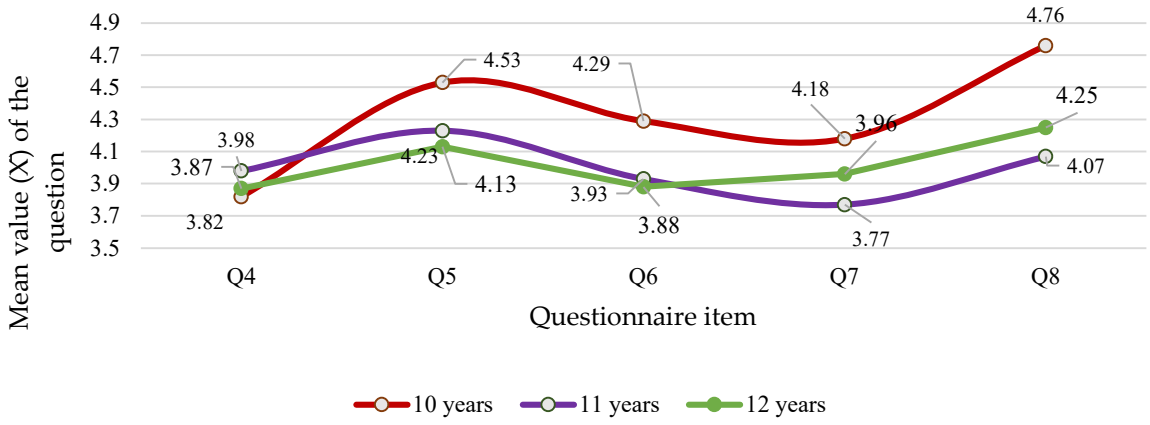


Figure 5. Average results per question (second dimension) in relation to student gender.

Regarding the results by gender and age, which show a very positive perception of the video game—highlighting its visual design, playability, and learning mechanics, and generating interest in

 doi:10.20944/preprints202602.0644.v1

continuing to use it and to learn through video games—it is necessary to analyse whether differences exist between age or gender in the overall perception of the tool, either across age groups or between genders. Table 6 presents the results of the non-parametric tests.

Table 6. Non-Parametric Tests in Second Dimension Grouped by Observed Variables (Gender and Age).

Variable		*Student Gender* (*Mann-Whitney U Test*)		*Student Age* (*Kruskal-Wallis H Test*)		
		Male	**Female**	**10 years**	**11 years**	**12 years**
Q4	Value U/H (*p-value*)	827.0 (*.768*)		.654 (*.721*)		
Q5	Value U/H (*p-value*)	784.5 (*.448*)		1.022 (*.600*)		
Q6	Value U/H (*p-value*)	819.0 (*.704*)		1.105 (*.575*)		
Q7	Value U/H (*p-value*)	744.5 (*.283*)		1.479 (*.477*)		
Q8	Value U/H (*p-value*)	738.5 (*.226*)		4.200 (*.122*)		

Given the lack of statistically significant differences, as indicated by the high bilateral significance values, neither gender nor age appear to be indicators that affect or generate variation in how motivating, engaging, or conducive to learning the video game is perceived to be. Since no differences were found, the next step was to examine whether these same variables show any correlation with the high scores obtained in this category (Table 7).

Table 7. Spearman's ϱ Tests for Bivariate Correlation Between Second Dimension and Student Age.

Variable		*Student Age*
Q4	Spearman's ϱ (*p-value*)	-.004 (*.973*)
Q5	Spearman's ϱ (*p-value*)	-.102 (*.351*)
Q6	Spearman's ϱ (*p-value*)	-.098 (*.370*)
Q7	Spearman's ϱ (*p-value*)	-.057 (*.602*)
Q8	Spearman's ϱ (*p-value*)	-.119 (*.278*)

 doi:10.20944/preprints202602.0644.v1

Although no statistically significant correlation was found, the qualitative results again reinforce the high descriptive scores. A high proportion of adjectives used to describe the video game were positive, with terms such as "*fun*," "*good*," and "*cool*" standing out, alongside requests for more time to play the game.

The third dimension and category of the questionnaire, corresponding to SO3, concerns students' perceptions of the learning acquired through the video game and their views of such tools as didactic resources. Accordingly, students were asked about their own perception of the knowledge gained and how they relate, or would like to relate, to video games within the context of education and learning. Table 8 presents both the descriptive statistics and the comparison of means by gender.

Table 8. Perception of Knowledge Acquired and Use of Video Games as a Didactic Tool (Third Dimension) and Student's t-Test by Gender.

Variable		*Total Sample (n=84)*	*Student Gender*	
			Male (n=52)	**Female (n=32)**
Q9. I have learned new things through the video game.	$\bar{x}$	**4.13**	4.02	4.30
	SD	***1.121***	*1.180*	*1.015*
Q10. I would like to use video games to learn and reinforce what I'm taught in class.	$\bar{x}$	**4.26**	4.17	4.39
	SD	***.966***	*1.080*	*.747*
Q11. If I could, I would use video games outside of class to learn more.	$\bar{x}$	**3.53**	3.58	3.45
	SD	***1.377***	*1.419*	*1.325*
Q12. When I play non-educational video games (*Roblox*, *Fortnite*, etc.), I try to pay attention to see if I can learn something new.	$\bar{x}$	**3,55**	3,54	3,58
	SD	***1.305***	*1.407*	*1.146*

Test for Equality of Means	**Levene's Test**		**Student's t-Test**	
	F	**p-value**	**t**	**p-value (two-tailed)**
Q9.	.473	.493	.386	.701
Q10.	5.111	.026*	-1.113	.269
Q11.	.506	.479	.397	.692
Q12.	3.579	.062	-.128	.376

**Note*: Equal variances not assumed for Student's t-test at significance level $p < 0.05$.

Although equal variances are assumed for item 10, which relates to the desire to use video games regularly to reinforce curricular content, the difference in means does not, in fact, reveal statistically significant differences between the gender groups analysed. These means, both by gender and by age, are represented for this dimension in Figures 6 and 7, respectively.

 doi:10.20944/preprints202602.0644.v1

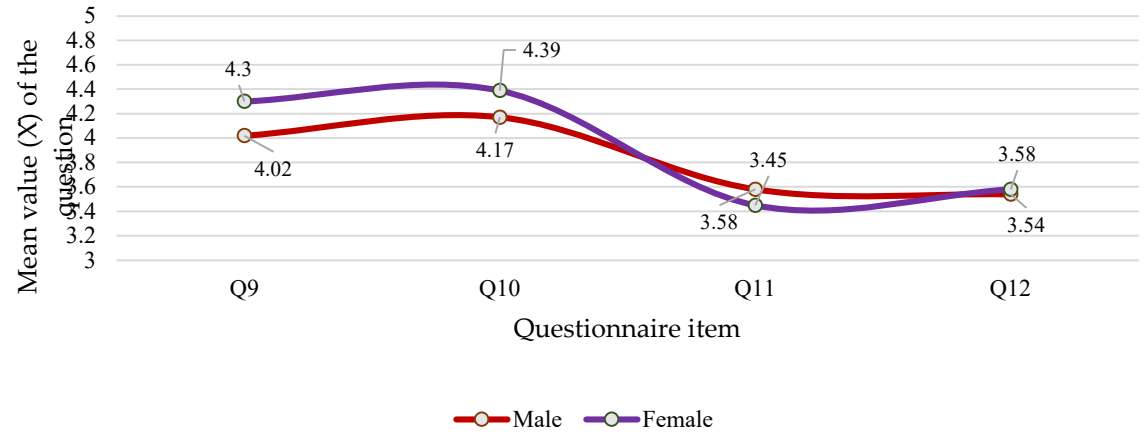


Figure 6. Average results per question (third dimension) in relation to student gender.

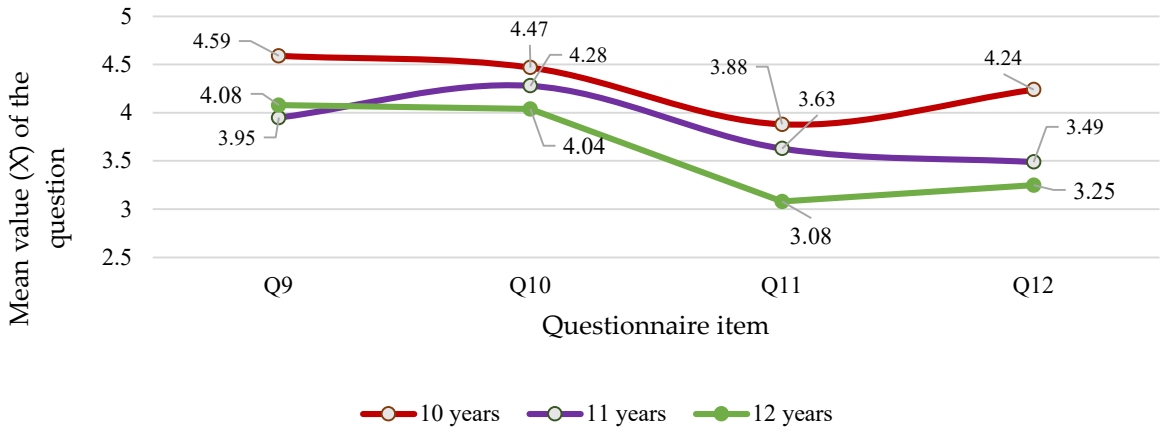


Figure 7. Average results per question (third dimension) in relation to student gender.

As can be observed, no major descriptive differences between genders are apparent at first glance, although a noticeable gap of nearly one point can be seen between the scores given by ten-year-old students and those aged twelve. To analyse these data more precisely, non-parametric tests were conducted to determine whether statistical differences exist between groups, as shown in Table 9.

Table 9. Non-Parametric Tests in Third Dimension Grouped by Observed Variables (Gender and Age).

		Student Gender *(Mann-Whitney U Test)*		***Student Age*** *(Kruskal-Wallis H Test)*		
Variables		**Male**	**Female**	**10 years**	**11 years**	**12 years**
Q9	Value U/H (*p-value*)	743.0 (*.257*)		2.770 (*.250*)		
Q10	Value U/H (*p-value*)	803.5 *(.589)*		3.627 *(.163)*		
Q11	Value U/H (*p-value*)	798.0 *(.577)*		5.073 *(.079)*		

 doi:10.20944/preprints202602.0644.v1

Q12	Value U/H (*p-value*)	847.5 *(.922)*	7.503 *(.023)**

**Note*: Statistically significant differences observed between age groups at $p < 0.05$.

Based on these results, statistically significant differences appear to exist between age groups for item 12, which refers to the interest in learning when playing other non-educational video games. To explore this further, pairwise comparisons with Bonferroni correction were carried out within the Kruskal–Wallis test for item 12, as shown in Table 10, along with a representation of average rank nodes by age in Figure 8.

Table 10. Pairwise Comparison by Age Group for Question Twelve.

Sample Pairs	*Contrast Statistic*	*Error*	*Std. Dev. of Contrast Statistic*	*p-value*	*Adjusted p-value*
10 years – 11 years	15.039	6.804	2.210	*.027*	.081
11 years – 12 years	5.098	6.046	.843	*.399*	1.00
12 years – 10 years	20.137	7.553	.666	*.08*	.023*

**Note*: Statistically significant differences observed between groups at $p < 0.05$ after Bonferroni correction to control Type I error rates.

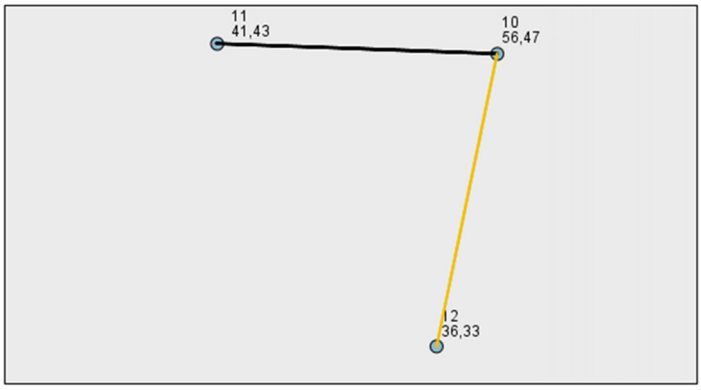


Figure 8. Visualization of Average Rank per Node by Age Group.

A statistically significant difference is thus observed between the ten-year-old and twelve-year-old groups regarding the use of non-educational video games outside the classroom as potential sources of knowledge, with older students being less interested in this. To determine whether an observable correlation exists in the data, Spearman's ρ test was applied within this same category (Table 11).

 doi:10.20944/preprints202602.0644.v1

Table 11. Pairwise Comparison by Age Group for Question Twelve.

Variable		***Student Age***
Q9	Spearman's ϱ (*p-value*)	-.126 (*.252*)
Q10	Spearman's ϱ (*p-value*)	-.208 *(.057)*
Q11	Spearman's ϱ (*p-value*)	-.242 *(.026)**
Q12	Spearman's ϱ (*p-value*)	-.276 *(.011)**

**Note*: Statistically significant correlations observed at $p < 0.05$.

As shown, there appears to be a weak but significant negative correlation between age and both the use of video games outside the classroom to learn more and the interest in acquiring new knowledge when playing non educational games. As age increases, this interest seems to decrease in a non-random manner, suggesting that video games may be more effective as tools for informal learning (outside the classroom) among younger students.

Next, potential correlations are explored between accessibility, its effect on motivation and self-perceived learning, and, on the other hand, motivation as an influential element in the perception of knowledge acquisition through *Misterios de Olivenza*. To examine this, total mean scores for each dimension per participant were cross analysed using Spearman's ρ (Table 12).

Table 12. Spearman's ϱ Tests for Bivariate Correlation Between Dimensions.

Crossed Dimensions	*Spearman's ρ* *(p-value)*
D1 × D2 (Accessibility × Motivation)	-.007 (*.949*)
D1 × D3 (Accessibility × Self-Perception of Learning)	-.209 (*.054*)
D2 × D3 (Motivation × Self-Perception of Learning)	0.441 (*.000*)*

**Note*: Statistically significant correlations observed at $p < 0.05$.

A moderate positive correlation can be observed, with a ϱ value of 0.441, between students' motivation and enjoyment of the video game and their greater self-perception of learning through video games, as well as their desire to use them for educational reinforcement. Conversely, based on the sample presented, no statistically significant results were found to support the idea that accessibility or the difficulties encountered constitute an impediment to the use of video games, or to students' enjoyment of the tool or interest in it and the knowledge it aims to convey.

Regarding items 13 and 14, which refer to students' opinions about the experience of testing the video game and about the use of the video game itself, a frequency analysis was conducted. For the former, most participating students evaluated the experience positively, with the most common words used to describe it being "*good*" (15.12%), "*fun*" and "*funny*" (10.47%), "*cool*" (9.30%), as well

 doi:10.20944/preprints202602.0644.v1

as various forms of "*like*" (5.81%) and "*love*" (4.65%) (Table 13). Reflections or suggestions for improvement regarding the session focused on the need for more time to play the game, the large amount of text they encountered and needed to copy, or formal aspects related to the video game (such as increasing visual interface guides).

Table 13. Frequency Table for Question Thirteen Regarding Opinions on the Learning Experience with Video Games.

Word	*Count*	*Percentage*	*Word*	*Count*	*Percentage*
good (*bueno*)	*13*	*15.12%*	to love (*encantar*)	*4*	*4.71%*
fun (*divertir / divertido*)	*12*	*14.12%*	cool (*guay*)	*4*	*4.71%*
neat *(chulo)*	*8*	*9.41%*	entertaining (*entretener*)	*3*	*3.53%*
to like (*gustar*)	*5*	*5.88%*	interesting (*interesante*)	*3*	*3.53%*

Note: Only nouns, adjectives, verbs, and auxiliary forms are considered. Base forms are inferred and unified. In italics, the original words in Spanish.

Item 14, meanwhile, addresses opinions relating to the video game as a recreational tool, asking students to express what they thought of it, potential issues to improve, and points for enhancement. Students highlighted the need to improve the graphical aspect which, although praised and considered attractive, they felt could resemble commercial video games with larger budgets. Within this analysis, the adverb "*very*" stands out as an intensifier, along with "*good*," "*well*" and their derivatives (10.75%), "*fun*" and its conjugations (9.68%), "*cool*" (8.60%), "*great*" (7.53%), and "*entertaining*" and its conjugations (4.30%) as descriptors of the game (Table 14). With a small group describing it as boring, students emphasised improvements related to movement, map accessibility for orientation, and customisation of the playable character to make the experience more satisfying.

Table 14. Frequency Table for Question Fourteen Regarding Opinions on Video Games as a Tool.

Word	*Count*	*Percentage*	*Word*	*Count*	*Percentage*
good (*bueno*)	*10*	*10.99%*	entertaining (*entretener*)	*4*	*4.40%*
fun (*divertir / divertido*)	*10*	*10.99%*	educational (*educativo*)	*4*	*4.40%*
neat *(chulo)*	*8*	*7.69%*	to love (*encantar*)	*3*	*3.30%*
to like (*gustar*)	*5*	*7.69%*	to bore (*aburrir*)	*2*	*2.20%*

Note: Only nouns, adjectives, verbs, and auxiliary forms are considered. Base forms are inferred and unified. In italics, the original words in Spanish.

Taken together, the results related to the three secondary objectives allow the main objective of the study to be properly met, indicating that the use of a teacher-created serious game produces positive effects on students' gameplay experience, motivation, and self-perceived learning.

 doi:10.20944/preprints202602.0644.v1

4. Discussion

As previously stated, the study and analysis of these data, in relation to the three secondary objectives (examining playability and experienced performance, analyzing the motivation generated through satisfaction and enjoyment, and analyzing self-perception of the knowledge acquired during the gameplay session), which complement the main objective, have been performed in detail based on the previously presented results, first within each relevant dimension and subsequently as a whole.

Regarding students' playability and performance with *Misterios de Olivenza* (SO1), participants described it as easy to play ($\bar{x}$ = 3.42) and reported no notable problems or difficulties in locating content or answering the questions ($\bar{x}$ = 3.42 and $\bar{x}$ = 3.42, respectively). These assessments appear consistent with the classical position in the literature on the use of video games in education as tools capable of energizing learning and fostering student engagement [1–3], as well as their use across multiple curricular subjects [10,11,15], such as, in this case, Social Sciences. Serious games created by teachers to adapt curricular content to their classrooms therefore seem to have a place among young learners interested in learning or reinforcing knowledge through such tools. Nevertheless, the lack of statistical significance must be acknowledged and considered, as this is a fundamental requirement for drawing conclusions applicable to a larger population.

This interpretation is reinforced by the second dimension (SO2), which examined motivation and satisfaction with the video game. Although no statistically significant values were found, the descriptive results are high, highlighting *Misterios de Olivenza* as a fun and entertaining tool ($\bar{x}$ = 4.25) and indicating that learning through video games is perceived positively ($\bar{x}$ = 4.26). The high indicators for enjoyment and desire to continue playing (all with means close to 4) suggest that such experiences activate students' engagement with the learning process, enabling them to relate to content—formal or informal—in a playful manner and fostering deeper involvement [4,34]. Clear evidence of this is the students' explicit desire to continue playing, stating that the two-hour session was insufficient given the extensive content of *Misterios de Olivenza*.

In the third dimension (SO3), related to the knowledge acquired and the use of educational video games for learning, and despite the limited timeframe, students reported having learned new things ($\bar{x}$ = 4.13) and expressed a strong desire to use video games to reinforce classroom content ($\bar{x}$ = 4.26). As shown by McGowan et al. [24], students' participation in gamified challenges generates ideas and strengthens soft skills and 21st-century competencies [18,20], including learning-to-learn, problem-solving, adaptability, critical thinking, and positive attitudes—all of which are necessary to tackle the questions and challenges presented in *Misterios de Olivenza*. Statistically significant differences were observed, however, between ten-year-old students and those aged twelve regarding their proactivity in seeking information and knowledge when using non-educational video games during their leisure time. The correlational analysis confirms this, with a slight but significant negative value indicating that the older the student, the lower their interest in using video games outside the classroom to learn or maintain a proactive attitude towards new knowledge in commercial games.

To assess the tangible impact of teacher-created serious games on students—the primary aim of this research—the outcomes observed in each dimension and specific target were cross-referenced. A clear, moderately strong positive correlation was found between motivation (second dimension) and self-perceived learning (third dimension); higher motivation was associated with a greater sense of learning, regardless of accessibility or difficulties encountered in problem solving, as anticipated by Moradi and Noor [26] and Vahlo et al. [27].

No significant differences were found, however, in relation to gender concerning difficulty, motivation, or perceived learning. Within the present sample, this variable does not appear to be a determining factor, a finding that contrasts with the age-related results bur aligns with the observations of Manero et al. [6], corroborating their conclusions regarding younger students.

Thus, it is possible to conclude that *Misterios de Olivenza*, as a teacher-created serious game designed to teach Social Sciences and local heritage, functions effectively provided that students are given sufficient time to adapt to the tool (in relation to its difficulty or content), and that detailed

 doi:10.20944/preprints202602.0644.v1

guidance, a user-friendly interface, and all necessary material and digital supports [9]—such as maps and in-game indications—are supplied, along with clear, well defined objectives that do not pressure the learner. This enables students to construct and develop their own strategies for acquiring knowledge autonomously. Interest in the cultural heritage of Olivenza, cultivated through the experience and the didactic tool, was confirmed through the qualitative analysis, where a high proportion of the words used carried a positive connotation, often accompanied by intensifying adverbs and, when responses were elaborated, emphasizing the need for more time or reduced content. The few responses referring to errors or problems during the gameplay session serve as a reminder that the creation of educational video games by teaching staff is an ongoing process, requiring continuous refinement and adaptation for classroom use, gradually improving the medium through which cultural heritage is preserved, disseminated, and studied in digital form.

5. Conclusions, Implications, and Limitations

Based on the results and discussion presented, the educational implications of this study, considering the use of teacher-created educational serious games as effective and valid, center on the need to first understand the classroom requeriments, the object of study, and to ensure that teachers possess both the willingness to use video games for learning and the technical capacity to develop them. However, their use should not be random or generalized; the video game must be integrated into a curricular framework that allocates sufficient time for it to become effective, efficient, and satisfactory for students. Learners must have enough time to construct their own learning and problem-solving strategies (scaffolding) and must always have support available to prevent confusion or disengagement when using the new tool. Support, both material and human, should be universal, although it is highly advisable to reinforce it for older students, who may feel less enthusiastic about using video games in formal educational contexts. Regarding enjoyment and motivation, it is important to highlight the clear relevance of these emotions in shaping students' perception of the experience as useful, reinforcing their desire to use educational video games in their free time and to maintain a proactive learning mindset when playing commercial games not designed for teaching.

There are, however, notable limitations that invite further investigation. The intentional sample (n = 86) within a narrow age range limits the generalizability of the findings to other locations or sociocultural contexts; although *Misterios de Olivenza* yielded positive results among participating students, who showed interest in nearby cultural heritage—often previously unknown—this may not be transferable to other settings. The duration of the experience and the general brevity of participants' qualitative responses, which were short and concise, also prevent a deeper understanding of how students relate to the video game. Furthermore, measuring students' self-perception of learning does not provide evidence of actual learning outcomes, making it impossible to determine, beyond impressions, emotions, and the potential of serious games as vehicles for cultural heritage education, the extent of real learning, transfer, or retention in the medium to long term.

Future research should therefore focus on the real learning effects of teacher-created video games that incorporate heritage related content within Social Sciences. To achieve this, different methodologies could be compared and results measured between groups instructed through different approaches, or knowledge retention could be evaluated after playing *Misterios de Olivenza* (or similar tools) for a sufficient period in longitudinal studies. Likewise, expanding the sample and replicating the experience across different educational levels or socio-economic contexts would allow for a deeper comparison of such effects, improving the generalizability of the findings. Finally, qualitative analysis could be strengthened to better understand students' emotions, and, in parallel, the level of teacher training, interest, and feasibility studies could be examined to assess the current and realistic potential for teacher-created educational video games to be developed and used in classrooms.

 doi:10.20944/preprints202602.0644.v1

Appendix A

Appendix A.1. Validated Questionnaire

Survey: Use of Video Games in Learning History and Social Studies

Sociodemographic Data (circle or write the requested option)

GENDER	*AGE(number)*	*GRADE*
BOY / GIRL / OTHER		

INTRODUCTION

This questionnaire is part of a research project and doctoral thesis on the use of educational video games in the classroom as a learning tool in History and Social Studies.
All collected data are anonymous.

The survey uses a scale based on agreement with the following statements:

1	2	3	4	5
Strongly disagree	Disagree	Somewhat agree	Agree	Strongly agree

This survey evaluates the experience with the video game ***MISTERIOS DE OLIVENZA.***

Playability and accessibility of the video game (mark only one box per question.)

	1	2	3	4	5
1. I believe the video game I tried is easy to play.					
2. I had some difficulty discovering information in the game.					
3. I had some difficulty an-swering the questions in the game.					
4. I believe the video game I tried is visually appealing.					
5. I believe the video game I tried is fun and entertaining.					
6. I wish I had played the video game longer.					

Survey: Use of Video Games in Learning History and Social Studies

	1	2	3	4	5
7. I like being able to find infor-mation at my own pace, even if I must search for it.					
8. I enjoyed learning through video games.					
9. I have learned new things through the video game.					
10. I would like to use video games to learn and reinforce what I'm taught in class.					
11. If I could, I would use video games outside of class to learn more.					
12. When I play non-educational video games (Roblox, Fortnite, etc.), I try to pay attention to see if I can learn something new.					

Retroalimentación de la experiencia y del videojuego

13. What did you think of the experience? Did you enjoy it? Would you change anything?

14. What did you think of the video game you played? Would you improve anything? Did you encounter any error or problem?

References

1. Squire, K. Video Games in Education. *Int. J. Intell. Games Simulation* **2003**, *2*, 49–62.
2. Zyda, M. From Visual Simulation to Virtual Reality to Games. *Computer* **2005**, *38*, 25–32. https://doi.org/10.1109/MC.2005.297
3. Annetta, L. A. Video Games in Education: Why They Should Be Used and How They Are Being Used. *Theory Into Practice* **2008**, *47*, 229–239. https://doi.org/10.1080/00405840802153940
4. Martinez, L.; Gimenes, M.; Lambert, E. Entertainment Video Games for Academic Learning: A Systematic Review. *J. Educ. Comput. Res.* **2022**, *60*, 1083–1109. https://doi.org/10.1177/07356331211053848
5. Núñez-Barriopedro, E.; Sanz-Gómez, Y.; Ravina-Ripoll, R. Los Videojuegos en la Educación: Beneficios y Perjuicios. *Revista Electrónica EDUCARE* **2020**, *24*, 240–257. https://doi.org/10.15359/ree.24-2.12
6. Manero, B.; Torrente, J.; Fernandez-Vara, C.; Fernandez-Manjon, B. Investigating the Impact of Gaming Habits, Gender, and Age on the Effectiveness of an Educational Video Game. *IEEE Trans. Learn. Technol.* **2016**, *10*, 236–246. https://doi.org/10.1109/TLT.2016.2572702
7. Sánchez-Mena, A.; Martí-Parreño, J. Teachers Acceptance of Educational Video Games: A Comprehensive Literature Review. *J. e-Learn. Knowl. Soc.* **2017**, *13*.
8. Lima, S. D. M.; Otero, P. Los Serious Games Son Más Que Juegos. *Arch. Argent. Pediatr.* **2024**, *122*, 11–11. https://doi.org/10.5546/aap.2023-10218
9. Moras, J. M.; Esquerdo, G. S. C. La Jugabilidad Educativa en los Serious Games. *Artediez* **2016**, *10*, 1–23.
10. Laamarti, F.; Eid, M.; El Saddik, A. An Overview of Serious Games. *Int. J. Comput. Games Technol.* **2014**, *2014*, 358152. https://doi.org/10.1155/2014/358152
11. Ullah, M.; Amin, S. U.; Munsif, M.; Yamin, M. M.; Safaev, U.; Khan, H.; et al. Serious Games in Science Education: A Systematic Literature. *Virtual Real. Intell. Hardw.* **2022**, *4*, 189–209. https://doi.org/10.1016/j.vrih.2022.02.001
12. Barbieri, G. G.; Barbieri, R.; Capone, R. Serious Games in High School Mathematics Lessons. *Eurasia J. Math. Sci. Technol. Educ.* **2021**, *17*, em1963. https://doi.org/10.29333/ejmste/10857

 doi:10.20944/preprints202602.0644.v1

13. Morawski, M.; Wolff-Seidel, S. Gaming & Geography (Education). *Eur. J. Geogr.* **2023**, *14*, 1–19.
14. Soyoof, A.; Reynolds, B. L.; Shadiev, R.; Vázquez-Calvo, B. Incidental Acquisition of Foreign Language Vocabulary and Healthcare Knowledge Through Serious Game Play. *Comput. Assist. Lang. Learn.* **2022**, *37*, 27–60. https://doi.org/10.1080/09588221.2021.2021242
15. Bellotti, F.; Kapralos, B.; Lee, K.; Moreno-Ger, P.; Berta, R. Assessment in and of Serious Games. *Adv. Hum.-Comput. Interact.* **2013**, *2013*, 136864. https://doi.org/10.1155/2013/136864
16. Almeida, F.; Simoes, J. The Role of Serious Games, Gamification and Industry 4.0 Tools in the Education 4.0 Paradigm. *Contemp. Educ. Technol.* **2019**, *10*, 120–136. https://doi.org/10.30935/cet.554469
17. Rebah, H. B. The Educational Effectiveness of Serious Games. *Médiations et Médiatisations* **2019**, *2*, 131–155.
18. Cueva, J. P. M.; Guaicha, D. J. M. El Desarrollo de Habilidades del Siglo XXI en la Educación. *Rev. Cient. Innov. Educ. Soc. Actual ALCON* **2025**, *5*, 300–312. https://doi.org/10.62305/alcon.v5i2.502
19. Díaz, M. M.; Lim, J. R. *El Poder del Currículo para Transformar la Educación*. Banco Interamericano de Desarrollo: Washington, DC, 2022.
20. Monroy, N. E. C.; Villamil, Y. P. R. Competencias del Siglo XXI en Educación. *Ciencia Latina Rev. Cient. Multidiscip.* **2023**, *7*, 219–249. https://doi.org/10.37811/cl_rcm.v7i4.6869
21. Gürbüz, S. C.; Celik, M. Serious Games in Future Skills Development. *Comput. Appl. Eng. Educ.* **2022**, *30*, 1591–1612. https://doi.org/10.1002/cae.22557
22. Checa-Romero, M.; Giménez-Lozano, J. M. Video Games and Metacognition in the Classroom. *Front. Educ.* **2025**, *9*, 1485098.
23. Wong, Y. L.; Bothma, T. J. D.; Smith, A. E. Effects of Meaningful Choices in Serious Games. *Int. J. Serious Games* **2024**, *11*, 71–87. https://doi.org/10.17083/ijsg.v11i3.745
24. McGowan, N.; López-Serrano, A.; Burgos, D. Serious Games and Soft Skills in Higher Education. *Electronics* **2023**, *12*, 1432. https://doi.org/10.3390/electronics12061432
25. Horban, O.; Maletska, M. Videogames as Means of Increasing Students' Motivation. *Mod. High. Educ. Rev.* **2019**, *4*, 66–74. https://doi.org/10.28925/2518-7635.2019.4.8
26. Moradi, M.; Noor, N. F. B. M. The Impact of Problem-Based Serious Games on Learning Motivation. *IEEE Access* **2022**, *10*, 8339–8349. https://doi.org/10.1109/ACCESS.2022.3140434
27. Vahlo, J.; Tuuri, K.; Välisalo, T. Exploring Gameful Motivation of Autonomous Learners. *Front. Psychol.* **2022**, *13*, 825840. https://doi.org/10.3389/fpsyg.2022.825840
28. Hyndman, B. Struggle to Use Technology in the Classroom. *The Conversation* **2018**. https://theconversation.com/ten-reasons-teachers-can-struggle-to-use-technology-in-the-classroom-101114
29. Stieler-Hunt, C. J.; Jones, C. M. Feeling Alienated—Teachers Using Immersive Digital Games in Classrooms. *Technol. Pedagog. Educ.* **2017**, *26*, 457–470. https://doi.org/10.1080/1475939X.2017.1334227
30. Kolosovskaya, E.; Yarmoshuk, Y.; Rybaltovskaya, E. *What Is a Video Game Designer?* 2017. https://rep.bntu.by/handle/data/33600
31. Pasqualotto, A.; Parong, J.; Green, C. S.; Bavelier, D. Video Game Design for Learning to Learn. *Int. J. Hum.-Comput. Interact.* **2023**, *39*, 2211–2228. https://doi.org/10.1080/10447318.2022.2110684
32. Romero, E.; Artal-Sevil, J. S. Scratch: A Tool for Learning and Teaching. In *ICERI2021 Proceedings*; IATED: Valencia, 2021; pp 7844–7853.
33. Gravelsina, E.; Daniela, L. Student Teachers' Perceptions of a Game-Based Exam in the Genially App. *Computers* **2024**, *13*, 207. https://doi.org/10.3390/computers13080207
34. Annetta, L. A.; Cheng, M.; Holmes, S. Assessing Twenty-First Century Skills Through a Teacher-Created Video Game. *Res. Sci. Technol. Educ.* **2010**, *28*, 101–114. https://doi.org/10.1080/02635141003748358
35. González, B.; Cortés, P. Diseño y Programación de un Videojuego Educativo. *Rev. Latinoam. Tecnol. Educ.* **2023**, *22*, 155–172. https://doi.org/10.17398/1695-288X.22.1.155
36. López-Fernández, D.; Gordillo, A.; Pérez, J.; Tovar, E. Learning and Motivational Impact of Game-Based Learning. *IEEE Trans. Educ.* **2023**, *66*, 360–368. https://doi.org/10.1109/TE.2023.3241099
37. Gotcha Gotcha Games. *RPG Maker MV* (Version 1.6.2) [Computer software]; 2015. https://www.rpgmakerweb.com

 doi:10.20944/preprints202602.0644.v1

38. Herrero, A.; Roselló, D.; Moll, S. E.; Moraño, J. A.; Sánchez Ruiz, L. M.; Sánchez López, S.; Vega, E.; Moraño, M.; Núñez, A. Aprendizaje Basado en Juegos con Elementos de Rol Empleando RPG Maker MZ. *Modelling Sci. Educ. Learn.* **2023**, *16*, 55–65. https://doi.org/10.4995/msel.2023.18975
39. Dewi, N. L. P. J.; Sujana, I. W. Learning Multimedia Based on RPG Maker MV. *J. Educ. Technol.* **2021**, *5*, 365–374. https://doi.org/10.23887/jet.v5i2.34462
40. Rasyid, A.; Iswari, R. I.; Marwoto, P. The Effectiveness of Mobile Learning RPG Maker MV. *J. Phys.: Conf. Ser.* **2020**, *1567*, 042088. https://doi.org/10.1088/1742-6596/1567/4/042088
41. Wardrip, P.; Gagnon, D.; Mathews, J.; Scianna, J. Jo Wilder and the Capitol Case. *arXiv* **2022**. https://arxiv.org/abs/2210.09433
42. Clarke, S.; Collins, B.; Flynn, D.; Arnab, S. Gamifying the University Library. In *European Conference on e-Learning*; Academic Conferences International: Reading, 2018; pp 721–XIV.
43. Krmnicek, S. NumisGames. *J. Ancient Hist. Archaeol.* **2024**, *11*, 172–177. https://doi.org/10.14795/j.v11i2.1008
44. Viccari, A.; Göllner, R.; Hahn, J. U.; Bardach, L. Limes (The Roman Frontier). In *European Conference on Games Based Learning*; Academic Conferences International: Reading, 2024; pp 839–847.
45. Cruz, M. A. M. O RPG Digital Como Forma de Divulgar o Patrimônio Histórico Cultural. *SBGames* **2022**. https://doi.org/10.5753/sbgames.2024.240343
46. García-Fernández, J.; Medeiros, L. Cultural Heritage and Communication Through Simulation Videogames. *Heritage* **2019**, *2*, 2262–2274. https://doi.org/10.3390/heritage2030138
47. Gufhron, R.; Usman, A. Educational Game Introduction to the North Sumatra State Museum. *J. Artif. Intell. Eng. Appl.* **2025**, *5*, 896–900. https://doi.org/10.59934/jaiea.v5i1.1498
48. Xue, L.; Pierce, E.; Larsen, S.; Oprean, D. Examining Student Responses to Game Layers in Cultural Geography. In *Joint International Conference on Serious Games*; Springer: Cham, 2024; pp 93–107. https://doi.org/10.1007/978-3-031-74138-8_8
49. Bundy, S. L. *Cultural Simulations: A New Approach to Study Abroad Pedagogy*; Doctoral Dissertation; Morehead State University, 2020; ProQuest.
50. Pretelín-Ricárdez, A.; Beltrán-Alvarado, E. Algunos Aspectos para el Diseño de Videojuegos para Patrimonio Cultural. *Patrimonio Digital* **2021**, *187*.
51. Hair, J. F.; Black, W. C.; Babin, B. J.; Anderson, R. E. *Multivariate Data Analysis*; Pearson: London, 2010.
52. Hulin, C.; Netemeyer, R.; Cudeck, R. Can a Reliability Coefficient Be Too High? *J. Consum. Psychol.* **2001**, *10*, 55–58.
53. Ursachi, G.; Horodnic, I. A.; Zait, A. How Reliable Are Measurement Scales? *Procedia Econ. Finance* **2015**, *20*, 679–686. https://doi.org/10.1016/S2212-5671(15)00123-9