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PRE-SERVICE TEACHERS' PERCEPTIONS OF EDUCATIONAL ESCAPE ROOMS

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Abstract

Using games as an educational strategy stimulates participation and collaboration, thereby impacting the development of competencies. Escape rooms (and escape games) are cooperative games in which players must discover clues, solve puzzles, and complete tasks within a limited time. Escape rooms are becoming increasingly relevant in education and are associated with motivation. The goal is to escape from a room (or access a treasure). In this study on educational escape rooms, we analysed students' perceptions (N = 34) after participating in an escape room experience, inquiring about its educational usefulness, and looking for relationships with other variables. A questionnaire was also administered for this purpose. The results revealed a positive view, highlighting this recreational proposal's attractiveness. Previous experience with recreational games influences students' perceptions, and those with less experience may show reservations. In conclusion, teachers are increasingly interested in training to incorporate escape rooms in the classroom, given their capacity to favour the acquisition of learning, skills, abilities, and competencies.

Keywords – Active methodologies, Gamification, Escape room, Breakout, Game based learning (GBL).

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1. Introduction

The European Higher Education Area has changed the current university system, including teaching and learning methodologies. Nowadays, in many cases, methodologies play a greater role in the student and complement the traditional theoretical class (Abella-García, Ausín-Villaverde, Delgado-Benito & Casado-Muñoz, 2020; Carrión, 2019; Rodríguez, 2012). Active methodologies are among the most interesting approaches for developing cooperative learning and student involvement in the classroom (Botella & Cañero, 2020; Rodríguez-García & Arias-Gago, 2018). In recent years, research has focused on methodologies related to play and playful learning perspectives within the methodologies that promote cooperative learning and student autonomy. Some advantages over more traditional approaches are

motivation, class dynamicity, active learning, autonomy, critical thinking, creativity, problem solving, social skills, collaboration, communication, and obtaining information about the strengths and weaknesses of students (Fernandez, 2022). This look at games from education is not new: the association between play and learning is indisputable, especially in the first years of life (Andrade, 2020; Solís, 2018), which is inherent to human development. In a university setting, it is increasingly easy to find examples of its use (Umamah & Saukah, 2022; Zabala-Vargas, García-Mora, Arciniegas-Hernández, Reina-Medrano, Benito-Crosetti & Darder-Mésquida, 2022), although there are also some obstacles to its implementation, such as the absence of a solid theoretical framework (Andrade, 2020) and teacher training (Moscoso-Abad, García-Herrera & Álvarez-Lozado, 2022).

1.1. Theoretical Background

Among playful methodologies, the most widespread concept is gamification. The concept, in turn, is ambiguous in terms of its definition and the aspects it encompasses. There seems to be consensus that gamification is the application of game elements and mechanics in non-game contexts (Arias-Fernández & Grande-de-Prado, 2022; Karpp, 2012; Teixes, 2015). However, there is some terminological confusion surrounding the application of playful methodologies in the educational setting, given that although there are closely related concepts, they present characteristics that distinguish them. In the first place, serious games are those created with the intention of achieving an additional objective (characterizing objective) in addition to the intention of entertaining (Abt, 1987). Although the terms "game" and "serious" may seem contradictory, the idea of "serious" refers to the fact that they can focus on areas as different as education, economics, health, industry, etc. (Grande-de-Prado, García-Martín, Baelo & Abella-García, 2021). This indicates that the intention to play serious games goes beyond educational intention, as proposed by Abt (1970) in his first definition of serious play. Sometimes, the concepts of serious games and Game Based Learning (GBL) are used as synonyms, although the latter focuses on teaching. That is, they are games that have been designed with a playful intention but are used in educational contexts as a teaching-learning tool (Charlier, Ott, Remmele & Whitton, 2012; Grande-de-Prado, Baelo, García-Martín & Abella-García, 2020). We can say that ABJ describes an environment in which game content and play enhance the acquisition of knowledge and skills, and where game activities involve problem-solving spaces and challenges that provide players/learners with a sense of accomplishment (Kirriemuir & McFarlane, 2004; McFarlane, Sparrowhawk & Heald, 2002; Prensky, 2008).

Having clarified these terms, we can say that Educational Escape Rooms or Edu-Escape Rooms (EER) are included in the concept of Game-Based Learning. Edu-Escape Rooms constitute an adaptation of popular escape rooms to the educational world (Sánchez & Plumettaz-Sieber, 2019). In both formats, a narrative guides participants throughout the activity, in which they assume the protagonist role, so choosing an avatar is unnecessary (Nicholson, 2015). The main objective is to solve a series of tasks or riddles in a limited time to escape from a space, open a container that houses a treasure, or provide an answer to a mystery (Martín-Caraballo, Paralera-Morales, Segovia-González & Tenorio-Villalón, 2018; Moreno-Fuentes, 2019). Through the narrative and aesthetics inherent in this type of experience, the aim is to maximise the participants' immersion. Generally, these activities are developed cooperatively among a group of players in charge of solving challenges. Adaptation of the Escape Room to the educational world started from the bottom up with enthusiastic teachers, and its growth in the academic world is unique (Veldkamp, Van-de-Grint, Knippels & Van-Joolingen, 2020). Although escape rooms and edu-escape rooms have many similarities, educators should consider several important differences when designing and developing an educational escape room (see Table 1).

Designing and developing an Edu-Escape Room is not without its difficulties due to the large number of possibilities that escape games offer, and that in many cases depend on the teacher's previous experience in this type of game. Clarke, Peel, Arnab, Morini, Keegan and Wood (2017) proposed a framework for the creation of Edu-Escape Rooms with six areas of work: Participants, Objectives, Theme, Puzzle, Equipment and Evaluation. This framework offers a holistic approach to developing a person-centred

educational practice, highlighting the potential of the arts and creativity in designing immersive learning experiences in different contexts (Grande-de-Prado et al., 2021).

Topic	Conventional Escape rooms	Edu-Escape rooms
Audience	Wide audience	Specific target group with well-defined learning objectives
Success rate	Variable	High
Enigmas	It is not necessary to align with the curriculum	Aligning with the curriculum
Results of the enigmas	Variable	Numerical or alphabetical codes
Spaces	Generally, one or more rooms are connected to each other	Generally, more limited (classroom)
Schedule	Free	Limited (academic hours)
Number of users	Generally, one team (3-7, average)	One class or full course (groups of 20-100)

Table 1. Differences between Conventional Escape Rooms and Edu-Escape Rooms (EER). Note: Grande-de-Prado et al. (2021)

In addition to this conceptual framework, three fundamental issues must be considered when designing an Edu-Escape Room (Veldkamp et al., 2020). First, the immersion of the participants within the game, as it will help to engage and motivate the learner; second, consistency in game aesthetics, activities, and narrative, as it will help prevent cognitive dissonance; third, tests or puzzles (whatever challenge or riddle is posed) that use a simple game loop: a challenge, a solution, and a reward (e.g., a code for a lock, or information needed in the next puzzle).

The use of Edu-Escape Rooms has numerous purposes and their scope of application covers a wide range of areas such as Nursing (Adams, Burger, Crawford & Setter, 2018), Economics (Sánchez, 2023), Physics (Vörös & Sárközi, 2017), History (Rouse, 2017) or even to work on generic skills independent of a specific subject (Craig, Ngondo, Devlin & Scharlach, 2019).

Grande-de-Prado et al. (2021), Veldkamp et al. (2020), and Eukel, Frenzel and Cernusca (2017) highlight social competence, teamwork, collaboration, and motivation among their benefits or advantages. Although several difficulties have also been described, for example, Fotaris and Mastoras (2019) highlighted the need to devote a lot of time, limited resources, and problems in balancing the difficulty of the tests. In addition, there is also the problem of group size, as a small group will be easier to handle; however, from a research perspective, the group may be considered too small to extrapolate the results. Conversely, a group that might be considered sufficient to conduct research is likely to be too large to adequately handle.

Although the application of the Edu-Escape Room is relatively recent, its educational potential has attracted the attention of various researchers, such as Clarke et al. (2017), Moore and Campbell (2020) and Grande-de-Prado et al. (2020, 2021). Most of the published scientific research has been conducted in higher education; however, there is also a growing interest in applying this type of escape game in primary and secondary education. Some authors have attributed growth in the use of these resources to various platforms for sharing experiences, such as Breakout EDU (https://www.breakoutedu.com/). These platforms have increased access to these types of activities, allowing teachers to learn about and adapt to the available Escape Rooms. However, it is crucial to recognise that this access can also have negative implications, as it can lead to the replication of these experiences without adequate understanding of the theoretical, scientific, and pedagogical foundations underlying Escape Rooms. Consequently, little research has been conducted on these fundamental aspects (Veldkamp et al., 2020).

In any case, it seems clear that Edu-Escape Rooms have great educational potential. Still, it is necessary to recognise that there is little scientific evidence and that their trends, possibilities, and challenges in the educational field are yet to be explored (Fotaris & Mastoras, 2019; Grande-de-Prado et al., 2021; Veldkamp et al., 2020). Recently, we found some reviews and meta-analyses that reflect that Edu-Escape

Rooms have an increasing academic impact (Bray, Antoniou, Nikolaidou, Fides-Valero, Roberts, Ahonen et al., 2023; López-Pernás, 2024; Quek, Tan, Sim, Ignacio, Harder, Lamb et al., 2024), because the problem-based and meaningful activities of Edu-Escape Rooms provide environments that activate students and force them to collaborate. Empowering communication and teamwork skills (Veldkamp et al. 2020).

For example, in a healthcare educational setting, Eukel et al. (2017) developed an Edu-Escape Room for diabetes assessment aimed at undergraduate pharmacy students. The results show that this experience provides valuable disease management with the ability to improve health outcomes and decrease the costs associated with healthcare. In addition, it was noted that hands-on training appeared to increase students' competence and self-confidence in providing diabetes care. Another example of the Edu-Escape Room is that developed by Vides and Álvarez-Díaz (2023) with undergraduate students of the Degree in Economics, about the European Central Bank. The authors highlight collaboration and teamwork as key aspects and a deeper understanding of a little-known topic facilitated by collaborative work. They also highlighted other values based on respect, collaboration, and the promotion of communication skills, problem solving, and critical thinking, which led them to propose the activity as a tool to be included in the continuous evaluation modality, which can be designed, adapted. They applied to each of the contents established in the teaching guides of the various subjects.

In the same line, the objective of this article is to understand and analyze the valuation that university students and future teachers have towards Edu-Escape Rooms after having participated in one. To achieve this objective, the following research questions and hypotheses were proposed:

- Research questions:
  - RQ1: How do prospective teachers rate Edu-Escape Rooms as an educational tool?
  - RQ2: Do students' gender and age variables relate to their perception of Edu-Escape Rooms?
  - RQ3: Do students' previous experiences with analogical or digital games relate to their perceptions of the Edu-Escape Room?
- *Hypothesis 1: Students and future teachers who have more experience as role-playing, board, card, or video game players value the use of the Edu-Escape Room in the learning process.*
- *Hypothesis 2: The variables of gender and/or age of the students and future teachers are related to the valuation of the use of the Edu-Escape Room in the learning process.*

2. Methodology

The methodology implemented in this study is quantitative and cross-sectional, analysing a specific case. This study begins with a real experience that seeks to understand a case and its contextual conditions (Yin, 2017). From this perspective, the samples do not need to be very large because the objective is an analytical generalisation, to expand and generalise theories, and not a statistical generalisation, to extrapolate probabilities (Yin, 2017).

To achieve the objective of this research, an Edu-Escape Room experience was developed for university students, and their responses to a questionnaire assessing Escape Rooms as an educational tool were analysed.

2.1. Participants

Thirty-four students from the Information and Communication Technologies course of the Primary Education Degree of the University of León (Spain) participated in the experiment. Of the participants, 47 % (N = 16) were male and 53 % (N = 18) were female. The sample was between 18 and 20 years old (M = 18.82, SD = 1.38). In this degree, students (Office of Assessment and Quality, 2021) can be

described as vocational because in their pre-enrolment choices, they prioritise this university degree by more than 70 %. Most students enter through the "Humanities and Social Sciences" mode of the Baccalaureate and state that they have received good information and orientation beforehand. Women predominated (approximately 65 % of the students). They state that they choose the degree for pleasure and motivation and would like to work in teaching and education. Their knowledge of languages is at a medium level, mainly English. They believe they have a medium-high capacity for teamwork, learning skills, written expression of ideas and projects, and reading habits, and a medium level in general culture, computer literacy, information and documentation search, time management, decision making and leadership of work groups, critical thinking, and oral expression of ideas and projects.

2.2. Instrument

The information collection instrument was the semantic differential questionnaire developed by Osgood, Suci and Tannenbaum (1976). This questionnaire is based on the one used by Llorente and Cabero (2008) and Marín-Díaz, Cabero-Almenara and Barroso-Osuna (2017) to determine students' attitudes toward the Internet, which has several advantages, such as being easy to understand and quick to answer. The questionnaire comprised 35 pairs of bipolar adjectives. The reliability index, shown in previous studies by means of Cronbach's Alpha Coefficient, was 0.94. Our study presented a lower value of 0.868, which still confirms its high reliability (Bisquerra, 1987). Five additional items were added to these 35 items: gender, age, and three Likert scale items (1-4).

- How often do you play board games, role-playing, or card games (Magic type, for example)?
- How often do you play computer or console games?
- Do you think that games and play resources can be helpful in education?

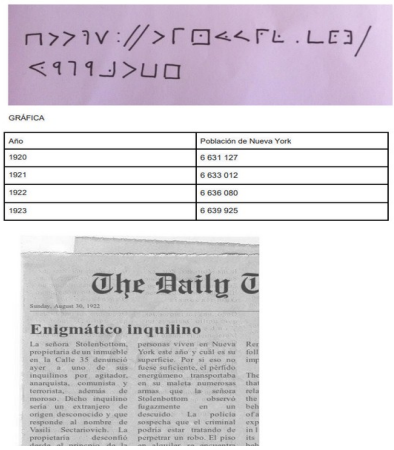
The questionnaire was administered online, and responses were voluntary after the end of a didactic activity in an escape room. The study complied with the ethical values and practices required for educational research: voluntary informed consent, right to information, data protection, and guarantees of confidentiality, anonymity, and non-discrimination.

2.3. Escape Room

The entire activity lasted two hours, including the start, discussion afterwards, and questionnaire completion. Previously, another two-hour session was developed, dedicated to explaining some ideas about Escape Rooms and their designs. The development of this activity was based on the proposal of Maté (2018), but some locks were transformed into digital ones, and audiovisual support was used for settings such as videos, images (see Figure 1), ambient music, and online timers. The narrative is as follows: Dr. Henry Armitage has recently passed away. His intellectual heirs and students gathered in Arkham to read his will with The Lawyer (professor). The deceased has prepared a surprise for them in his will: to discover a treasure that can change the world, they must overcome a series of intellectual challenges against the clock. The main source of inspiration was The Cthulhu Myths, a choral work of different writers, but mainly linked to the American author Howard Phillips Lovecraft.

The aim of the activity was for students to experience an educational experience in an Escape Room, integrating the content of Language, Geography, Mathematics, Literature. From different types of puzzles (10 enigmas), with encrypted messages, online forms, physical clues... a mixed escape room was created (analogical and digital) within the variant called breakout, consisting of opening a safe with a treasure inside.

The structural design of the puzzles or enigmas (Nicholson, 2015; Veldkamp et al., 2020) is very simple: an open structure (all secondary puzzles can be solved simultaneously, and all together are necessary to solve the main puzzle). All puzzles were created mainly using digital locks from the eduescaperoom.com website (https://eduescaperoom.com/generador-candado-digital/) and Google Forms.



GRÁFICA

Año	Población de Nueva York
1920	6 631 127
1921	6 633 012
1922	6 636 080
1923	6 639 925

The Daily T

Sunday, August 30, 1922

Enigmático inquilino

La señora Stolenbottom, propietaria de un inmueble en la Calle 35 denunció ayer a uno de sus inquilinos por agitador, anarquista, comunista y terrorista, además de moroso. Dicho inquilino sería un extranjero de origen desconocido y que responde al nombre de Vasili Sectariovich. La propietaria desconfió

personas viven en Nueva York este año y cuál es su superficie. Por si eso no fuese suficiente, el pérfido energúmeno transportaba en su maleta numerosas armas, que la señora Stolenbottom observó fugazmente en un descuido. La policía sospecha que el criminal podría estar tratando de perpetrar un robo. El piso

Figure 1. Supporting material for the escape room (Maté, 2018)

Using The EscapeED Framework (Clark et al., 2017) as a reference, an overview of the activity is as follows:

- Participants: 34 Higher Education students.
  - Time: 75 minutes
  - Difficulty: Easy.
  - Mode: Hybrid (analogical + digital).
- Objectives:
  - To understand the mechanics of escape rooms in education.
  - Multidisciplinary: Mathematics, Literature, Geography, Second Language...
  - Soft skills: Communication and teamwork.
- Topic:
  - Independent breakup.
  - Narrative related to Cthulhu Myths (H.P. Lovecraft).
- Puzzles / enigmas
  - Open structure.
  - Linked to objectives.
  - Instructions and clues.
- Equipment:
  - Classroom with several computers.
  - QR codes.
  - Digital cannon.
  - A teacher acting as The Lawyer (or Notary).
- Equipment:
  - The tests were adjusted and retested with the three other groups.

Finally, in other sessions, students developed, as a group, a small Escape Room activity, with at least three enigmas and the support of technology (with programs such as Genially or digital locks).

3. Results

To evaluate the normality of the distribution, the Kolmogorov-Smirnov test was performed, and it was observed that several items of the scale rejected the hypothesis of normality, indicating the need to use nonparametric tests to evaluate the relationship between the variables. The Mann-Whitney U test or Kruskal-Wallis test was chosen depending on the type of grouping variable using the SPSS 24.0 statistical package.

3.1. Descriptive Analysis

To obtain an overview of students' perceptions of the Edu-Escape Room as an educational tool, descriptive analyses of central tendency (mean, mode, and standard deviation) were performed for each of the 35 items that made up the data collection instrument, as shown in Table 2. In addition, we include the asymptotic significance (bilateral) calculated using the Kolmogorov-Smirnov (K-S) test, which evaluates the normality of the sample distribution.

As shown in Table 2, participation in the Edu-Escape Room was rated very positively by the students for most of the items. The 35 semantic differential items (the three items incorporated, with a Likert scale from 1 to 4, which do not correspond to a semantic differential, are presented in Table 3). There is only one average of less than four points (Addictive), whereas 20 items have an average of more than five points.

If we focus on the items of the semantic differential questionnaire, the item most highly rated by the students was that indicating that they found the activity entertaining (M = 6.32). This shows that the activity is a departure from the monotony of the other activities and assessments in the curriculum. This was followed by the attractiveness of the activity, and, at the same time, it was not considered by them as a distractor to learning (M = 5.91) and the dynamism of the task (M = 5.76). The modes of these three elements were at their maximum value (7). On the other hand, in the most negative values, we found its assessment as addictive (M = 3.21; Mo = 3), followed by three values with more neutral scores (Mo = 4), which refer to elements of cost, complexity, and dispensability. The rest of the mode values are at values of 5 or 6, closer to more positive adjectives.

Regardless of normality, more than half of the items (22) analysed had values below .05, which means that they did not have a normal distribution.

For the three items included in the questionnaire that did not belong to the semantic differential, a frequency analysis (Table 3) was performed to determine how the sample was grouped along the scale.

As can be seen, most of the sample does not play board, role-playing, or card games frequently; the percentage is more balanced in the case of video games, with 50 % playing values 1-2 and 3-4. Regarding the perception of the usefulness of recreational resources, 94.12 % had a favourable opinion.

	Mean	Mode	Standard deviation	K-S normality
Boring [1] – Entertaining [7]	6.32	7	1.02	.000
Distracting [1] - Attractive [7]	5.91	7	1.17	.046
Passive [1] - Dynamic [7]	5.76	7	1.16	.145
Negative [1] - Positive [7]	5.76	6	0.84	.062
Useless [1] – Useful [7]	5.62	6	0.84	.002
Stupid [1] – Intelligent [7]	5.62	6	0.84	.002
Impractical [1] – Practical [7]	5.59	6	1.03	.001
Ineffective [1] – Effective [7]	5.53	6	.95	.011
Unpleasant [1] – Pleasant [7]	5.47	6	1.27	.077
Pernicious [1] – Educational [7]	5.47	6	0.85	.007
Rigid [1] – Flexible [7]	5.32	6	1.05	.106
Hindering [1] – Facilitator [7]	5.32	6	0.96	.023
Trivial [1] - Important [7]	5.29	5	0.99	.106
Uncomfortable [1] – Comfortable [7]	5.26	6	.98	.039
Detrimental [1] - Beneficial [7]	5.24	6	1.06	.006
Deformative [1] – Formative [7]	5.21	5	.83	.013
Worthless [1] - Valuable [7]	5.21	5	0.80	.011
Overpowering [1] - Manageable [7]	5.15	5	1.09	.132
Clumsy [1] – Agile [7]	5.12	5	.87	.007
Unnecessary [1] - Necessary [7]	5.06	5	1.14	.012
Time Loss [1] - Time Savings [7]	4.97	6	1.29	.150
Insecure [1] – Secure [7]	4.91	5	.95	.022
Inaccessible [1] - Accessible [7]	4.85	5	.91	.015
Overwhelming [1] - Easy To Control [7]	4.82	5	1.07	.095
Slow [1] - Fast [7]	4.68	5	1.23	.170
Inaccurate [1] - Accurate [7]	4.68	5	1.05	.229
Doubtful [1] – Reliable [7]	4.62	5	.84	.019
Uninformative [1] – Informative [7]	4.59	5	1.46	.060
Expensive [1] – Economic [7]	4.53	4	1.50	.375
Difficult [1] - Easy [7]	4.44	5	1.09	.027
Inappropriate [1] - Appropriate [7]	4.35	5	1.47	.143
Impersonal [1] - Personal [7]	4.29	5	1.10	.030
Complicated [1] – Simple [7]	4.03	4	1.10	.306
Essential [1] – Essential [7]	4.03	4	.95	.03
Addictive [1] – Indifferent [7]	3.21	3	1.13	.031

Table 2. Descriptive analysis and normality of items on scale 1-7

	Measures of central tendency			Normality K-S	Frequency %			
	Mean	Mode	Standard deviation		1	2	3	4
How often do you play board games, role-playing games or card games (e.g., Magic)?	2.24	2	.88	.027	20.59	44.12	26.47	8.82
How often do you play computer or console games?	2.44	1	1.14	.185	29.41	20.59	26.47	23.53
Do you think that games and play resources can be useful in education?	3.44	4	.60	.002	0	5.88	44.12	50

Table 3. Pre-service Teachers' Game Habits and Perceptions of Educational Games: Descriptive and Normality Analysis

3.2. Differences between Groups

To identify differences between groups, and taking gender as a variable, the Mann-Whitney U test was used to find statistically significant differences in the item Unnecessary [1] - Necessary [7] of the semantic differential questionnaire (Table 4), showing a slightly higher valuation by women (5.39) compared to men (4.69).

	Sex (U of Mann. Whitney)	**Game frequency (roll, table or cards) (Kruskal-Wallis)**	**Utility of play resources in education (Kruskal-Wallis)**
Passive [1] - Dynamic [7]		.022	
Deformative [1] - Formative [7]		.012	
Clumsy [1] – Agile [7]			.18
Unnecessary [1] – Necessary [7]	.02		
Negative [1] - Positive [7]		.016	
Hindering [1] – Facilitator [7]		.014	

Table 4. Contrast tests on the semantic differential questionnaire

Regarding the usefulness of playful resources in education (Table 3), those who rate them as less useful (f = 5.88 %) paradoxically tend to have means closer to agile (M = 6.50) than those with values 3 and 4 on the Likert scale (M = 5.27 and M = 4.82, respectively).

To investigate the link between game frequency (role-playing, board, or cards) and tool rating, Kruskal-Wallis nonparametric analysis was performed as an alternative to ANOVA, because the data did not conform to normality. The Kruskal-Wallis test showed significant differences in the four items of the semantic differential questionnaire as a function of the frequency with which students participated in board or card role-playing games.

For the Passive-Dynamic item, the analysis revealed differences between groups χ^2 ([3], N = 34), = 9.584 p = .02. For the Deformative-Formative item, the differences were χ^2 ([3], N = 34), = 10.99, p = .012, while for the Negative-Positive pair it was χ^2 ([3], N = 34), = 10.26, p = .016. Finally, for the Hindering-Facilitating rating, the result was χ^2 ([3], N = 34), = 10.69, p = .01.

Post hoc comparisons using Dunn's method, with Bonferroni correction, indicated that in the Passive-Dynamic item, the median of the group that played a lot was higher than that of the group that played little (p = 0.23).

On the other hand, in the Negative-Positive item, the group that had never played significantly higher scores than the group that had played little (p = .018). Regarding the item Hindering-Facilitating, there were significant differences between the four groups (p < .05). The group with the highest median was the group that had played frequently, followed by the group that had never played, the group that reported playing quite a lot, and finally, the group that had played very little obtained the lowest median.

These scores indicate that the frequency of participation in board games, card games, or role-playing games influences students' perceptions of all four items. Considering the differences between the groups that play a little and those that play a lot, it can be suggested that greater involvement or use of these types of games would be related to the variations in students' perceptions of these four items of the semantic differential questionnaire.

4. Conclusions

Escape Rooms are a recent educational application and appear in the scientific literature, which are gradually receiving greater attention, especially in the university environment, due to the increasing

application of innovative methodologies based on games in the classroom (Moreno-Fuentes, 2019; Sierra-Daza & Fernández-Sánchez, 2019).

This study sought to understand university students' perceptions about Edu-Escape Rooms after conducting a real experience with students of the Degree in Primary Education. Responding to the first research question, motivation stands out as the most important aspect of students' evaluations of educational Escape Rooms. This variable has been considered in previous research, such as that of Teixes (2015) and Onecha-Pérez, Sanz-Prat and López-Valdés (2019), who justified the use of educational Escape Rooms to achieve objectives such as promoting motivation to action and learning by doing, facilitating immersion in learning and fostering group cohesion, and the ability to work as a team. This shows that the inclusion of the game is a teaching and learning strategy that brings an attractive perspective to teaching, especially for interventions that seek to foster student participation and motivation, which are considered fundamental aspects of learning (Piaget, 1985; Chaiklin, 2003).

Among the differences obtained between groups, in response to the second research question, a slightly higher positive valuation was observed in women when the need to use this tool in the educational setting was addressed. Similarly, the results of Hunt-Gómez, Moreno-Fernández, Moreno-Crespo and Ferreras-Listán (2020) indicate that future female teachers show high expectations about using Escape Rooms to achieve meaningful learning. This is especially relevant if we consider the teaching profession primarily female.

On the other hand, in answering the third research question, the results indicated that experience with different types of games, such as role-playing games, board games, or card games, has some influence on students' perceptions. Students who say they have had little experience with these types of games have been more reserved about the application of Escapes in the educational environment than those who do not know or those who play at least with some assistance. The more favourable perception of those who have never had contact with role-playing or card games than those with some experience is striking. However, this can be explained by the fact that those few experiences may have been unsatisfactory, which could have generated some negative perception of this type of game.

It should also be noted that this group of inexperienced students was the largest since it alone represented almost half of the sample. Therefore, a group can become key to knowing what type of gamified experience is best received in the classroom. However, the sample size is a limitation for generalising the results obtained. Nevertheless, this experience can provide valuable guidelines for planning Escape Room practices based on an analysis of the level of prior knowledge to assess the acquisition of learning and the perceived usefulness of this educational resource in university classrooms.

From a practical perspective, the results show growing interest in Escape Rooms as an educational strategy for future teachers. This may be related to the very nature of the Escape Room, which is more suitable for activities of limited duration, and whose potential can and should be explored in other educational stages.

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