Educational Gamification to Improve Knowledge and Sexist Attitudes in Teachers

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Abstract

Education is undergoing a constant transformation driven by the use of new technologies. The integration of these effective digital tools in the teaching-learning process has allowed changes in the way students access information and how educators facilitate learning. Therefore, the prevention of gender violence in the school environment is not limited only to students, but must be addressed at the level of the entire educational community, with the active participation of teachers being crucial as key agents to transform ingrained patterns. The objective of the research was to develop a training program for teachers in educational gamification tools to improve knowledge and attitudes against sexism. The study adopted a quantitative approach through a quasi-experimental design. The sample included 40 high school teachers, divided into an experimental group of 20 teachers and a control group of 20 teachers. A validated instrument on sexism was used, composed of 14 knowledge questions and 26 attitude questions, adapted from Bonilla (2018), based on the dimensions proposed by Fisher. The results showed a p-value of 0, indicating a significant difference between the means of the pre and post test, with a significance value of 0.00 in both variables. In conclusion, it is evident that the use of educational gamification tools leads to an improvement in both knowledge and attitudes against sexism among teachers.

Keywords: *Gamification, sexism, attitude, gender violence, active learning.*

INTRODUCTION

Educational gamification, as an innovative pedagogical strategy, has emerged as an effective tool to transform the teaching and learning process, it seeks to take advantage of playful and dynamic elements of games to enhance the acquisition of knowledge and, in this particular case, to address sexist attitudes among high school teachers. Therefore, the implementation of gamification in the educational field is presented as a promising way to influence teachers' perception, understanding and reflection on gender issues.

For Merlyn and Díaz (2021), sexism is a social problem that has existed throughout history, creating differences and inequalities between genders. Despite government

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initiatives and support from international organizations to eliminate and prevent gender-based violence, it remains a reality. Although comprehensive strategies have been put in place, little progress has been made and women continue to experience different types of violence in their daily lives, which has a negative impact on educational and social progress in society.

On the other hand, UNESCO (2020) underlines that women and girls continue to face discrimination and gender-based violence, which is a major obstacle to achieving gender equality. In addition, the Pan American Health Organization (2023) indicates that discrimination and gender-based violence affect about 30% of women worldwide, which translates into around 736 million women affected by this alarming social problem.

It is imperative to mention that, in Ecuador, gender-based violence has been a persistent problem for the last decades, with worrying statistics reported by the State Attorney General's Office (2020). According to their records, 65 out of every 100 women have suffered at least one type of violence and discrimination in their lives, which is evidenced by the 19,359 complaints filed with the prosecutor's office, with numerous cases of sexism.

Pesce and Etchezahar (2019) describe sexism as attitudes and behaviors that relegate women to an inferior position to men because of their gender. These attitudes can appear in any stratum of society and include behaviors such as sexist jokes, derogatory comments about appearance, harmful attitudes towards women, or the imposition of gender roles. These behaviors fall into two categories: hostile sexism, which comprises explicit misogynistic attitudes, and benevolent sexism, which reflects attitudes that appear to be positive toward women but actually confine them to socially accepted gender stereotypes. This includes the expectation that women will be kind, submissive, or valued primarily for their physical appearance rather than for their accomplishments. (Orellana et al., 2020)

In both cases, sexism manifests itself as harmful behaviors that generate wrong thoughts, ideas and beliefs in people, since, when expressed through various harmful behaviors, it negatively impacts the perception and construction of thoughts, ideas and beliefs in people, so by promoting sexist attitudes, gender stereotypes are reinforced and inequalities are perpetuated. creating an environment conducive to the development of distorted perceptions about the roles and capabilities of men and women.

On the other hand, Atlatenco and De la Garza (2019) argue that it is at school, and particularly during adolescence, where sexist behaviors begin to manifest. These are the result of prejudices and attitudes that have become normalized in society, and that stand in the way of equal rights for all. Similarly, Nicolás and Johnson (2019) argue that, in some cases, educators have come to normalize gender-based violence to such an extent that certain behaviors, which reinforce stereotypes, go unnoticed or are considered innocuous. This also extends to their own sexist behaviors.

It should be noted that Echeverría and Francisca (2017) argue that the lack of effective policies and actions has resulted in an inequitable society. The lack of clear and effective protocols by the Ministry of Education to address and prevent discrimination inside and outside educational institutions has generated a system of impunity that favors aggressors, who are not adequately punished, as it is considered a common practice in society. The lack of clarity about what teachers can or cannot do in terms of behaviour and prevention is a crucial aspect that requires attention. (Decombel et al., 2022)

However, Aristizábal et al. (2018) point to the lack of training on gender and diversity issues among teachers, which creates a difficulty in detecting and addressing sexism in the classroom. This lack of training can lead to tolerance and normalization of sexist behaviors and attitudes. Therefore, the use of technology is seen as an ally to address this problem. Along these lines, Guevara (2018) highlights that gamification in the

educational field has been successfully implemented both inside and outside the classroom, promoting cognitive development and user participation through games as an educational tool. The use of educational gamification platforms such as Blooket, Educandy, PlayFactile, Word Wall, Kahoot, Genially, My Tutor, Duolingo, among others, has incorporated various elements to motivate participation and learning.

In addition, Rodríguez et al. (2019) argue that current education should be oriented towards pedagogical innovation, using digital environments that encourage collaborative work, autonomy, critical thinking and creativity. The use of educational gamification tools provides these advantages. This study is carried out with the aim of improving the knowledge of Ecuadorian teachers about sexism and its complexity in society, using playful and interactive gamification tools, with the purpose of promoting a non-sexist education in educational establishments.

From a practical perspective, the integration of educational gamification tools in non-sexist education would enhance the skills of high school teachers to prevent and mitigate the risk of gender discrimination inside and outside the educational institution. In theoretical terms, it will allow us to delve into the theoretical foundations related to the topics of study: sexism and the use of gamification tools, as well as the empirical evidence related to the topic investigated by other authors. As for its methodological usefulness, it will serve as a reference for future research on teacher training in the use of digital tools to contribute to the knowledge and reduction of sexist behaviors in the teaching environment.

In terms of social relevance, the study promotes non-sexist education in educational institutions, seeking to apply actions and strategies that reduce gender discrimination in the classroom, aligning with Sustainable Development Goals 4 (Quality Education) and 5 (Gender Equality). In this way, the research will contribute to addressing the problem of the high rates of violence that affect the female gender in Ecuador.

Based on this premise, the general objective is to determine how educational gamification tools influence knowledge and attitudes against sexism in Ecuadorian teachers. At the same time, specific problems are raised, which include the analysis of ambivalent sexism and strategies to counteract sexist attitudes in teachers, the identification of sexist knowledge and attitudes in teachers at all educational levels, the design and implementation of a training program on the use of gamification tools to address issues of sexism, and the evaluation of the results of the use of educational gamification tools in the attitudes and knowledge of high school teachers in relation to sexism and, in turn, demonstrate that the use of educational gamification tools can significantly improve the knowledge and attitudes about sexism in high school teachers in Ecuador.

METHODS

This study falls within the scope of applied research, according to Novoa's classification (2023) its main objective is to explore personal, social, cultural and political experiences to achieve a deeper understanding of reality and how people influence citizenship. The main purpose of this research is to address and solve social problems within the educational context. The approach adopted is quantitative in nature, focusing on the measurement of various aspects related to the study variables.

Regarding the research design, a quasi-experimental approach has been chosen that incorporates pre- and post-test measurements. To carry out this evaluation, a questionnaire composed of 14 items with multiple answers will be used to analyze both the use of educational gamification tools and the presence of sexist attitudes among high school teachers.

The study was divided into two phases: in the first, an online survey was conducted to the sample participants to assess knowledge about sexism, using the sexism scale assessment instrument to measure teachers' attitudes. Both surveys were conducted using the Typeform platform and participants were informed about the contents of the instruments. Subsequently, the database was filled in, classified and organized.

In order to evaluate the reliability of the instruments, a pilot sample was carried out through a descriptive study. The data were analyzed in Microsoft Office Excel, filtering the information and representing it in frequency tables. Then, Cronbach's alpha was used as a statistical instrument to measure the reliability of the results obtained. The processing of the test results was carried out using SPSS software. The t-test was used to compare the means of two different groups and determine if there was a significant difference between them.

In the context of the research, the t-test was applied to contrast the knowledge or attitudes of teachers before and after the implementation of educational gamification tools, as well as to compare the knowledge averages between the two time points and determine if there was a significant improvement in knowledge after implementing the educational gamification program. The sample was composed of 40 teachers who teach at the high school level in the morning and afternoon, specifically in the area of Science and Computer Technician of the Ximena 2 district.

RESULTS

Taking into account the application of the instruments, the following results were obtained:

Table 1. Sexist knowledge and attitudes in teachers before applying the program in the experimental and control groups

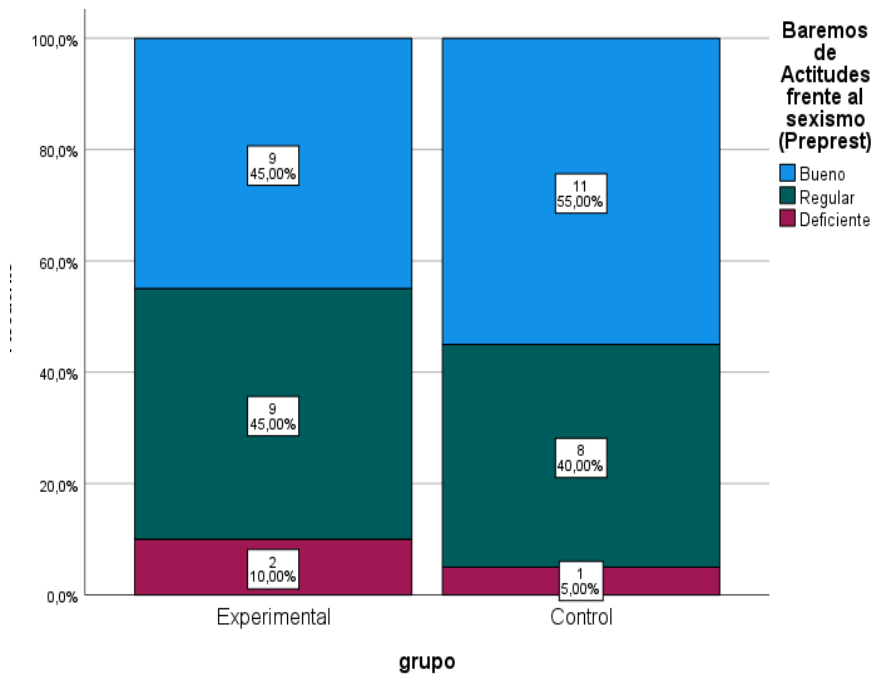| Group Statisticians					
	group	N	Stocking	Typical deviation	Typ. of the average
Hostile Sexism (Pre)	Experimental	20	38,9500	20,57202	4,60004
	Control	20	32,7000	14,44445	3,22988
Benevolent Sexism (Pre)	Experimental	20	36,5000	10,85066	2,42628
	Control	20	34,1000	12,66117	2,83112
General Knowledge (Pre)	Experimental	20	4,8500	1,84320	,41215
	Control	20	3,1000	2,14966	,48068
Protocol (Pre)	Experimental	20	1,6000	1,09545	,24495
	Control	20	1,3500	1,46089	,32667

The data shown in Table 1 provide a detailed analysis of the descriptive statistical values for each dimension of the study, corresponding to the first phase of the study, the PRE TEST. It can be noted that the means of the control group in terms of attitudes (in the dimensions of Hostile and Hostile Sexism) are 66.80, and in terms of knowledge (in the dimensions of Conceptualization and Protocols) it is 4.45. On the other hand, the means

of the Experimental group in terms of attitudes are 75.40 and in terms of knowledge it is 6.45.

In addition, it can be noted that at the level of sexist attitudes, both hostile and benevolent, the experimental group shows more sexist attitudes than the participants in the control group. In terms of knowledge, the experimental group has a higher level of sexist knowledge than the control group. As can be seen in both groups, the mean of the Experimental Group is higher than the average of the Control Group, by 2 points at the level of knowledge and by 8.60 at the level of sexist attitudes.

Regarding the results obtained, Figure 1 shows the level of sexist attitudes achieved by the experimental and control group, before (pre-test) the implementation of the gamification program.
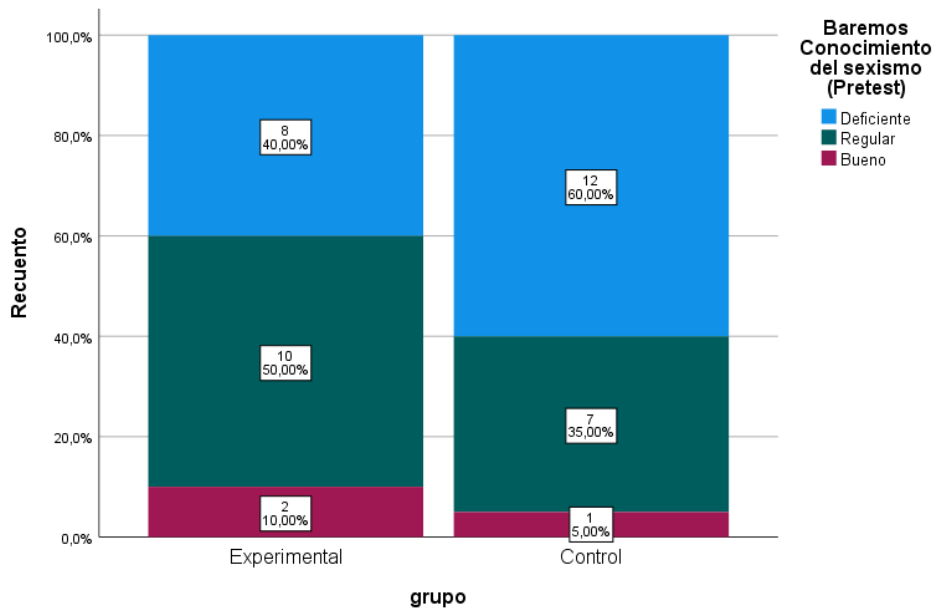
Figure 1. Attitudes Towards Sexism (Pre Test)

As shown in Figure 1, attitude levels are classified as Good (55% control and 45% experimental), Fair (45% experimental and 40% control), and Poor (10% experimental and 5% control). This indicates that, in terms of attitudes towards sexism for the PRE TEST groups, the control group has a higher percentage of sexist attitudes compared to the experimental group, reflecting a difference of 10 percentage points.

Regarding the results obtained, Figure 2 shows the level of knowledge about sexism achieved by the experimental and control group, before (pre-test) the implementation of the gamification program.

Figure 2. Knowledge of Sexism (Pre Test)

Note. Spss Statistical Program

As shown in Figure 2, knowledge levels are classified as Poor (60% control and 40% experimental), Fair (50% experimental and 35% control), and Good (10% experimental and 5%). This indicates that, in terms of knowledge about sexism for the PRE TEST groups, the control group has a higher percentage of knowledge compared to the experimental group, reflecting a difference of 20 percentage points.
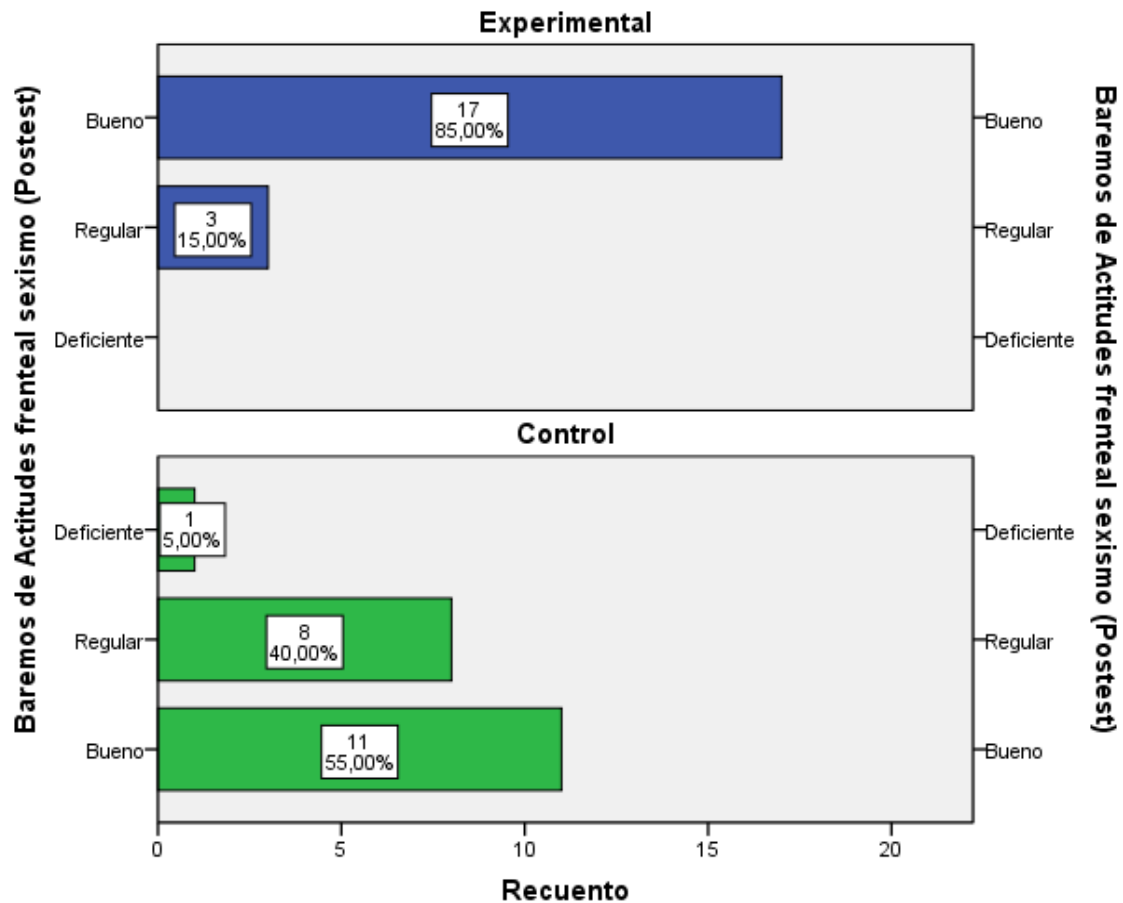
Table 2. Sexist knowledge and attitudes in high school teachers after applying the gamification program.

Group Stats						
Dimension		N	Stocking	Standard deviation	Standard Mean	Error
Knowledge of Sexism (Posttest)	Experimental	20	12,2000	1,10501	0,24709	
	Control	20	5,3500	2,27746	0,50926	
Protocol (Posttest)	Experimental	20	4,1000	0,78807	0,17622	
	Control	20	1,6500	1,30888	0,29267	
Hostile Sexism (Posttest)	Experimental	20	27,8500	9,26382	2,07145	
	Control	20	38,2500	10,95385	2,44936	
Benevolent Sexism (Postest)	Experimental	20	24,6500	6,26834	1,40164	
	Control	20	38,5000	8,20462	1,83461	

The results presented in Table 2 detail the descriptive statistical values of the dimensions of the study in the second phase, which corresponds to the POST TEST. It is observed that the means of the control group before the intervention, in terms of attitudes (between the Hostile and Hostile Sexism dimensions), are (76.75), and in knowledge (between the Conceptualization and Protocols dimensions) is (7.00). On the other hand, the mean of the experimental group after the intervention, in attitudes, is (52.50), and in knowledge is (16.30).

It is evident that, in both groups, the mean of the Experimental Group exceeds that of the Control Group by (24.25) in terms of knowledge and is lower in (9.30) in sexist attitudes after the application of the program. After the educational intervention, the experimental group experienced a 40% increase in positive behaviors against sexism (from 45% in the pretest to 85% in the posttest), compared to the control group, demonstrating an increase in positive attitudes among the participants.
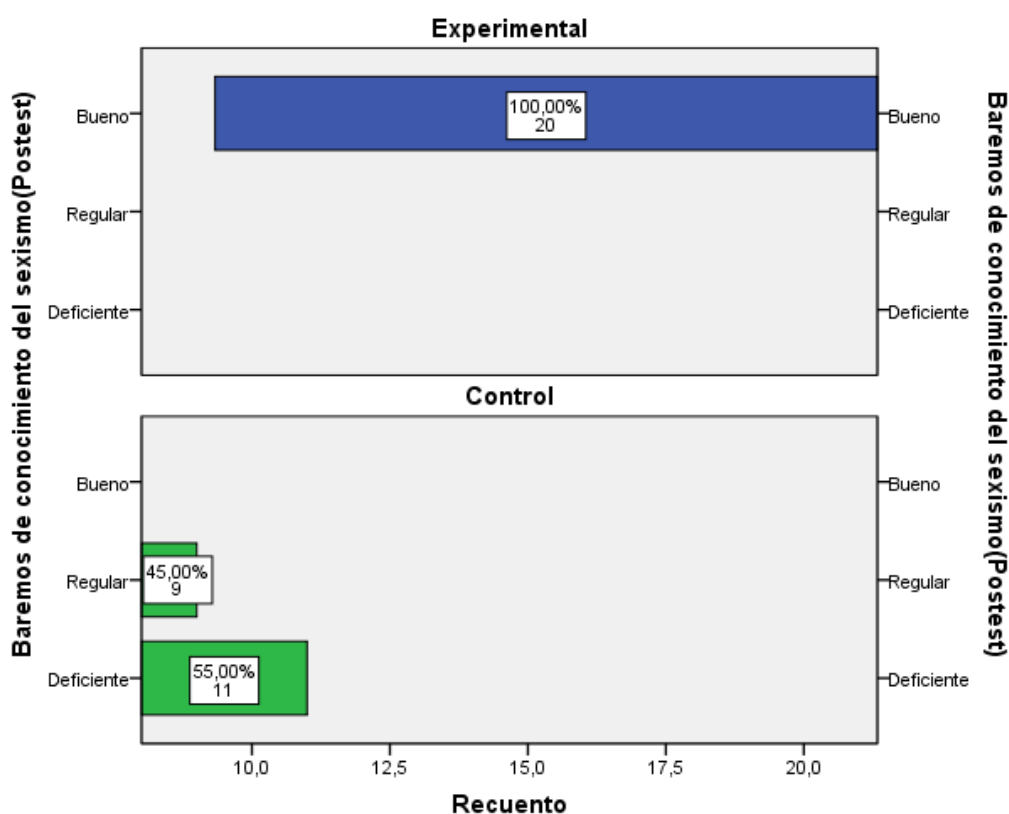
Figure 3. Attitudes Towards Sexism (Post Test)

Note. Spss Statistical Program

Figure 3 shows an improvement in the levels of attitudes against sexism after the intervention, in contrast to the control group, which maintains similar data to the group in the Pre-Test; showing a difference of 30 percentage points. When analyzing the results of the group in the Pre-Test, they are distributed between the categories of Good (85% in the experimental and 55% in the control), Fair (15% in the experimental and 40% in the control) and Deficient (0% in the experimental and 5% in the control). This indicates an increase in positive attitudes towards sexism in the POST TEST groups.

Figure 4. Knowledge of sexism (Post Test)

Note. Spss Statistical Program

In Figure 4, it can be seen that after the intervention, all participants have acquired significant knowledge about sexism, unlike the control group that maintains data similar to the PRE-TEST; showing a difference of 90 percentage points. When analyzing the results of the group in the Pre-Test, the level of knowledge was mostly Poor (40% in the experimental), Fair (50% in the experimental) and Good (10% in the experimental), indicating that the training has had a positive impact on the knowledge imparted.

Program Effectiveness (Hypothesis Testing)

Normality Test

An inferential analysis was carried out to identify the most appropriate statistical test to confirm the proposed hypotheses of the study variable. The data normality test was used to determine the normal distribution of the control and experimental group, both before and after the implementation of the NON-Sexist Educational Program for Teachers: "GAMIFY YOUR CLASSROOM". The Shapiro-Wilk normality test was selected because the sample consisted of 40 teachers participating in the study. The results generated by the SPSS statistical program are as follows:

Table 3. Shapiro-Wilk Normality Test

Group		Shapiro-Wilk		
		Statistical	Gl	Gis.
Experimental	Knowledge (postest-pretest)	0,905	20	0,052
	Attitudes (postest-pretest)	0,940	20	0,241
Control	Knowledge (postest-pretest)	0,945	20	0,295

Attitudes (postest-pretest)	0,845	20	0,006

*. This is a lower limit of true significance.

to. Lilliefors Significance Correction

As shown in Table 3, the values calculated by the Shapiro-Wilk normality test are not statistically significant at the significance level (e.g. value <.0.05), indicating that the data have a normal distribution. Regarding its dimensions, values higher than (sig. 0.05) were found, which indicates that it is parametric. Therefore, to verify the hypotheses, the parametric statistical T-Student test was used for related samples (before and after) and the Student's T-test for independent samples (control and experimental groups).

Hypothesis testing

(Ha): The use of educational gamification tools improves knowledge and attitudes related to sexism in high school teachers in Ecuador.

(H0): The use of educational gamification tools does not improve the knowledge and attitudes related to sexism in high school teachers in Ecuador.

Table 4. T for Student - Before and after the application of the program

Matched Sample Testing									
Groups		Paired Differences					t	Gl	Follow-up (bilateral)
		Stocking	Standard deviation	Standard Error Mean	95% Difference Confidence Interval				
					Inferior	Superior			
Experimental	Attitudes (Pretest) – Attitudes (Posttest)	22,95000	15,67927	3,50599	15,61188	30,28812	6,546	19	0,000
	Knowledge (Pretest) – Knowledge (Posttest)	-5,75000	2,93571	0,65645	-7,12396	-4,37604	-8,759	19	0,000
Control	Attitudes (Pretest) – Attitudes (Posttest)	-9,95000	10,42505	2,33111	-14,82907	-5,07093	-4,268	19	0,000
	Knowledge (Pretest) – Knowledge (Posttest)	-0,90000	1,41049	0,31539	-1,56013	-0,23987	-2,854	19	0,010

Note. Spss Statistical Program

Table 4 shows a value of p=0 <0.05, which leads to the rejection of (Ho) and the acceptance of (Ha). This indicates that the means between the pre- and post-test differed

significantly in the experimental group, both in attitudes (T=6.546) and knowledge (T=8.759), with a significance value of 0.000 for both variables.

In addition, it is noted that the samples come from populations with similar variances, since the calculated significance value is lower. Consequently, the null hypothesis is discarded and the alternative hypothesis is supported. In this way, it is concluded that the implementation of educational gamification tools effectively improves knowledge and attitudes about sexism in high school teachers in Ecuador.

DISCUSSION

The integration of gamification tools in education emerges as an essential component for the effective transmission of knowledge in today's digital age. Not only do these tools enable constant innovation, but they also offer playful and interactive pedagogical strategies that capture the attention of both students and teachers. In this sense, the training of educators is revealed as a crucial element to meet the sustainable development goals, especially in terms of providing quality education and addressing persistent gender inequality in society, where sexism plays a central role.

Despite theoretical advances in the field of education over time, in public institutions, teachers tend to maintain traditional approaches and show reluctance towards the incorporation of technological resources during classes. Students express their desire for classes to include technological elements to enrich and enhance their educational skills.

Therefore, teachers take responsibility for constantly updating their knowledge and perfecting their skills, committing themselves to the improvement of education through participation in training courses. It is essential that they use creative and innovative teaching methodologies and strategies, and gamification is presented as a tool that offers valuable learning skills in this context.

By connecting technological advancement to societal issues, such as the detection of sexism in educational institutions, ICTs could facilitate the creation of enabling and interactive environments to foster effective learning that motivates both teachers and students. These tools could be used as preventive strategies to reduce violence and gender stereotypes in such places.

In addition, the use of gamification is promoted to enrich learning in the psychopedagogical field, contributing to the development of skills to manage or solve conflicts, strengthening social behaviors and reducing inappropriate behaviors, according to the theoretical contributions of Echeverría and Francisca (2017), the lack of training of teachers on gender and diversity issues is due to the absence of clear policies by educational authorities.

In this sense, Rodríguez (2019) defends an education focused on innovation through digital environments, stressing that educational gamification tools have essential benefits in terms of collaboration, autonomy and critical thinking, to generate knowledge and identify sexism. In addition, gamification can assist teachers in introducing innovations in their pedagogical practice.

Considering the main purpose of the research, which is to evaluate how Educational Gamification Tools impact on Knowledge and Attitudes Against Sexism in High School Teachers in Ecuador, it is theoretically supported by the perspective of Bonilla et al. (2022). This theory argues that sexism has ingrained attributes that perpetuate the perception of the inferiority of the female gender in significant roles in society, thus underscoring the importance of comprehensive education to prevent this phenomenon.

The research applied the T-Student hypothesis test for related samples, where the hypothesis proposed was Ha: u1≠u2. With a significance level of 0.000, it was

determined that the means were different, indicating a significant difference between the group's results before and after the application of the training course in the use of educational gamification tools. In other words, it was evidenced through this training program that high school teachers in Ecuador experienced improvements in both their knowledge and their attitudes related to sexism.

Similar results were obtained in the research of Navarro et al. (2019), where a mobile application called "Liad@s" was developed that applied gamification to raise awareness among adolescents in the province of Valencia about the prevention of sexism, both in its hostile and benevolent manifestations. The application, available in IOS and Android versions, presents a roulette game with 10 different colors that identify behaviors, attitudes and knowledge about sexism, thus encouraging critical and reflective thinking about this social problem.

In terms of inferences, the study revealed that the intervention group experienced a noticeable decrease in ratings of hostile and benevolent sexism after using the psychoeducational app, in contrast to the control group. Specifically, the intervention group showed a 6-12% reduction in sexist attitudes, which was considered statistically relevant. The researchers suggest that these findings support the use of games in mobile apps as a means of promoting gender equality and decreasing sexist attitudes among adolescents.

In this research, the variable "knowledge of sexism" was assessed at three levels: poor, fair, and good. A higher score in the results obtained from the sample groups in the pre- and post-test stages would confirm the reliability of the study. This is supported by theories such as Ausubel's Learning, which holds that the individual is always willing to learn new content that is relevant or has a social impact.

The results of the training carried out with educational gamification tools to improve the knowledge of sexism in high school teachers show that all participants in the experimental group have acquired a high knowledge about sexism, in contrast to the control group that maintains its data similar to the PRE-TEST, in terms of the specific level, the variable "attitudes against sexism" was evaluated at three levels: good, fair and poor. A lower score in the results obtained from the samples of the groups in the pre- and post-test stages would confirm the reliability of the study.

On the other hand, the results derived from the training carried out through the use of educational gamification tools with the purpose of preventing sexism in high school teachers show that, in the experimental group, the participants have obtained an 85% increase in identified positive attitudes and 15% have moderate attitudes. It is evident that the variable of attitudes towards sexism has improved in the POS TEST group compared to the control group, where more than 45% of the participants exhibit sexist behaviors.

When exploring research related to the variable of sexist attitudes, we can cite Espinoza and Albornoz (2023) who link the theory of gender socialization, which holds that people learn gender roles and behaviors through social interaction and culture, and the theory of growth mindset, which states that people can develop intelligence and skills through effort and practice. The results of Espinoza & Albornoz reveal a study of the Durbin-Watson test with DW=2.133, reflecting acceptable values (<1.147). This indicates that the participants, mostly teachers, present EGE on academic skills (t(87)=4.673, p<0.001), assigning more need for academic support to men in feminized careers and to women in masculinized careers.

In addition, in the study by Díaz and Sánchez (2019) on the prevention of sexist attitudes through emotional intelligence, it is highlighted that the level of sexism, whether hostile or benevolent, is associated with the social construction of stereotypes based on specific gender roles. The results indicate a statistically significant correlation between the

variables, suggesting that greater emotional control can prevent sexist attitudes and behaviors in educational settings.

Therefore, through the implementation of a pedagogical innovation based on educational gamification tools, it was possible to have a positive impact on learning, as well as on the identification of sexist attitudes and behaviors among teaching staff. The focus of the study is on providing teachers with gamified tools to prevent school sexism while also passing on that knowledge to students.

Consequently, it has been shown that the use of educational gamification tools improves sexist learning, attitudes and behaviors in high school teachers in the city of Guayaquil, being essential to continue exploring and offering new pedagogical approaches to counteract sexism and all its manifestations in society, through the application of workshops, courses, lectures, among others, on this social problem, making it possible to close the gender inequality gap.

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