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Chilean Student Teachers' Willingness to Learn with Gamified Systems

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Abstract: In recent years, the use of gamified systems in education has increased due to the growing empirical evidence of their usefulness in improving motivation and participation in learning processes, resulting in sustainable social development. To take advantage of the opportunities for improvements in the sustainability of education presented by gamification, in addition to the decision to create gamified systems in higher education, this article investigates the willingness of student teachers to learn with gamified systems. The research method is quantitative, with validated instruments used to measure: (1) student perception of gamification; (2) player profile; and (3) screen time, with n = 569 student teachers from the fifteen regions of Chile. The results show that students prefer to learn with gamified systems rather than in a traditional way, with a significant difference (Wilcoxon $z = -18.86$, $p < 0.01$). There are significant positive and negative relationships corresponding with the gamer profiles. However, as a finding, a negative relationship was found between the number of hours spent playing video games and the perception of learning through gamified systems. In conclusion, Chilean student teachers present a favorable disposition to teacher training with gamified systems. However, the disposition varies in relation to the number of hours spent playing video games.

Keywords: gamification; university students; higher education; gamer profile

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1. Introduction

In recent years, the use of gamified systems in education has increased due to growing empirical evidence of their usefulness in improving motivation and engagement in face-to-face and distance learning processes [1,2]. These issues are in line with the challenges posed by pedagogical theory in the search for innovation and adaptation to the context and needs of students [3], which is why gamification presents pedagogical opportunities with the incorporation of playful elements in educational spaces [4,5]. And, by improving the motivation of student teachers, they can learn more, better and will have the tools to be the engine of the values-based education for sustainable development [6]. For these reasons and others presented below, our research is guided by the questions: What is the disposition of the student teachers to learning with gamified systems? How does the willingness to learn with gamified systems of student teachers relate to their perception of gamification, gamer profile, and screen time habits?

From these questions and within the framework of a project to create gamified systems to take advantage of the opportunities for improvement in education presented by gamification, this article investigates the willingness of student teachers to learn with gamified systems based on the analysis of three variables: (1) student perception of gamification; (2) player profile; and (3) screen time.

The first variable is the perception of learning with gamified systems. This variable is considered because an initial diagnostic evaluation is desirable for effective planning of future actions [7]. A second reason is that the studies that analyze gamified systems in education involve measurements carried out after the implementation of gamified

systems, so they only report the perception of the experience without addressing questions such as the students' disposition towards gamification, nor their initial perceptions of the incorporation of playful strategies in the learning process [8]. As a third reason, it underlies the assumption that the gamified experience must be well regulated and planned to avoid possible negative effects and favors a good experience for the student [9], since defective planning of gamified systems can generate a decrease in academic performance, motivation problems, a lack of understanding, and devaluation of the gamified content [10].

The second variable is the profile of the player. This variable is considered since gamification systems are more effective when they adapt to the preferences, behaviors, and role that a person takes when playing or being in playful environments [11,12]. It also informs us about the profiles of students, which could serve as an input for the planning of other university activities.

The third variable is the number of daily hours of screen time, with a focus on video game time. We consider this variable in line with the hypothesis that students welcome learning through video games [13].

1.1. State of the Art

Current knowledge of the perception of gamification in university education shows that the common result is a low awareness of gamification by teachers and students [14–17]. However, after being involved in gamified activities, university teachers believe that gamification improves teamwork, oral communication, critical thinking, and the development of social skills [18,19].

The change in perception of gamification is also evident in doctoral students, who, when participating in gamified classes, favorably changed their perception of gamification [15]. Perceptions of learning were also studied, with beneficial results, specifically, increased motivation and engagement, fun learning, working more and better in class, feedback, reflection, and team performance [15].

In the case of initial teacher training, student teachers' perception of gamification improved after participating in gamified classes, as well as their motivation and commitment to their classmates [14]. In addition to this information, students' perception of the use of gamified systems for learning was favorable, and they considered the use of gamified systems in classes desirable [14], and they also observed an improvement in motivation, participation, academic results, development and competencies for their development as future teachers [14,16,19]. And, specifically, measuring the willingness to learn with gamified systems shows that students prefer gamified classes to classes with traditional methodologies and assessments [20]. With this information, it was also observed that there are no significant differences in relation to sex but there are significant differences in age, where the younger the age, the greater the willingness to engage in gamification [4].

Despite the growing number of publications on gamification in education [16], there are gaps in the knowledge of the impact of gamification on learning and emotionality in various contexts [15]; the effects of gamification on collaboration, information synthesis, critical thinking, and problem solving [14]; gamification and its impact on academic performance and intrinsic motivation [21]; and "teachers' perceptions towards the practice of gamification strategies in the university classroom" [19].

1.2. Problem Statement of the Study

The focus of our research is based on the last recommendation: the gap in knowledge detected in the quote [19], and on the scarcity of information on the gamification disposition of Chilean or Latin American university students. By studying these knowledge gaps, the present study improves the understanding of how student teachers perceive gamification, their self-perception as gamers, and their habits of using video games and screens in general. With the reported findings, we have an empirical theoretical basis for the development of effective and adequate strategies that advance towards personalization to the students' needs, thus maximizing the positive impact of gamified systems in education that promote

sustainable development in Chilean higher education students or in cultural contexts with certain similarities such as Latin American countries.

1.3. Research Objectives

The present article aims to describe and relate the willingness of student teachers to learn with gamified systems with the students' perception of gamification, their profile as gamers, and the time spent on screens with emphasis on the hours devoted to video games. With the study of these variables, this article seeks to improve the current understanding of the field based on previous research to generate a profile of student teachers and generate more effective gamified systems for this group of higher education students. It was carried out at this stage because of the importance of training teachers as the driving force behind the sustainable development of society [6].

2. Methods

2.1. Research Design

This research was quantitative and ex post facto, since the data were created prior to the study or were self-perceived so they ere been modified or manipulated in the data collection phase [22]. The design was observational with a cross-sectional approach, as the observation was carried out through Microsoft Forms surveys in June 2023. In this sense, the paper presents calculations of correlation and differences between variables.

2.2. Participants

The study sample corresponds to n = 569 Chilean higher education teaching students (see Table 1). Sampling was random with the inclusion criterion being a student of a teaching degree. The data were collected through influencers with pedagogical themes, who called on social networks (Instagram, Facebook) to answer the questionnaire through a Microsoft form (link: https://forms.office.com/r/mjgsHqqZjA, accessed on 1 June 2023). A total of 595 responses were obtained; however, when the data were cleaned using the criteria of (1) being a student teacher and (2) not having answered all the questions with the same answer on the Likert scales, we were left with n = 569.

Table 1. Descriptive data of the sample.

	Frequency	**%**
	Age groups	
18–20	170	29.88
21–23	217	38.14
24–26	103	18.10
27–29	41	7.21
30+	38	6.68
	Gender	
Female	457	80.32
Male	107	18.80
LGBTIQ+	5	0.88
	Indigenous status	
No	471	82.78
Mapuche	94	16.52
Aymara	4	0.70
	Years at university	
1 year	155	27.24
2 years	143	25.13
3 years	147	25.83
4 years	72	12.65
5 years	47	8.26
6 years	5	0.88

Table 1. *Cont.*

	Frequency	%
	Economic level	
Very low	94	16.52
Low	258	45.34
Lower-middle	145	25.48
Upper-middle	47	8.26
High	18	3.16
Very high	7	1.23
	Religion	
None	190	33.39
Catholicism	236	41.48
Protestant	143	25.13

Source: Own elaboration.

2.3. Instruments

The data collection instruments were:

- Gamification readiness with the scale "University students' perceptions of gamification" [8].
- Gamer profile was measured with the Gamification User Types Hexad (GUTH) scale [12,20].
- Screen hours, based on the questions asked by Zapata-Lamana et al. (2021) [23]. The questions in our study were:
    - ○. How many hours a day do you spend checking email, social networks or surfing the internet?
    - ○. How many hours a day do you spend doing homework and studying on your computer, tablet, mobile phone or other electronic device?
    - ○. How many hours a day do you usually play video games?
    - ○. How many hours a day do you usually watch TV series, movies or television in general?
- Descriptive data: age, gender, origin, nationality, region of study, and socio-economic level with the survey conducted by the European Society for Opinion and Marketing Research, validated in Chile [24].

2.4. Data Analysis

First, the descriptive data of the sample were calculated (Table 1), and then the gamified classrooms were calculated with the mean of the scores obtained with the scale of university students' perceptions of gamification (Table 2). With the means, the difference between the scores obtained between traditional and gamified classes was calculated using the Wilcoxon statistical test because the sample did not show a normal distribution when performing the Kolmogorov–Smirnov test ($p < 0.05$). Then, the relationship between the descriptive data and the scale of university students' perception of gamification was calculated using Pearson's correlation test. Furthermore, the differences in the willingness to provide gamified classes between the segmented groups in Table 1 were calculated with Welch's ANOVA statistical test, the Games–Howell post hoc tests, and the effect size with Cohen's d [25]. The effect size with Cohen's d states that values (1) <0.2 = no effect; (2) between 0.2 to 0.5 = low effect; (3) between 0.5 to 0.8 = medium effect; and (4) >0.8 = high effect.

$$d = \frac{\overline{X}_2 - \overline{X}_1}{\sqrt{\frac{\sigma_1 2 + \sigma_2 2}{2}}}$$

Table 2. Student teachers' perceptions of gamification and traditional classes.

Category	Subcategory	Type of Class	Statement	M	ED
Methodology	Strategies	traditional	A good way to learn the contents of a subject is to memorize them.	2.66	1.25
		gamified	A good way to learn the contents of a subject is through playful strategies.	4.28	1.26
	Participation	traditional	I prefer a class focused only on the teacher's presentation.	2.07	1.16
		gamified	I prefer learning to be active and participatory.	4.35	1.30
	Stages	traditional	Playful learning strategies are not appropriate at university.	2.30	1.29
		gamified	The use of playful elements in learning can bring benefits at university level.	4.26	1.27
	Time	traditional	Playing in class as a teaching strategy wastes students' time.	1.78	1.28
		gamified	Playful activities can speed up the assimilation of content.	4.21	1.29
	Teamwork	traditional	Working in a team makes the learning process more difficult.	2.23	1.16
		gamified	Working in a team enriches the learning process.	4.09	1.29
Evaluation	Qualification	traditional	The only way to evaluate is through exams.	1.83	1.07
		gamified	The use of play activities in class provides elements that can be incorporated into the grading of a subject.	4.20	1.29
	Evaluation time	traditional	Assessment should only take place at the end of the process.	2.21	1.23
		gamified	Playful strategies help to assess during the whole process and not only at the end.	4.20	1.27
	Purpose	traditional	Assessment is only necessary to evaluate whether or not students know the content.	2.46	1.25
		gamified	Continuous assessment of play activities aims to improve the learning process.	4.04	1.24

Source: Own elaboration.

Note: d = Cohen's effect size; $\overline{X}$ = mean; σ = standard deviation.

The gamer profile was calculated with the mean score obtained; with these data, the Pearson correlation test was carried out with the scores obtained from the scale of perceptions of university students on gamification.

Screen time was measured in relation to the daily hours of (1) web browsing, understood as the daily hours dedicated to the use of email, social networks, and browsing through web browsers; (2) study screen time, understood as the hours per day dedicated to doing homework and studying with an electronic device with a screen; (3) video game time, understood as the daily hours dedicated to playing video games on any platform; and (4) TV time, understood as the hours dedicated to watching films, documentaries, series, and television in general. With these data, the correlation with the results of the scale of university students' perceptions of gamification was calculated.

3. Results

The research results were analyzed to understand the willingness to gamify the university teaching received by Chilean student teachers. First, the results of the calculation

of the differences between the perception of traditional and gamified classes are detailed; second, the relationship between the profile of the player and the willingness to learn with gamified systems is described; and third, the relationship between the daily hours of screen use and learning with gamified systems is explained.

3.1. Willingness to Learn with Gamified Systems

The willingness to learn with gamified systems is presented by means of the results obtained from the scale [8]. The data are represented with means and standard deviations (Table 2).

The results of the application of the scale of willingness to use gamified and traditional classes show that students of teaching degrees give a higher score to the statements that refer to gamified classes than to traditional ones (Wilcoxon z = −18.86, $p < 0.01$).

When calculating the relationships between the descriptive data in Table 1, we found a positive relationship between the willingness to gamify and the years studied at university ($p < 0.01$). In other words, the more years a university student has been at university, the greater the willingness to learn with gamified systems.

In the analysis of the mean differences between groups with Welch's ANOVA test, significant differences were found in the willingness toward gamified classes according to the age groups, with a high effect (Welch's F = 16.49 (5, 42), $p < 0.01$, Cohen's D = 0.87). The post hoc test shows differences between those who had studied in higher education for one year (M = 4.01) and those who had studied for five years (M = 4.78), Games–Howell $p < 0.01$. While calculating the differences with the descriptive data of the samples in Table 1, no significant differences between groups were found.

3.2. Gamer Profile and Learning with Gamified Systems

The results obtained from the application of the GUTH scale show that the following student teachers most often have a gamer profile, from highest to lowest: philanthropist (M = 23.75); achiever (M = 23.38); free spirit (M = 23.21); socializer (M = 22.71); gamer (M = 18.82); and disruptor (M = 13.15). The relationship between these factors and the willingness to learn with gamified systems is presented below in Table 3 and its subsequent explanation.

Table 3. Correlations between willingness to have gamified classes and the gamer profile.

			Gamer Profile					
Category	**Subcategory**	**Type of Class**	**Philanthropist**	**Socializer**	**Free Spirit**	**Achiever**	**Gambler**	**Disrupter**
Methodology	Strategies	Traditional	0.739 **	0.660 **	0.722 **	0.730 **	0.300 **	0.154 **
		Gamified					0.406 **	
	Participation	Traditional	0.738 **	0.664 **	0.719 **	0.715 **	0.182 **	0.222 **
		Gamified					0.388 **	
	Stages	Traditional	0.732 **	0.665 **	0.704 **	0.720 **	0.142 **	
		Gamified					0.400 **	
	Time	Traditional	0.716 **	0.653 **	0.687 **	0.698 **	0.144 **	0.248 **
		Gamified					0.397 **	
	Teamwork	Traditional	0.701 **	0.730 **	0.664 **	0.657 **	0.180 **	0.263 **
		Gamified					0.349 **	
Evaluation	Qualification	Traditional	−0.118 **	0.661 **	0.716 **	0.724 **	0.118 **	0.195 **
		Gamified	0.736 **				0.403 **	
	Evaluation time	Traditional	0.709 **	0.645 **	0.686 **	0.688 **	0.130 **	
		Gamified					0.404 **	
	Purpose	Traditional	0.681 **	0.617 **	0.673 **	0.683 **	0.245 **	0.153 **
		Gamified					0.393 **	

* The correlation is significant at the 0.05 level (bilateral). ** The correlation is significant at the 0.01 level (bilateral). Source: Own elaboration.

When observing the relationships between the gamification readiness of university student teachers with their gamer profile, we found that the philanthropist, socializer, free spirit, and achiever profiles have a significant ($p < 0.01$) and strong relationship with r-values > 0.5 in the preference of gamified systems over traditional ones.

The gamer profile has a significant ($p < 0.01$) weak to moderate positive relationship ($p < 0.01$) in all categories and subcategories on students' willingness to have gamified or traditional classes, with the gamer profile. Specifically, the gamer profile has a positive relationship ($0.1 < r < 0.3$) with the disposition to traditional classes, while with gamified classes, a moderate positive relationship ($0.3 < r < 0.5$) is present.

The disruptor profile has a significant ($p < 0.01$) and positive ($0.1 > r < 0.3$) relationship with the statements referring to traditional classes. On the other hand, no relationship is observed between this profile and the predisposition to gamified classes. Therefore, disruptors prefer traditional classes to gamified classes as measured by the relationship with their preferences.

The gamer profile is positively and significantly related to the willingness to have gamified classes ($0.3 > r < 0.5$) or traditional classes ($0.1 > r < 0.3$). Therefore, students with a gamer profile show a favorable disposition to learn from both traditional and gamified classes.

3.3. Screen Hours and Learning with Gamified Systems

The daily hours of screen usage of Chilean student teachers are shown in Table 4, and the relationship with the willingness to learn through gamified classes is shown in Table 5 and its subsequent explanation.

Table 4. Average hours of screen time per day.

Type of Screen Use	M	SD
Navigation	3.71	2.15
Studio	3.20	1.84
Video games	0.56	1.22
Television	1.33	1.54
Total	8.80	3.88

M = mean; SD = standard deviation. Source: Own elaboration.

Table 5. Correlations between willingness to have gamified classes and screen time.

			Screen Hours per Day			
Category	**Subcategory**	**Type of Class**	**Web Browsing**	**Video Games**	**Study**	**TV**
Methodology	Strategies	Traditional		−0.093 *		
		Gamified	0.101 *		−0.094 *	
	Participation	Traditional		−0.170 **		
		Gamified	0.103 *		−0.101 *	
	Stages	Traditional				
		Gamified	0.093 *		−0.093 *	
	Time	Traditional	−0.118 **	−0.092 *		
		Gamified	0.100 *		−0.119 **	
	Teamwork	Traditional		−0.106 *		
		Gamified			−0.136 **	
Evaluation	Qualification	Traditional	−0.095 *	−0.138 **		
		Gamified			−0.096 *	
	Evaluation time	Traditional		−0.163 **		0.121 **
		Gamified	0.083 *		−0.134 **	
	Purpose	Traditional	−0.123 **	−0.102 *		0.115 **
		Gamified			−0.090 *	

* The correlation is significant at the 0.05 level (bilateral). ** The correlation is significant at the 0.01 level (bilateral). Source: Own elaboration.

The hours of browsing have a positive and significant relationship ($p < 0.05$) with five subcategory statements on the willingness to learn with gamified classes. That is, the higher the number of hours of browsing, the higher the willingness to learn with gamified classes.

Study hours have a negative and significant relationship ($p < 0.05$) with seven subcategories on the willingness to learn with traditional classes. In other words, the more hours a university student spends studying on screen, the less the willingness to learn with traditional classes.

The hours spent playing video games have a negative and significant relationship ($p < 0.05$) with all the subcategories on the willingness to learn with gamified classes. In other words, the more the hours of video game use, the lower the willingness to learn with gamified classes.

The hours of television have a positive and significant relationship ($p < 0.05$) with two subcategories on the willingness to learn with traditional classes. For the university student, the more hours spent watching television, the greater the willingness to learn with traditional classes in the evaluation category.

4. Discussion

The readiness of student teachers to learn with gamified systems is a step prior to the gamification of classes and a study along the lines of the ideal on the personalization of gamified studies [11,26]. Our research shows that students like gamified classes more than regular ones, which agrees with what other studies have found [8,21]. This suggests that using games in education, especially for training university teachers, could make scholar education better [27–30].

But, when we looked at students in their first year of university compared to those in their fifth year, we found something interesting. The students in their fifth year actually prefer to gamify learning more than the ones in their first year. This goes against what previous studies have found, which is that younger students usually prefer gamified education [21]. So, it seems that as students spend more time in university, they start to prefer gamified learning even more.

As for the gamer profile, it was measured because, although gamification is not the same as playing games, the tendency is to gamify with games [30]. Our results on the gamer profile show that students, when gamifying, self-identify mostly as philanthropists, a type of profile that is aligned with sustainability education, and to a lesser extent as disruptors, results that coincide with studies conducted with Brazilian, Spanish, and German populations [20,31,32]. However, the scientific novelty of our study is the measurement of the relationship between player profile and readiness for formal learning with gamified systems. One reason for this is that the scale used to measure the perception of university students was published in the same year that this research was conducted [8]. Consequently, the philanthropist, socializer, free spirit, and achiever profiles have a significant and positive relationship with the willingness to have gamified classes.

However, in relation to disruptors, we found a significant and negative relationship with willingness to have gamified classes. This last result draws our attention because the definition of disruptor is in line with change, with a challenging attitude to the established and are generators of change [12]. By this definition, we hypothesized a priori that this type of player would have the greatest willingness to learn with gamified systems over the traditional way, but the results show us the opposite.

Along the same lines, the hours a student spends playing video games has an inversely proportional relationship with the willingness to have gamified classes. This statement makes sense when contrasted with authors who found that students believe that video games are detrimental to their academic performance and believe that the inclusion of video games for learning is not favorable [13].

The total average number of hours of screen time reported by students is 8.8 h per day, a result that coincides with the latest work reporting screen time in the Chilean population [33]. This situation is worrying as it is a sedentary activity that rivals healthy

lifestyle habits [34]. In awareness of this situation, we propose that gamified activities in classrooms try to decrease the hours of screen time [35], to educate in accordance with goals 3 and 4 of Sustainable Development 2030 [36].

Limitations of the Study

The limitations of this study are represented by the sample: although it is a sample size with a more than 95% confidence level and a less than 5% margin of error, the sampling was conducted by convenience through social networks. This could limit the generalizability and external validity of the findings.

Another limitation of the study is that these results are obtained with self-report questionnaires with accepted psychometric validations, but completed voluntarily without direct supervision, thus without significant evidence that the information is strictly correct and that respondents completed the questionnaires conscientiously and responsibly.

5. Conclusions and Future Work

In conclusion, Chilean student teachers are favorably disposed towards teacher training with gamified systems, preferring this methodology over the traditional one. However, the disposition changes in relation to the daily hours of video game consumption, since the relationship indicates that the longer the hours of video game use, the less the disposition toward learning with gamified systems and vice versa. Likewise, the profile of the player also conditions the willingness to learn with gamified systems, specifically, the higher the disruptor score, the lower the willingness to learn with a gamification methodology.

Considering that future teachers, as in the case in this research, are a fundamental pillar for the sustainable development of society, it is required that initial teacher training is strengthened. In this sense, gamification can be a useful didactic tool to improve motivation and commitment to learning for themselves and their future students. For this reason, it is recommended that future studies on the willingness to learn with gamified systems contemplate qualitative or quantitative data on personal preferences and tastes about the activities that are voluntarily performed, and generated by a self-determined decision inspired by intrinsic motivation.

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