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Research Article

Gamification in Geography. Use, appropriateness and proposals according to university students in Spain



- ¹ University of Valencia, Spain
- ² University of Alicante, Spain

☑ Correspondence: alvaro.morote@uv.es

Abstract: Gamification awakens interest and motivation for teaching Geography. The objective of this study is to analyse the use, appropriateness and proposals according to university students in Spain. Methodologically, we surveyed 125 students (Geography, History, Humanities) in the subject "Geography of the world regions" (2022-2023). The results indicate that both the knowledge of the meaning of gamification and of the learning resources is low. Respondents report a limited use of gamification (56.8% in schools and 55.8% in universities). With respect to the appropriateness of gamification, the opinions are notably positive (for example, serves as an ideal tool to assist students in mastering course materials). However, regarding the student proposals, the half of the participants (52.0%) do not mention any proposals which may limits the application of this innovative technology in the instruction of university level Geography courses.

Keywords: gamification; appropriateness; educational resources; university students; geography

Highlights:

- •Gamification awakens interest and motivation for teaching Geography.
- •The knowledge of the meaning of gamification and of the learning resources is low.
- •The appropriateness of gamification is notably positive (assist students in mastering course materials)

1. Introduction

Geography university studies in Spain encounter different problems (Correa et al., 2024). One is the small number of students enrolled (Sebastiá & Tonda, 2018; Souto, 2018). There is also a structural problem which is manifested on an international level (D'Agostino & Santus, 2022; Kidman, 2018; Murphy, 2018), even in countries such as the United Kingdom where this discipline has traditionally enjoyed considerable prestige (Butt & Lambert, 2014). The majority of researchers agree that it is due to the perception of students of how this subject is taught (Fraile-Jurado & Periáñez-Cuevas, 2023). In general, it is characterized by being a discipline which is trained with traditional methodologies (lectures or lessons, memorization and an excessive use of the school textbook) (D'Agostino & Santus, 2022; Espinoza, 2022; Guasch, 2020; Santiago, 2005). In Spain, this has led to its representation as a subject that does not motivate students and a science that has little use in daily life and limited job prospects (Morote & Hernández, 2022).

For this reason, the learning/teaching resources currently in use is vitally important to examine how the students who study Geography are currently learning this science (Almelweth, 2022). Therefore, Geography graduates who go into teaching in the future are likely to use the same methodologies and resources in their classes as those that were used when they studied at school and university (Morote & Hernández, 2021).

According to gamification, Pegalajar (2021) explains that "is understood as an innovative methodological strategy that incorporates strategies, dynamics, mechanics and elements typical of games into the teaching-learning process" (p. 169). It is a widely recognized definition in the academic world (Attali & Arieli-Attali, 2015; González et al., 2016; Werbach, 2012).

With respect with teaching/learning resources, gamification and game-based learning has become one of the most motivational methodologies in teaching in general (Chetan et al., 2018; Mora et al., 2016; Ortiz et al., 2018; Pegalajar, 2021; Roa et al., 2021; Zeybek & Saygı, 2024) and in Geography in particular (Casado & Castro, 2017; Corrales & Garrido, 2021; Fraile-Jurado & Periáñez-Cuevas, 2023; Ye et al., 2021). However, recent publications in Spain indicate how the use and application of gamified resources in Geography at the university level is still low (Morote & Hernández, 2022). For example, these authors have shown how some teachers are even reticent to use gamification in university studies (the 55.8% of teachers do not use this methodology). Ortega (2020) explains that this is because teachers (active and in training) still have a very limited knowledge of these methodologies. However, it is appropriate to raise the issue of gamification as a teaching tool in university teaching. For example, incorporating gaming technology (Farber, 2016) was a response to the necessity to sustain student interest in on-line learning during the COVID-19 pandemic.

Besides, it would be insightful to explore the accessibility of these technologies in different educational settings. Factors such as economic disparities, infrastructural limitations, and varying levels of technological literacy can significantly impact the effectiveness of gamification strategies. Addressing these factors would provide a more holistic view of the challenges involved in implementing gamification.



This study seeks to address the following research questions: 1) what do the students know about the meaning of gamification and gamified resources?; 2) are gamification being used to teach geographic content in pre-university and university studies?; 3) what is the appropriateness of the gamification for teaching Geography in the university?; and 4) what gamified resources do students propose?

2. Literature Review

On an international level (particularly in the English-speaking world), the study of the implications of gamification in teaching Geography is an issue that has been analysed for decades (Walford, 1969; 1981). However, there is currently an increasing interest in this line of research, particularly due to the emergence of the new technologies (video games, for example) (Farber & Schrier, 2017). Among reference authors on gamification and game-based learning, it is worth highlighting, for example, the works of Farber (2016), Farber & Schrier (2017), Gee (2005) or McGonigal (2011). Therefore, the interest in gamification has led different authors to review the scientific literature on this topic (Breda, 2018; Dicheva et al., 2015; Kastens et al., 2010; Lozada & Betancur, 2017; Pascuas et al., 2017; Prieto & Álvarez, 2021).

With reference to the use of gamification in the educational context, teachers should pay particular attention to the design, approach and implementation of this methodological strategy (Oliva, 2017). In this respect, Aldemir et al. (2018) have verified the high degree of acceptance of gamification by students if the game is designed correctly. Therefore, as indicated by Kokkalia et al. (2017) and Egea and Arias (2020), gamification should not be confused with the simple adaptation of a game to the teaching content. It is necessary to develop incentives in students, because otherwise it is just "playing" and not a teaching methodology.

Secondly, respect to the appropriateness of gamification, studies such as Lee and Hammer (2011) and Morote and Hernández (2022) are illustrative, focusing on the importance of teaching with this methodology at schools and in the university. It is also worth mentioning the one carried out by Rivero (2017) which examines the training of teachers of social sciences (school stage), or that of Prieto et al. (2014) which focuses on the use of gamification in university studies (Medicine) or Morote and Hernández (2022) in Geography.

In relation with the motivation of the students, different authors (Chu & Hung, 2015; Fraile-Jurado & Periáñez-Cuevas, 2023; González & Blanco, 2008; Marín et al., 2019) show that the use of gamification improves their motivation and academic performance. This is explained by the fact that the use of gamified resources in Geography implies a change in the traditionally used methodology. That is, we move from a traditional methodology based on the use of the school textbook and master class to a more dynamic tool, where problem solving, flipped class or group work becomes more relevant.

Other works focus on its impact. Pascuas et al. (2017) presents a systematic review of the literature related to gamification in order to identify the impact it has on learning processes in the field of education. These authors demonstrated that, from the studies consulted, gamification increase the motivation and participation of the students. García et al. (2016) explain that gamification becomes a powerful tool for increasing student attention and motivation and allows new technologies to be incorporated in the classroom setting from a very early age (preschool stage; 3-4 years old). Virtual platforms are commonly used, in which students assume a specific role and enjoy being fully immersed in a story (García et al., 2016). In particular, the student develops skills in cooperation, group work, problem solving, etc., moving away from the meaningless memorization with which Geography has traditionally been taught. Marrón (2005) explains that game-based methodology, in addition to being highly motivating, constitutes a particularly suitable means to develop in the individual a wide range of capacities in the three areas of knowledge (conceptual, procedural and attitudinal) and effectively contributing to their socialization.

Moreover, gamification favours the predisposition of the students to achieve certain competences and skills necessary for their professional development (Kapp, 2012; Pegalajar, 2021; Ryan et al., 2006; Zichermann & Cunningham, 2011). Other authors point out other advantages, such as the improvement in the commitment of the students to learn and their involvement in the process (Alhammad & Moreno, 2018; García et al., 2016; Çakıroğlu et al., 2017).

Thirdly, in relation with studies about proposals, in Geography, it should be noted different publications conducted by Casado and Castro (2017), Crespo & Hernández (2022), Khuen (2021), Rodríguez-Domenech and Gutiérrez (2016), Suárez and Sierra (2023) or Ye et al. (2021). It is also worth highlighting in relation to the proposals, the works in recent years on video games (Fraile-Jurado & Periáñez-Cuevas, 2023; Rodríguez-Hoyos & Joao, 2013). For example, Fraile-Jurado and Periáñez-Cuevas (2023) investigates the effectiveness of innovative teaching strategies designed to enhance student motivation and engagement in a compulsory Physical Geography of the Iberian peninsula course taught to first-year history students at the University of Seville (Spain).

3. Methods

3.1. Research design

This research is a correlational and explanatory study (not experimental) (Pérez-Castaños & García-Santamaría, 2023), based on the use of a mixed questionnaire (quantitative and qualitative) as an instrument for gathering information (Moreno-Vera et al., 2021; Pardo et al., 2015). With respect to the time dimension, the design is transversal (Colás & Buendía, 1998), as the information obtained has been compiled at specific moment (academic year 2022-2023) in the University of Alicante (Spain).

3.2. Context and participants

The participants are students enrolled in the subject "Geography of the world regions" (academic year 2022-2023) in the University of Alicante (Spain). This subject is taught in the first year of three different degrees (Geography and Territorial Planning, History, Humanities) and to four groups. With regard to the context of this subject, it focuses on analysing the knowledge of the different regions of the world, of their internal relations and the processes that help to understand their current complexity. This subject seeks to offer the students basic training in essential aspects of regional Geography to help them understand the different elements that define these areas and their relations with other territorial contexts.

The selection of the students was carried out through non-probabilistic sampling (available or convenience sampling) (McMillan & Schumacher, 2005). The total number of students enrolled for the year 2022-2023 was 219. To select the sample, a confidence level of 90.0% and error margin of 5.0% were taken into account. Considering these estimates, a minimum of 122 students had to take part in order for the sample to be representative. Finally, 125 students completed the questionnaire.



With respect to age, the average age is 20.9 years. In terms of gender, more than half are men 55.2% (n=69). In relation to the university degree in which the students are enrolled, the sample is made up of students of: History (72.0%; n=90); Geography (15.2%; n=19); and Humanities (10.4%; n=13). According to the latest report published in 2019, these data correspond to normal values. The average number of first-year students enrolled in Geography degree in Spain amounts to 31.4 (data from 22 universities) (Asociación Española de A6019).

3.3. Research instrument

For this study, we used a validated questionnaire (quantitative and qualitative) that has been used in previous studies (Morote & Hernández, 2021). The questionnaire has a total of 43 items and is structured into four sections: 1) socio-educational characteristics; 2) memories of school Geography; 3) representation of the Geography discipline; and 4) the didactic potential of Geography in today's world. Taking the proposed objectives in this research, it was analysed the items related to gamification (Section 2): items 26 and 27 (specific objective n. 1), 28 and 29 (specific objective n. 2), 30 and 31 (specific objective n. 3), and 32 (specific objective n. 4) (see Table 1).

To corroborate the internal consistency and reliability, Cronbach's Alpha test has been used of the items analysed in this study (items 26, 27, 28, 29, 30, 31 and 32). Cronbach's Alpha test shows an acceptable internal consistency and the appropriateness of the instrument (α =0.824) for the proposed study (Gómez-Trigueros & Yáñez, 2021).

Table 1. Items of the questionnaire analysed Note: Answer Likert scale from 1 to 5, where 1 is "completely disagree" and 5 "completely agree".

Item (nº)	Type of response
- Item 26. "Do you know the meaning of gamification?"	- Item 26. Answer Likert Scale (1-5).
- Item 27. "Do you know any gamification resources to support student learning in Geography?"	- Item 27. Answer Likert Scale (1-5).
- Item 28. "Did you use gamification in your Geography classes at school?"	- Item 28. Answer Likert Scale (1-5).
- Item 29. "During your training as a geographer (during your degree), have the teachers used gamification?"	- Item 29. Answer Likert Scale (1-5).
- Item 30. "Does gamification help teachers to teach in a more engaging way to support student learning?"	- Item 30. Answer Likert Scale (1-5).
- Item 31. "Do you consider that gamification is an appropriate tool for the subject of "Geography of the world	- Item 31. Answer Likert Scale (1-5).
regions?"	
- Item 32. "What games would you propose for working with in the subject of "Geography of the world regions?"	- Item 32. Open answer.

3.4. Procedure

The questionnaire was administered in the first session of the subject (second semester) and with a response time of 25 minutes (week 1 to 4 of February 2023). The study was carried out in accordance with the directives of the Helsinki Declaration (Declaration of the World Medical Association), guaranteeing the ethical and philosophical commitment and unwavering respect of human dignity, privacy, physical and moral integrity and the protection of personal data in the use of the survey throughout the research. The privacy regulations were fulfilled, taking into account the personal data protection code (Organic Law 3/2018) and also those of anonymity and informed consent (Castellví et al., 2023; Hirsch & Navia, 2018).

3.5. Data analysis

The data analysis was at the item level. The program SPSS v. 28 was used to analyse the data and a statistical-inferential analysis was conducted and interpreted (non-parametric tests) of frequencies and percentages. In order to carry out the non-parametric tests, the Kruskal-Wallis H test was used when it was necessary to relate nominal variables (degree in which the students were enrolled) with ordinal variables of more than two independent samples (items 26, 27, 29, 30 and 31).

Furthermore, the Chi-squared test (x^2) was used when it was necessary to relate nominal variables (degree in which the students were enrolled) with Item 32 ("proposals"), following the procedure of other studies (Gómez-Trigueros & Ruiz, 2017; Moreno-Vera et al., 2021). With respect to the answers of the last item ("proposals"), the respondents' answers have been grouped according to the category of the resource proposed. The categorization of these resources was done according to themes (see Table 6). In this way, we proceeded to categorize these responses (n = 60) into large sets (a total of 5 categories): simulation games, questions game, groups dynamics, interactive maps and war games.

4. Results

4.1. Knowledge about the meaning of gamification and of the resources

The first of the items analysed was related to the meaning of gamification (Item 26). The results obtained show that there is disparity in the students' opinions. In terms of the number of answers, there is a prominence of the students answering with a value of "1" (36.0%; n=45; "completely disagree") (see Table 2). But from the analysis of the results, it becomes clear that the percentage of those who indicate that they know it

(answers "4" and "5": 40.0%; n=50) shows similar values to those of answers "1" and "2" (41.5%; n=52). The observation of the answers of the students (Geography, History, Humanities) shows how there are practically no differences (see Table 2).

Second, the knowledge of the student regarding gamified resources was analysed (Item 27). The results show that more than a half of the participants do not know gamified resources for teaching Geography: the sum of value "1" and "2" amounts to 59.2% (n=74) (Table 3). In order to verify whether there are statistically significant differences in terms of the discipline in which the students are trained, the Kruskal-Wallis H test has been carried out. This test indicates that there is no significance (Kruskal-Wallis H = 3.502; p=0.174).

Table 2. Item 26. "Do you know the meaning of gamification?"

Note 1: Answer Likert scale from 1 to 5, where 1 is "completely disagree" and 5 "completely agree". Note 2: statistical test: Kruskal-Wallis H = 0.378; p= 0.828.

Degree		1	2	3	4	5	Total
History	n	33	6	15	20	19	93
	%	35.5%	6.5%	16.1%	21.5%	20.4%	100.0%
Geography	n	7	1	5	4	2	19
	%	36.8%	5.3%	26.3%	21.1%	10.5%	100.0%
Humanities	n	5	0	3	2	3	13
	%	38.5%	0.0%	23.1%	15.4%	23.1%	100.0%
Total	n	45	7	23	26	24	125
	%	36.0%	5.6%	18.4%	20.8%	19.2%	100.0%

Table 3. Item 27. "Do you know any gamification resources to support student learning in Geography?"

Note 1: Answer Likert scale from 1 to 5, where 1 is "completely disagree" and 5 "completely agree". Note 2: statistical test: Kruskal-Wallis H = 3.502; p= 0.174.

Degree		1	2	3	4	5	Total
History	n	42	12	19	12	8	93
	%	45.2%	12.9%	20.4%	12.9%	8.6%	100.0%
Geography	n	5	4	7	2	1	19
	%	26.3%	21.1%	36.8%	10.5%	5.3%	100.0%
Humanities	n	7	4	2	0	0	13
	%	53.8%	30.8%	15.4%	0.0%	0.0%	100.0%
Total	n	54	20	28	14	9	125
	%	43.2%	16.0%	22.4%	11.2%	7.2%	100.0%

4.2. The use of gamification and their appropriateness for teaching Geography

In order to determine the use of gamification in Geography classes (both in schools and universities), items 28 and 29 were analysed. With respect to the former, the results obtained indicate that more than a half of the students did not use these types of resources during their schooling



(see Figure 1). 56.8% of the students (n=71) answered with value "1" (completely disagree). This shows that, for the case of Geography in schools, its use in the twenty-first century is still very low.

With respect to the use of gamification by university teachers to teach Geography (Item 29), the results show that about half of the students affirm that they have not used these resources at the university stage (55.8%; n=66) (see Figure 2). In order to verify whether there are statistically significant differences in terms of the discipline in which the students are trained, the Kruskal-Wallis H test has been carried out. This test indicates that there is no significance between the disciplinary training of the students (Kruskal-Wallis H = 5.628; p= 0.06).

Figure 1. Item 28. "Did you use gamification in your Geography classes at school?".

Note 1: Answer Likert scale from 1 to 5, where 1 is "completely disagree" and 5 "completely agree". Note 2: statistical test: Kruskal-Wallis H = 5.728; p= 0.06.

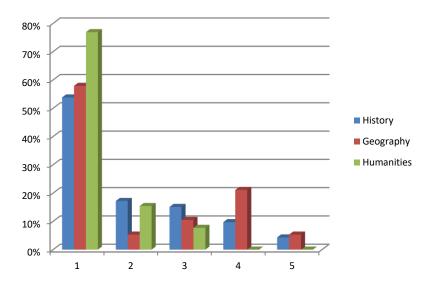
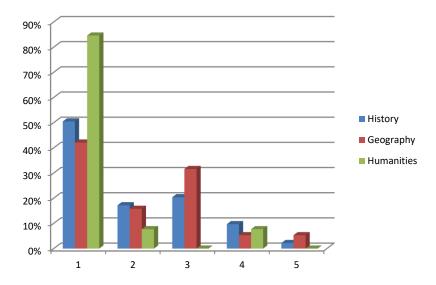


Figure 2. Item 29. "During your training as a geographer (during your degree), have the teachers used gamification?" Note 1: Answer Likert scale from 1 to 5, where 1 is "completely disagree" and 5 "completely agree". Note 2: statistical test: Kruskal-Wallis H = 5.628; p= 0.06.



With respect to the results on gamification and its appropriateness for teaching Geography, items 30 and 31 have been analysed. The first ask "Does gamification help teachers to teach in a more engaging way to support student learning?". The data obtained are disparate, but indicate a "positive" response of the sample as a whole: if the values "4" and "5" are added they amount to 47.2% (n= 59) (see Table 4). When analysing the appropriateness of these resources, and more specifically for the case of the subject object of this study (Item 31 "Do you consider that gamification is an appropriate tool for the subject of "Geography of the world regions?"), the results show that half of the participants answered positively: the sum of the values "4" and "5" represent 50.4% (n=63), while a minority (the sum of values "1" and "2") amount to 20.0% (n=25) (see Table 5). In order to verify whether there are statistically significant differences in terms of the discipline in which the students are trained, the Kruskal-Wallis H test has been carried out. This test indicates that there is no significance between the disciplinary training of the students (Kruskal-Wallis H = 1.740; p= 0.419).



Table 4. Item 30. "Does gamification help teachers to teach in a more engaging way to support student learning?" Note 1: Answer Likert scale from 1 to 5, where 1 is "completely disagree" and 5 "completely agree". Note 2: statistical test: Kruskal-Wallis H = 1.029; p= 0.598.

Degree		1	2	3	4	5	Total
History	n	13	9	25	26	20	93
	%	14.0%	9.7%	26.9%	28.0%	21.5%	100.0%
Geography	n	4	2	5	6	2	19
	%	21.1%	10.5%	26.3%	31.6%	10.5%	100.0%
Humanities	n	4	1	3	0	5	13
	%	30.8%	7.7%	23.1%	0.0%	38.5%	100.0%
Total	n	21	12	33	32	27	125
	%	16.8%	9.6%	26.4%	25.6%	21.6%	100.0%

Table 5. Item 31. "Do you consider that gamification is an appropriate tool for the subject of The Geography of the World Regions?" Note 1: Answer Likert scale from 1 to 5, where 1 is "completely disagree" and 5 "completely agree". Note 2: statistical test: Kruskal-Wallis H = 1.740; p= 0.419.

Degree		1	2	3	4	5	Total
History	n	10	3	31	27	22	93
	%	10.8	3.2	33.3	29.0	23.7	100.0
Geography	n	5	2	4	4	4	19
	%	26.3	10.5	21.1	21.1	21.1	100.0
Humanities	n	3	2	2	1	5	13
	%	23.1	15.4	15.4	7.7	38.5	100.0
Total	n	18	7	37	32	31	125
	%	14.4	5.6	29.6	25.6	24.8	100.0

4.3. Proposals made by students of resources for teaching Geography based on gamification

With respect to the proposals made by the students (Item 32), the results indicate that about a half of the respondents propose resources to the subject of "Geography of the world regions" (48.0%; n=60) (see Figure 3). Three types of games can be highlighted: 1) question games (through questionnaires) (16.0%); 2) interactive map games (12.0%); and 3) war games (12.0%). With respect to the former, online games such as Kahoot, Quizz or Edu365 particularly stand out. For the case of map-based games, the students have proposed Map Quiz Game, Seterra or Capitals of the World Quiz (Table 9). There is more variety in the proposals of war games: Crusader Kings, Total War Saga, Europa Universalis, Clash of Clans, Rise of Kingdom, Civilization VI, El Risk or Grand Strategy. In order to verify whether there are statistically significant differences in terms of



the discipline in which the students are trained, the Chi-squared test has been conducted. This test shows that the association between these two variables (disciplinary training and proposals) is not significant (Pearson Chi-squared = 6.925; p = 0.732).

Figure 3. Item 32. "What games would you propose for working with in the subject of the Geography of the World Regions?" Note: statistical test: Pearson Chi-squared= 6.925; p = 0.732.

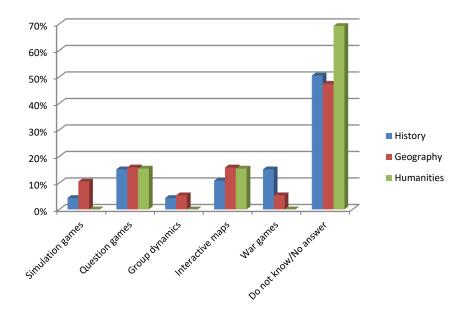


Table 6. Responses of the students about the different proposals related to gamification resources (Item 32)

Typology/categories of gamified resources		Resource characteristics	Resource example (games)		
1.	Simulation games	Games in which the respondents use interactive maps with which they can interact in different real virtual scenarios.	-"Visual recognition games" (student n.2; Geography) -"Geoguesser" (student n.6; History) -"Geoguesser" (student n.101; Geography)		
2.	Questions games	Games with questions about Geography concepts as a contest.	-"Quizlet, kahoot" (student n.4; Geography) -"Games for guess flags and their respective places" (student n.5; History) -"Word passing games to learn concepts" (student n.52; Humanities)		
3.	Groups dynamics	Game-based learning methodologies in non-ludic environments and character- ized by group work to solve a problem.	-"Do group dynamics with students" (student n.3; Geography) -"I would like to do exercises to create our regional maps, whether they are real or invented as a group" (student n.98; Geography) -"Play group games" (student n.124; History)		
4.	Interactive maps	Digital cartography that can be used in class and that the teacher can use as a game with the students.	-"Using electronic world maps" (student n.16; Geography) -"Didactic map games to name the regions" (student n.58; History) -"Using interactive maps" (student n.59; Geography)		
5.	War games	Virtual games in which the players (individually or in groups) have to conquer territories, manage natural and economic resources, etc.	-"Crusader Kings 2 and 3, and the Europe Universalis IV" (student n.25; Geography) -"Clah of clans, Rise of Kingdom" (student n.48; History) -"The Risk" (student n.48; Geography)		



5. Discussion

This study analyses the opinion of university students with respect to gamification and its use in the teaching of Geography. Due to the scarce studies on this topic in Spanish Geography, this research advances the knowledge about this methodology for their application, in this case, in university studies. In our research, in relation to the discipline in which the students are trained (Geography, History or Humanities), we obtained that the statistical tests show that there are no statistically significant differences in all the items.

In relation to the starting research questions, the first was "What do the students know about the meaning of gamification and gamified resources?". It has been established that about half of the students do not know the meaning of this word or identify gamified resources. The second research question was "Are gamification being used to teach geographic content in pre-university and university studies?". It has been established that for the case of the school stage, 56.8% of the students answered with a value of "1" (it does not use gamification) and 55.8% of respondents gave this value for the university level.

With respect to the use of the different resources used in Geography at the school level, Morote and Hernández (2022) indicate that digital cartography, gamification and the use of ICTs (Information and Communication Technologies) obtain disparate frequency data (both in high and low frequency). This can be explained by the fact that some teachers are introducing these resources into their classes while others continue to be reticent to use them, as found by Moreno-Vera and Vera (2017). Morote and Hernández (2021) indicate that, according to the opinion of students in regard with their memories of their schooling, the main resources used were: the school textbook (85.7%), maps (physical and political) (85.0%) and graphs and statistics (68.4%), coinciding with the classical didactic material in Geography classes (Kidman, 2018; Parra & Morote, 2020; Straforini, 2018). Morote and Hernández (2021) also explain that gamification is a resource that is not in high demand among students. The results obtained in the aforementioned research corroborate the moderate use of gamification in both school and university studies; also reflecting the still high use of other more traditional teaching resources.

Regarding study limitations, it is worth highlighting the contents of the subject. It is a regional Geography subject, traditionally associated with memorization and the reproduction of contents at least in the pre-university educational stages. With this study, it has been found that gamification continues to be considered as a scarcely used resource in the teaching of Geography at university level (D'Agostino & Santus, 2022; Espinoza, 2022).

In relation to the appropriateness of gamification (third research question), the results show average results. In this respect, it should be noted that half of the participants have answered with values in favour of using these resources and as an appropriate methodology for teaching Geography in the subject "Geography of the world regions". However, despite the results obtained in this research, other authors highlight the potential of gamification for teaching as these resources increase the motivation and performance of students (Alhammad & Moreno, 2018; Archilla & González, 2021; Çakıroğlu et al., 2017; Chu & Hung, 2015; González & Blanco, 2008). For example, in Geography, Marrón (2005) believes that in order to achieve positive results it is essential to develop intrinsic motivation towards learning in students. To do this, nothing better than resorting to the activity most desired by children and teenagers: the game. Although more than twenty years have passed since its publication, these statements are still valid today in Spain and, specifically, in Geography studies.

The study of Corrales and Garrido (2017), in relation with gamification and Sustainable Development Goals (SDGs), also show the increase of the motivation of the students and the knowledge of these contents with the use of gamified resources, because they learn Geography in a different way than the traditional one, and in it the student's participation is more active and not a passive recipient of content. Other authors, such as Gómez-Trigueros and Ruiz (2017), find improvements in teaching and learning processes at the higher levels of education (post-graduate), which, in turn, increases the motivation of the students and their performance. Archilla and González (2021) also corroborate the increase in performance and satisfaction in the teaching-learning process of those students who have worked with gamified resources.

In relation to proposals (forth question: "What gamified resources do students propose?"), this study finds that 48.0% of the respondents proposed different games and methodologies based on game-based learning. As previously mentioned, "Geography of the world regions" is a subject of regional Geography associated with the use of traditional didactic tools and one which is considered to have limitations in the implementation of these resources. This is corroborated by the data obtained in the question on the appropriateness of gamification (Item 31) in which average values ("3") predominate. The main types of games to be applied to Geography at the university level proposed are: questionnaire games, interactive maps and war games (historical games). In regard with these results, it is important to highlight that the use of location-based games as a tool for education within Geography would be beneficial – such games seem to be the best placed for teaching key geographical skills e.g., navigation, map-use.

Respect to the proposals of other authors, Casado and Castro (2017), contextualized in the area of social sciences, presents an experience based on the use of gamification. It combines a game, based on the well-known children's television series "Where is Carmen Sandiego?", with the development of content related to Geography. The students transform each week into detectives and try to catch the suspect of a robbery that leaves clues for the different places of the world Geography that they will visit. During the tour, students must collect information, compare it and make decisions about the next destination. Other studies such as the one carried out by Ye et al. (2021) present an experience of first-year students played a couplet game. In a first step, each student has to summarize and write individual opinions about human Geography in one keyword. Subsequently, the teacher wrote a couplet matching keyword. Analysing couples of words, the students showed an improved understanding of human Geography. According to these authors, the use of this game favoured students' creative and independent thinking.

Respects to war games are, on the whole, virtual games in which the players (individually or in groups) have to conquer territories, manage natural and economic resources, etc. In other words, they imply interpretation and knowledge of the assigned territory and the control or defeat of the rest of the players.

In our study, as the majority of students come from the History Degree (72.0%), it is important to highlight the responses linked to "historical games". For example, McCall (2016) explains that the literature on this subject (historical games) is scattered, making it difficult for educators considering the use of historical games. Other authors insist on the time frame in which these tools are used: while games and simulations with historical themes have been used in the classroom for more than 50 years (Chin et al., 2009; Duke, 2000; Stasz, 1995), the use of story thematic video games as tools in the classroom have developed more steadily in recent decades (Corbeil, 2011). For example, Weir and Baranowski (2011) consider the game called "Civilization" as a tool for teaching about international relations. Based on its use, it is defined how "civilization" shapes concepts of international relations and historical processes.



Wainwright (2014) analysed the use of "Civilization IV" and other games in the subject History in video games to assess their suitability for studying historiography and the theories of historical development. To do this, he examines these games based on seven questions: Game Mechanics, Economy and Environment, Cultural Bias, World Systems and World History, Determinism and Contingency, Combat and Brutality, and Gender. From surveys and informal observations, he concluded that the games effectively illustrated complex themes. He also found it educationally valuable to have students critique each game's models in discussions and writings. He also found it educationally valuable to have students critique each game's models in discussion and writing. McCall (2014) provided a case study of "Rome: Total War" and "Civcity: Rome" in a ninthgrade ancient world history class. He used this study to illustrate guidelines for implementing simulation game lessons in history classes. In these games, map interpretation and decision-making are competencies that the students should develop; many of them developing in real historical contexts (civilization and specific era, real events, etc.) They are highly interesting for the case of Geopolitics (Khuen, 2021). Having used these resources and more specifically linked to specific typologies such as war or location games in pre-university education may explain why they are those identified by the respondents in this study. It should not be forgotten that they are first-year students and their memories about methodologies have a strong connection with this stage than with the recently started one (university studies).

In social sciences, Rodríguez-Domenech and Gutiérrez (2016) found that the use of video games helps the students to maintain their attention on the subject of social sciences and favours the execution of the activities proposed. However, for teaching of Geography, some students still perceive that resources based on games are not appropriate to apply in Geography (Rodríguez-Domenech & Gutiérrez, 2016). Respect to video games, different authors have debated on their use and application in the classrooms (Farber & Schrier, 2017; Pegalajar, 2021; Rodríguez-Hoyos & Joao, 2013). Rodríguez-Hoyos & Joao (2013) indicate that video games do not represent a resource to reinforce the knowledge of the students "per se", but that the most important factor is the methodology used for their use in the didactic process. Gee (2005) explain that the main impediment to implementing the use of video games in formal education is cost. This author argument that "however, is not only (or even so much) monetary cost. It is, importantly, the cost of changing minds about how and where learning is done and of changing one of our most profoundly change-resistant institutions: the school" (p. 1).

Fraile-Jurado and Periáñez-Cuevas (2023) consider the influence of video games in teaching Geography to history students. This study investigates the effectiveness of innovative teaching strategies designed to enhance student motivation and engagement in a compulsory Physical Geography of the Iberian Peninsula course taught to first-year history students at the University of Seville (Spain). Their findings provide valuable insights into how video games specifically, as a subset of gamification, can be effectively integrated into Geography education. Some students choose to enhance their submissions by inventing a narrative surrounding the identified landscapes, such as a story of a traveller writing to their king, describing the unknown lands, landscapes, and resources encountered, showcasing their geographical knowledge, and fostering a deeper appreciation for the interplay between environment and human experiences. Typically, the games that students play are titles such as the Assassin's Creed, Far Cry, Elder Scrolls, and Grand Theft Auto franchises. And the authors said, this research could help bridge the gap between general gamification strategies and specific applications within the field of Geography.

6. Conclusions

The results obtained strongly indicate that this constitutes a first approach to a complex issue and context. The contrasting results (similar percentages obtained in responses with great acceptance and low acceptance) obtained in many of the responses corroborate this fact. The statistical test concludes that the results obtained do not depend on disciplinary training as we thought (Geography, History, Humanities). There is not a predominant answer, for example, 40.0% of students did not know the meaning of "gamification", but at the same time another 40.0% of students did know. It can be related to the fact that its use in pre-university education also presents opposed results; that is, teachers who use it versus others who reject it. Among possible factors that explain this "resistance" it is worth mentioning: 1) the poor training of teachers in the use of this methodology and resources (Morote & Hernández, 2021); and 2) the little "apparent" usefulness of gamification for the subject under study linked to the difficulty of its implementation and the predominance of other teaching methodologies (master class and Information and Communications Technologies –ICT-) (Moreno-Vera & Vera, 2017).

A limitation of the research is that we have analysed the perception that university students have about the use of gamification in a specific subject and grade. Also, regarding the sample, it is the reduced number of Geography students (n=19), although in a larger sample as it is made up of all students enrolled in this subject (n=125). One of the challenges of this research is to continue analysing and administering this questionnaire. The objective is, on the one hand, to increase the available sample in order to corroborate/compare the results obtained during this academic year; and, on the other hand, to examine in greater depth whether the disciplinary training of the students could have influenced the answers, which could be the case of the proposals of the students. Although they are first-year students, their answers about the methodologies may be due more to those used during Secondary Education and Baccalaureate than to the degree they study at the university, since the subjects are common in the first academic year at three degrees (History, Humanities and Geography).

The results show that there are no significant differences in the responses depending on the grade in which they are enrolled. The continuation of this line of research would allow results to be obtained with a broader universe of students, which would allow us to corroborate whether the results obtained are maintained over time and changes are recorded as these teaching methodologies are implemented more. Additionally, it will be interesting analysing on the long-term impacts of gamification on students' knowledge and skills development, even in other subjects if no studies about Geography are available. This includes examining whether gamified learning provides lasting benefits or primarily boosts short-term engagement.

Geography cannot be taught in class with these methodologies and resources if the teacher does not know it. The factors that contribute to the adoption to teaching faculty's adoption or rejection of gaming technology as a learning resource has not been investigated in this paper since the students were asked about their opinion about this methodology. We think that it would be an issue to consider in future research in which surveys and/or interviews will be carried out with teachers.

The use of these methodologies and resources is a matter of teacher training and in their creativity to teach Geography (university and school) through these tools. Therefore, it is necessary to train teachers in these resources. This would make it possible to increase its use in pre-university and university studies. Better training would probably determine that it was a resource considered more appropriate and used by a greater number of teachers. Besides, from the point of view of policy makers, it would be convenient, on the one hand, to organize courses aimed at new teaching methods and, on the other, for teachers to carry out a training course in this methodology. Many Geography students go on to



careers as secondary school teachers. Efforts on this population may be a potential solution. If future teachers are exposed to effective use of games during their university courses, they may be more inclined to use games in their own teaching.

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