

PRE-SERVICE PRIMARY TEACHERS' PERCEPTIONS OF GAMIFICATION AS A METHODOLOGY

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Abstract

Gamification involves making teaching processes fun with the intention of improving factors that affect learning, such as motivation. Although the focus is not on the game itself and the corresponding entertainment, its design and results provide an alternative for developing educational proposals that make students the protagonists and generate student engagement with their education. On that basis, this study aims to understand pre-service primary school teachers' perceptions of gamification as an active methodology, taking the gender and time of analysis variables into account. To this end, a quantitative longitudinal panel design (pre-test and post-test) from a descriptive and inferential approach was applied. The sample consisted of 284 pre-service primary education teachers from the University of Málaga (2021/2022 academic year). The information was collected through a validated instrument that measures perceptions of both digital didactic resources and teaching methodologies. The results revealed positive perceptions of gamification as a methodology, with a significant improvement from the pre-test to post-test scores. As for the analysis of the gender variable, there were significant differences, with the male participants' ratings of gamification being higher than those of the female participants. In conclusion, gamification constitutes a feasible methodology to implement due to being well-received by university students, as a result of its motivating and fun nature and the fact that it makes students the protagonists of the learning process.

Keywords – Perception, Gamification, Methodology, University, Initial training, Gender.

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1. Introduction

Active methodologies are those that make students the protagonists of their learning processes, thereby making the teacher a companion, advisor, guide, and designer of the different scenarios in which educational processes are carried out (Colomo, Gabarda & Rodríguez, 2018; Segura, Parra & Gallardo,

2020). Among the various active methodologies found in the current educational reality, gamification stands out as the point of interest in this study. This learning strategy allows for numerous improvements in the educational context to be achieved (Sierra & Fernández, 2019), its main objective being to increase student comprehension of and motivation towards the activities (Kostenius, Hallberg & Lindqvist, 2018).

The concept of gamification comes from the term “gaming”, referring to the process of playing (Cuevas, Cívico, Gabarda & Colomo, 2021). Thus, the use of learning designs based on games is linked to the game-based teaching and learning process (Contreras & Eguía, 2016). In this sense, the aim of gamification is to make learning fun so that it becomes more meaningful and increases student engagement (Centenero, Martínez & Guinea, 2021; Contreras & Eguía, 2017). This greater involvement also gets transferred to the relationships between students, leading to socializing and shared experiences, which increases the sense of belonging to the group (Deif, 2017). In addition, the students acquire a leading role by mediating their own construction of knowledge, with a corresponding higher level of responsibility and engagement with their learning processes (Gil, 2019). Moreover, this methodology promotes the development of intrapersonal intelligence, due to the identity experimentation and improvement of self-awareness that occurs when assuming different roles and putting them into practice (Ferrer, Fernández, Polanco, Montero & Caridad, 2018). It also positively influences performance, which is associated with the characteristic of errors being part of the game, where students can learn from them and try again, since penalisation connected to the student experience with educational content is reduced (Leaning, 2015; Marín, 2018). It is important to highlight that, despite the intention of being fun, the ultimate goal is rather to improve learning processes. In a much more relaxed and motivating classroom environment (López, Segura, Fuentes & Parra, 2020), the competitiveness factor promotes the acquisition of skills and knowledge in a simpler and more enjoyable way (Gabarda, Colomo & Romero, 2019; Prieto, 2020). This entails taking advantage of the benefits of an entertaining context based on the key aspects of games (García & Fuentes, 2022; González-Calatayud, 2022), without losing sight of gamification being an educational resource that should prioritise learning over entertainment so that learning always prevails over enjoyment even though both elements exist simultaneously. In this way, gamification implies planning the design of an educational action with elements, structures, designs, and mechanisms typically found in games to motivate, involve, and incentivize students (Kavaliova, Virjee, Maehel & Kleppe, 2016; Teixes, 2014).

For the design of a gamified proposal, it is necessary to highlight the importance of narrative as the core that binds all the elements of gamification together, which then captures and maintains the players’ attention and gives meaning to the whole process (Barreal & Jannes, 2019; Werbach & Hunter, 2015). Gamification can be presented at the beginning as a common thread, and its format can range from text to audio or video, serving as an invitation to participate in the adventure. For the player, it is equally important that the person who designs the game puts in time, effort, and dedication to achieve harmony between the rules and the game system (Gil, 2019), as well as the emotions sparked by its implementation, thereby promoting player engagement and attention (Marín, 2018). Among the components to be considered for a game, different authors (Acosta, Torres, Álvarez & Paba, 2020; Chaves, 2019; García, Cara, Martínez & Cara, 2020; Karmanova & Shelemetyeva, 2020; Manzano, Camacho, Guerrero, Guerrero, Aguilar, Trigueros et al., 2021; Ortiz, Jordán & Ágreda, 2018; Tsarapkina, Vaganova, Lapshova, Koldina & Sedov, 2021; Werbach & Hunder, 2015; Willig, Croker, McCormick, Nabavi, Walker, Wingo et al., 2021) highlight the following: the avatar as the virtual representation of the player; the world as the place where the story takes place; points or small rewards that can be redeemed, which favour increased participation, facing complex challenges, or collaborating with other classmates to reach achievements; challenges such as small tests that participants have to pass to reach a certain score; teams made up of various members who work together to achieve a common goal; badges as a visual representation of the participants’ achievements (medals, rankings, special powers, etc.); rankings and progress bars where achievements and progression are represented graphically; or tutorials, which refer to the instructions that help students become familiar with the game and understand the rules as well as their application in different situations and experiences.

All these aspects make a difference and contribute to varying degrees of success in their didactic implementation.

1.1. Pre-Service Teachers' Perceptions of Gamification as a Methodology

Gamification as a methodology has been supported by many studies, and it stands out for its impact on student motivation (Barokati, Setyosari, Kuswandi & Dwiyoogo, 2018; Bicen & Kocakoyun, 2018; Ekici, 2021; Subhash & Cudney, 2018), performance (Çakıroğlu, Başbüyük, Güler, Atabay & Memiş, 2017; Göksün & Gürsoy, 2019; Landers & Armstrong, 2017), and teachers' positive views regarding its use (Colomo, Sánchez, Ruiz & Sánchez, 2020; González, Cortés & Lugo, 2019).

Examining the studies that have investigated gamification as a teaching methodology, Ā-zer, Kanbul and Ozdamli (2018) carried out a study with 35 pre-service teachers on their opinions about implementing gamification along with the flipped classroom in a project development course. The quantitative results of the pre-test and post-test reflected positive ratings of gamification after the course, with an increase in motivation and skills. Without focusing on any educational stage in particular, Santos, Leiva, Ramos and Benítez (2020) examined the perceptions of 187 education professionals in training at the University of Málaga and found positive views of gamification and its impact on key factors of learning processes, such as motivation.

Hinojo, Gómez, Marín and Romero (2021) study with 98 pre-service social educators as a sample aimed to verify the impact of gamification on content acquisition and students' ratings in a pre-test/post-test study. The results reflected positive evaluations after the implementation of the methodology, with content acquisition improving in the subject "Design and development of plans, projects, and programs" at the University of Granada. There were no significant differences between the perceptions according to the gender variable. In the early childhood education stage, Marín, Sampedro, Muñoz and Jiménez (2020) analysed 232 pre-service teachers' opinions about gamification for learning maths, achieving positive perceptions of the use of video games in this process, with no differences according to the gender variable. In Romero and López (2021) study with 183 students in the Digital Technology Applied to Teaching Practices master's program, positive views of gamified processes stood out, especially for highlighting the methodology's potential to boost student participation and motivation.

Focusing on pre-service primary school teachers, similar to the sample in this study, Cuevas et al. (2021) analysed the perceptions of 83 pre-service primary teachers regarding a gamified proposal, finding positive evaluations by the participants in the results, without any significant differences according to gender. Along the same lines, Gómez, Montegudo, Moreno and Sainz (2020) studied the perceptions of 210 pre-service primary teachers and obtained very positive ratings of gamification, with perceptions improving after implementing a training program with this methodology. It should be noted that in their study, female participants obtained better results than male participants. With regard to pre-service teachers of English as a foreign language, Umamah and Saukah's (2022) study examined the perceptions of 86 students in second year, finding very positive scores for incorporating gamification into the learning process, with no significant differences according to gender. The perceptions of 76 pre-service primary teachers specialising in physical education were analysed by Flores, Fernández and Prat (2021), who found very positive views after the implementation of the methodology, notably improving student engagement and motivation towards the subject. On the other hand, Carrión (2019) analysed the perceptions of 105 pre-service teachers specialising in music, who positively rated gamification as an effective methodology for teaching and learning processes.

In view of the above, it is interesting to discuss empirical studies that report pre-service teachers' evaluations of gamification, determining whether they become modified after the methodology's implementation and how the gender variable affects such views.

2. Method

On the basis of the previous section, the methodology of this study is presented below, indicating the objectives, design, sample, instrument, procedure, and data analysis.

2.1. Goals

The main objective of this study was to understand pre-service primary teachers' perceptions of gamification as an active teaching methodology. In addition, we specifically sought to examine whether there were changes in their evaluations depending on the time of analysis (before and after implementing gamification) and, on the other hand, to test for the existence of significant differences according to the gender variable and time of analysis.

2.2. Design

Starting from a quantitative design, the approach of this study was ex post facto and pre-experimental, implementing a longitudinal panel with pre-test and post-test data collection, which allowed for pre-service teachers' perceptions of gamification to be recorded. The participants' responses were analysed descriptively and inferentially, taking gender and time of data collection into account as factors to be examined.

2.3. Sample

Convenience (non-probability) sampling was used to select 284 students from the course "Information and Communication Technology Applied to Education" (first year, second semester), which is part of the undergraduate degree in primary education at the University of Málaga during the 2021/2022 academic year. As for gender, there were 155 female participants (54.58%) and 129 male participants (45.42%), with an average age of 18.87 ± 1.18 .

2.4. Instrument

The perceptions of gamification were analysed with a validated instrument developed by Colomo, Colomo, Guillén and Cívico (2022). This questionnaire evaluates communicative, intellectual, and pedagogical aspects of both digital didactic resources and teaching methodologies mediated by technology. The instrument consists of a total of 12 items divided equally between the following dimensions: communicative (DIM C), which focuses on how gamification facilitates dialogue and interaction; intellectual (DIM I), which evaluates how cognitive skills are developed with this methodology; and pedagogical (DIM P), which considers factors that affect the quality and efficiency of the learning process. A 7-point Likert scale is used to measure the evaluations, thereby establishing different levels of agreement for the participants, which range from totally disagree (1 point) to totally agree (7 points). In this way, a better evaluation of gamification translates to higher scores, while lower scores reflect more negative opinions.

The validity and reliability of the instrument reflected adequate psychometric properties. In regard to reliability, the instrument was found to be acceptable both in its entirety ($\alpha = .775$) and in its dimensions (DIM C, $\alpha = .705$; DIM I, $\alpha = .772$; DIM P, $\alpha = .793$). As for validity, with the CFA (with 48.13% explained in the EFA with 3 dimensions and 12 items), a good fit was achieved in the structure (CMIN = 92.552; CMIN/DF = 1.815; GFI = .950; PGFI = .721; NFI = .814; PNFI = .729; IFI = .907; TLI = .916; RMSEA = .054). For the participants in this study, the reliability achieved was good ($\alpha = .811$).

Dimension	Code	Item
Communicative (DIM C)	C2	Contributes to conveying ideas and content
	C3	Encourages the asking and answering of questions
	C4	Promotes social interaction and dialogue
	C5	Promotes the understanding of information
Intellectual (DIM I)	I2	Boosts attention capacity
	I3	Boosts motivation for learning
	I4	Contributes to the development of critical thinking
	I5	Contributes to the development of creativity
Pedagogical (DIM P)	P1	Encourages feedback (formative assessment and personalised feedback)
	P2	Enhances the development of digital competence
	P3	Promotes autonomous learning
	P4	Promotes group work

Table 1. Items and dimensions of the instrument

2.5. Procedure

This study about the impact of gamification on the learning process was conducted in the “Information and Communication Technology Applied to Education” course. This subject is intended to develop students’ ability to select, design, and use digital resources in educational contexts, as well as to analyse the benefits of technology in educational processes, focusing on the educational potential of the internet and the use of active methodologies mediated by technology. Due to the very idiosyncrasy of the course, implementing active methodologies with technology, as is the case with gamification, becomes not only an educational possibility, but also an essential element of the course content itself. Starting from the premise that teaching the unknown should be avoided, the theoretical content on gamification was worked on by means of this methodology. Work groups were formed with the goal of creating their own gamified content. To this end, different methods of progression were established, and point systems based on the quality, creativity, and efficiency of the different assignments submitted (narrative, characters, challenges, scoring systems, etc.) were created. At the end of the unit, each group submitted their gamification proposal for evaluation by the teacher. Based on the above and with the aim of understanding student perceptions of gamification, it was decided to analyse their evaluations at two different times: before starting to implement gamification (prior to explaining it as course content) and after explaining and applying the methodology, which makes it possible to determine if there was a change in their perceptions after its use. The instrument was distributed online (Google Forms) and was completed freely and voluntarily in class at both times. For the data collection, the guidelines of the Declaration of Helsinki and the rest of the ethical and legal regulations applicable to research involving human beings were followed.

2.6. Data Analysis

The SPSS v.25 software was used to perform the analyses. The descriptive statistics of the pre-test and post-test were examined first, considering the individual items that compose the instrument, as well as the dimensions and overall instrument. The data of the dimensions and the entirety of the questionnaire were also analysed inferentially to check for the existence of significant differences. Since the normality criteria were not met ($KS = p. \leq .05$), the Wilcoxon *W* test was applied for related samples (pre-test/post-test). To analyse the gender variable, where distribution was not normal either ($KS = p. \leq .05$), two tests were performed: the Mann-Whitney *U* test for independent samples to inferentially compare both moments and the Wilcoxon *W* test for related samples within each gender. The effect size of the significant differences was calculated using Rosenthal’s *r* (Rosenthal, 1994), where the values of 0.2, 0.5, and 0.8 indicate small, medium, and large effects respectively.

3. Results

The gamification results are presented in two sections. In the first, student perceptions before and after developing the gamified proposal are examined, with analyses of the individual items as well as the dimensions and overall score of the questionnaire. In the second, an inferential statistical analysis is carried out between the pre-test and post-test for each gender, considering the dimensions and the overall instrument at both times.

3.1. Student Perceptions Before and After Gamification

The analysis began with student perceptions of gamification as a methodology before its implementation in the course (pre-test) and after its completion (post-test). In this way, all the items in the questionnaire were examined descriptively, differentiating between both moments of evaluation, and a descriptive and inferential analysis was also performed considering the dimensions and overall score of the instrument according to the time of analysis.

With regard to the items that make up the instrument, Table 2 shows the improvement in the scores of all the items. To explain this, the items will be considered according to the dimension to which they belong.

Dimension	Item	Moment	M±SD	
C	2	Pre-test	4.87±1.60	
		Post-test	5.98±0.98	
	3	Pre-test	4.89±1.55	
		Post-test	6.04±0.76	
	4	Pre-test	4.87±1.55	
		Post-test	6.00±0.74	
	5	Pre-test	4.96±1.53	
		Post-test	6.06±0.81	
	I	2	Pre-test	5.09±1.57
			Post-test	6.20±0.77
3		Pre-test	5.21±1.53	
		Post-test	6.38±0.69	
4		Pre-test	5.07±1.54	
		Post-test	6.17±0.76	
5		Pre-test	5.17±1.42	
		Post-test	6.19±0.84	
P		1	Pre-test	5.07±1.48
			Post-test	6.08±1.01
	2	Pre-test	5.25±1.51	
		Post-test	6.42±0.73	
	3	Pre-test	5.17±1.51	
		Post-test	6.31±0.73	
	4	Pre-test	5.38±1.47	
		Post-test	6.49±0.81	

Table 2. Descriptive statistics of the items in the questionnaire according to the moment of evaluation

The communicative dimension focused on the interaction and relationship possibilities that can be generated by carrying out educational processes with this methodology. With respect to contributing to conveying ideas and content (item C2), the scores increased by 1.11 points, going from a close to positive evaluation (4.87) almost to a quite positive one (5.98) after implementing gamification in class. Item C3 (pre-test, M = 4.89; post-test, M = 6.04) about encouraging the asking and answering of questions had a

similar range of difference between scores (1.15). The potential of gamification as a methodology that promotes social interaction and dialogue (item C4) obtained the lowest score in this dimension in the pre-test (along with item C2), with a score close to positive (4.87), whereas in the post-test, it was quite positive (6.00). Item C5, which evaluates whether gamification promotes the understanding of information, maintains the same trend, with a 1.10-point difference between the pre-test and post-test scores, being the highest rated item in this dimension both before the implementation of the methodology (4.96) and after (6.06).

As for the intellectual dimension, the focus was on higher-order cognitive operations that can be activated and improved through the use of gamification. In this sense, with respect to item I2 about boosting attention capacity, there is a difference of 1.11 points from before using the methodology (5.09), with a positive evaluation, to after it (6.20), with a quite positive evaluation. Item I3 about boosting motivation for learning was perceived positively by pre-service teachers both before the implementation of gamification (5.21) and after (6.38), being the highest rated item at both times of evaluation in addition to having the greatest difference (1.17 points). The contribution of gamification to critical thinking (item I4) was also perceived positively (pre-test, $M = 5.07$; post-test, $M = 6.17$), although this item had the lowest score in the intellectual dimension. Item I5 addressed whether gamification contributes to the development of creativity, which was evaluated positively by the students in both tests (pre-test, $M = 5.17$; post-test, $M = 6.19$), with a range of 1.02 points.

The pedagogical dimension, which includes didactic factors linked to using the methodology, becomes the next point of interest. The highest scores at both times of evaluation were found in this dimension. In this way, regarding the possibility of gamification to encourage feedback with formative assessment and personal feedback (item P1), the students had positive views before implementing the methodology (5.07), which became quite positive after it (6.08). This item had the lowest score in this dimension with a range of 1.01 points. With respect to the methodology's potential to enhance the development of digital competence (item P2), before its use the pre-service teachers evaluated it positively (5.25), and then quite positively after its implementation (6.42). Similar evaluations were made for item P3 about promoting autonomous learning, where the difference between the positive perceptions in the pre-test (5.17) and the quite positive ones in the post-test (6.31) was 1.14 points. It is worth noting that the potential of gamification to promote group work was rated the highest in this dimension and in the overall questionnaire at both moments of evaluation (pre-test, $M = 5.38$; post-test, $M = 6.49$), being the item closest to a very positive evaluation after using the methodology.

Looking into the analysis of the dimensions and the total score of the questionnaire, the data indicate an increase in the scores from before the implementation of the gamification methodology to after, both in the dimensions and in the overall questionnaire, with the mean scores increasing by more than 2 points in all cases (Figure 1). In this way, the communicative, intellectual, and pedagogical potential of gamification was perceived much better by the students after the implementation of the methodology in the classroom. It should be indicated that for the pre-test and the post-test, the dimensions occupy the same ranking in their evaluation, with the communicative one being rated the lowest and the pedagogical one the highest. In the pre-test, the communicative dimension reaches around a positive evaluation ($M = 3.78$), attaining a quite positive one after the use of gamification ($M = 6.02$). In the intellectual dimension, the scores are slightly higher (pre-test, $M = 4.03$; post-test, $M = 6.24$), achieving an acceptable evaluation before intervention and a quite acceptable one after it. The pedagogical dimension is perceived the best at both times, reflecting a positive evaluation in the pre-test ($M = 4.11$) and a quite positive one in the post-test ($M = 6.33$). Lastly, the overall instrument reveals these same perceptions at both moments (pre-test, $M = 3.97$; post-test, $M = 6.24$), maintaining what was found in the different dimensions that compose the questionnaire itself.

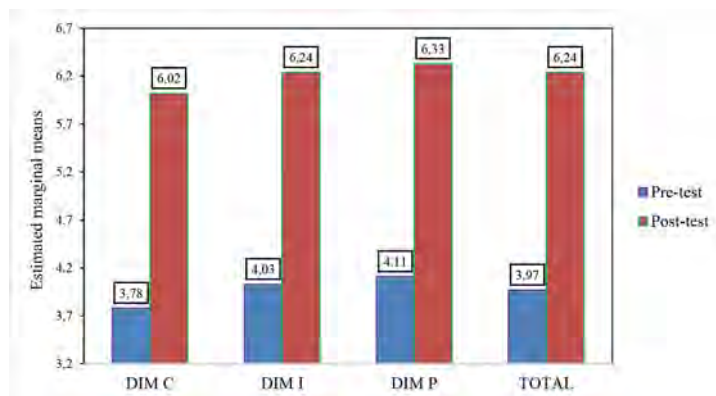


Figure 1. Student perceptions before and after implementing gamification

Significant differences were found between the students' evaluations before and after intervention, both in the dimensions and in the overall score of the instrument. This is reflected in the communicative dimension ($Z = -14.623$, $p < .05$) with a large effect size ($r = .825$), the intellectual dimension ($Z = -14.596$, $p < .05$) with a large effect size ($r = .819$), the pedagogical dimension ($Z = -14.603$, $p < .05$) also with a large effect size ($r = .850$), and in the overall questionnaire ($Z = -14.611$, $p < .05$) with a very large effect size ($r = .887$). Thus, it can be seen that the incorporation of gamification into the learning process improved the students' perceptions of the educational possibilities of this methodology.

3.2. Statistical Contrast of Student Perceptions According to Gender and Time of Evaluation

Examining the pre-test first (Figure 2), an acceptable evaluation was found for female participants ($M = 3.64$) and a positive one for male participants ($M = 3.94$) in the communicative dimension, which was rated the lowest by both groups and produced a significant difference between them ($U = 8465$; $Z = -2.232$; $p > .05$) with a small effect size ($r = .166$). The scores were similar in the intellectual dimension, where male participants' perceptions were positive ($M = 4.30$) and those of female participants acceptable ($M = 3.80$), yielding a significant difference ($U = 7017.5$; $Z = -4.352$; $p < .05$) that maintained a small effect size ($r = .264$). The pedagogical dimension was perceived the best by both genders, obtaining a positive evaluation (male, $M = 4.31$; female, $M = 3.93$) with significant differences ($U = 7772$; $Z = -3.253$; $p > .05$) and a small effect size ($r = .234$). As for the results of the overall questionnaire, the male participants ($M = 4.19$) had better perceptions than their female counterparts ($M = 3.79$), the values being situated between positive and acceptable. There were significant differences between the scores ($U = 19310$; $Z = -4.034$; $p > .05$), although the effect size was small ($r = .298$).

With respect to the post-test evaluations (Figure 3), the scores in all dimensions reflected higher perceptions in male participants in comparison to those found in female participants.



Figure 2. Pre-test descriptive statistics according to the gender variable and time of evaluation



Figure 3. Post-test descriptive statistics according to the gender variable and time of evaluation

Specifically, in the communicative dimension, a quite positive evaluation was achieved for both genders (male, $M = 6.21$; female, $M = 5.81$), despite being the lowest-rated dimension, generating significant differences ($U = 6795$; $Z = -4.697$; $p < .05$) with a small effect size ($r = .309$). Regarding the intellectual dimension, the male participants evaluated the possibilities of gamification quite positively after using the methodology ($M = 6.40$), with a higher mean score than the female participants ($M = 6.10$), significant differences ($U = 6731$; $Z = -4.794$; $p < .05$), and a small effect size ($r = .278$). The pedagogical dimension was again rated the highest by both genders, with male participants giving evaluations close to very positive ($M = 6.48$), while those of their female counterparts were quite positive ($M = 6.19$), yielding significant differences between the two genders ($U = 7056$; $Z = -4.339$; $p < .05$) with a small effect size ($r = .283$). With regard to the overall score of the questionnaire, the perceptions of both genders were quite positive (male, $M = 6.36$; female, $M = 6.05$), producing significant differences in the scores ($U = 6354$; $Z = -5.302$; $p < .05$) and a small effect size ($r = .353$).

Lastly, in Table 3, the statistical contrast from before the methodology’s implementation to after (pre-test and post-test) can be seen, considering each dimension of the questionnaire, and differentiating according to gender. As can be observed, there were significant differences between the scores from before and after using gamification for both genders, reaching large effect sizes in all the dimensions and in the total score.

Dimension	Male			Female		
	Z	p.	r	Z	p.	r
DIM. C	-9.868	.000*	0.868	-10.810	.000*	0.802
DIM. I	-9.869	.000*	0.839	-10.774	.000*	0.821
DIM. P	-9.832	.000*	0.892	-10.815	.000*	0.833
TOTAL	-9.858	.000*	0.930	-10.801	.000*	0.874

*Level of significance at 0.05.

Table 3. Wilcoxon test between pre-test and post-test perceptions

4. Discussion and Conclusions

In times when it is crucial to consider different distracting elements and their influence on attention levels in education (Ainciburu, 2022; Carrilo & García, 2022; Otazú, Mayta, Cavero & Martínez, 2022; Romero & Simaluiza, 2022), making students the protagonists of the learning process has become a fundamental necessity. Gamification, mediated by technology, constitutes a proposal for an entertaining methodology that boosts motivation (Bicen & Kocakoyun, 2018; Ekici, 2021) and that has proven to be effective in increasing academic results (Çakıroğlu et al., 2017; Landers & Armstrong, 2017).

Based on the above, this study aimed to understand how university students studying primary education evaluated the implementation of this active methodology in their teaching and learning processes. In this sense, the perceptions of the pre-service primary teachers at the University of Málaga were quite positive in general, thereby indicating positive evaluations of the characteristics that shape and compose this methodology; however, these results are rejected by other similar studies (Carrión, 2019; Cuevas et al., 2021; Flores et al., 2021; Romero & López, 2021; Santos et al., 2020; Umamah & Saukah, 2022).

Regarding the impact of gamification in the classroom, a pre-test and post-test was carried out, so that not only their perceptions of what they knew about it would become known, but also that their opinions would become based on a lived experience by using the methodology in the course. In this way, the point of interest was whether changes in their perceptions were produced. The results indicated a significant improvement in their perceptions in all the dimensions and in the overall instrument after implementing the methodology. These positive evaluations coincide with those found in other studies (Ä-zer et al., 2018; Gómez et al., 2020; Hinojo et al., 2021) that followed the same process, taking the changes in perceptions of gamification measured with a pre-test and post-test into account.

With respect to the possible existence of differences according to the gender variable and the time of evaluation, the findings reveal that male participants gave significantly higher scores than female participants, both before implementing gamification (pre-test) and after (post-test). These results contradict those found in a study by Gómez et al. (2020), where the female participants had higher scores. Neither do they coincide with those of the work by Tamrin, Latip, Latip, Royali, Harun and Bogal (2022), where women had significantly higher scores in their perceptions than men. Nor does it coincide with the study by González-Limón, Rodríguez-Ramos and Padilla-Carmona (2022), where women value gamification better but without significant differences. They also go against studies by Cuevas et al. (2021), Hinojo et al. (2021), Marín et al. (2020), Umamah and Saukah (2022), and Wu, Zhou and Li (2023), where no significant differences were produced in the evaluations of gamification according to the gender variable. However, there are works such as Ortiz-Colón, Ágreda-Montoro and Rodríguez-Moreno (2020) in which men perceive themselves as more capable of using technologies and implementing methodologies such as gamification as in our findings. The main reason is because they tend to consider their self-efficacy better than women in terms of technology (Zahedi, Batten, Ross, Potvin, Damas, Clarke et al., 2021).

In the end, it can be affirmed that the pre-service primary teachers in this study have positive perceptions of gamification, thus promoting the use of this entertaining and motivating methodology, where students become the protagonists of their own meaningful learning.

As for the limitations, the intentionality of the sample and the number of participants should be mentioned, as they make it difficult to generalise the results. In this sense, it would be necessary to carry out random sampling with pre-service teachers from different universities either at a regional or national level, as well as to expand the sample for a more significant extrapolation of the findings within the educational community. Another aspect to be considered is the use of an instrument based on self-perception, which is conditioned to the subjective evaluations and opinions of the participants. To this end, it would be interesting to consider other more objective factors such as academic performance or proof that demonstrates the effectiveness of the gamification methodology. Among future lines of research, other undergraduate degree programs could be incorporated (Early Childhood Education, Pedagogy, or Social Education), and the study could also be performed with in-service teachers in order to compare the results of pre-service and in-service teachers. Additionally, the predictors that may influence perceptions of gamification and academic performance, such as motivation, level of digital competence, or interest in gamification itself, could be analysed to determine the impact of these aspects and subsequently design learning processes based on this methodology.

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