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[Esteban Guillermo Saavedra](#) \*

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Article

# Chilean Student Teachers' Willingness to Learn with Gamified Systems

Esteban Saavedra Vallejos

Escuela de Educación Física, Facultad de Educación, Universidad Santo Tomás, Chile

## Highlight

- Chilean student teachers prefer to learn with gamified systems rather than in a traditional way.
- The perception of learning with gamified systems is positively or negatively related to the different categories of the Gamer Profile.
- The more hours of daily use of video games, the lower the willingness to learn with gamified systems.

**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. In order to take advantage of the opportunities for improvement in education presented by gamification, plus 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 to measure: 1) student perception of gamification; 2) player profile; and 3) screen time, with an  $n=569$  student teachers from the fifteen regions of Chile. The results show that students prefer to learn with gamified systems than in a traditional way with a significant difference (Wilcoxon  $z = -18.86$ ,  $p < 0.01$ ). There are significant positive and negative relationships in correspondence with the Gamer Profile. 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

## 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 (Dehghanzadeh et al., 2023; Yu et al., 2023). These issues are in line with the challenges posed by pedagogical theory on the search for innovation and adaptation to the context and needs of students (Van Poeck & Säfström, 2022), which is why gamification presents pedagogical opportunities with the incorporation of playful elements in educational spaces (Aguilar-Castillo et al., 2021; Oliveira et al., 2023).

In order to take advantage of the opportunities for improvement in education presented by gamification, plus the decision to create gamified systems in higher education, this article investigates the willingness of student teachers to learn with gamified systems from the analysis of three variables: 1) student perception of gamification; 2) player profile; and 3) screen time.

The first point is the perception of learning with gamified systems. This variable is considered because initial diagnostic evaluation is desirable for effective planning of future actions (Harris, 1987; Schultz et al., 2017). A second reason is that the studies that analyse gamified systems in education are 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 (Sánchez-Domínguez et al., 2023). As a third reason, it underlies the assumption that the gamified experience must be well regulated and planned to avoid possible negative effects and favour a good experience for the student (García-Iruela & Hijón-Neira, 2020), since a defective planning of gamified systems can generate a decrease in academic performance, motivation problems, lack of understanding and devaluation of the gamified content (Almeida et al., 2023).

The second point is the profile of the player. This variable is considered, since gamification systems are more effective when they adapt to the preferences, behaviour and role that a person takes when playing or being in playful environments (Orji et al., 2017; Tondello et al., 2019). It also informs us about the profile of students, which could serve as input for the planning of other university activities.

The third item 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 have a favourable reception to learning through video games (Marín-Díaz et al., 2020).

Current knowledge of the perception of gamification in university education shows that the common result is the low awareness of gamification by teachers and students (Alajaji & Alshwiah, 2021; An, 2023; Arias-Chávez et al., 2022; Malvasi & Recio-Moreno, 2022). However, after being involved in gamified activities, university teachers believe that gamification improves teamwork, oral communication, critical thinking and the development of social skills (Martí-Parreno et al., 2021).

The change in perception of gamification is also evident in doctoral students, who, when participating in gamified classes, favourably changed their perception of gamification (An, 2023). Perceptions of learning were also studied with favourable results, specifically, increased motivation and engagement, fun learning, working more and better in class, feedback, reflection and team performance (An, 2023).

In the case of initial teacher education, student teachers' perceptions of gamification improved following participation in gamified classes, It also increased motivation and engagement with peers (Alajaji & Alshwiah, 2021).

A systematic review on gamification in higher education indicates that students' perceptions show a favourable disposition to the use of gamified systems in classes, and they also observe an improvement in motivation, participation, academic results, development and competences for development as future teachers (Pegalajar Palomino, 2021).

Despite the growing publication on gamification in education (Arias-Chávez et al., 2022), there are knowledge gaps in the knowledge of the impact of gamification on learning and emotionality in various contexts (An, 2023); the effects of gamification on collaboration, information synthesis, critical thinking and problem solving (Alajaji & Alshwiah, 2021); gamification and its impact on academic performance and intrinsic motivation (Carrión et al., 2023); "teachers' perceptions towards the practice of gamification strategies in the university classroom" (Pegalajar Palomino, 2021, p. 183).

The relevance of our research is based on the last recommendation, since understanding how student teachers perceive gamification, their self-perception as gamers and their habits of using video games and screens in general, will provide an empirical theoretical basis for the development of effective, appropriate strategies that advance towards personalisation to the needs of students, thus maximising the positive impact of gamified systems in higher education.

In summary, this article presents a study on the willingness of student teachers to learn with gamified systems in which we calculate, through the application of validated scales, 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, the article seeks to improve the current understanding of the field based on previous research in order to generate a profile of student teachers and generate more effective gamified systems for this group of higher education students.

## 2. Method

### 2.2. Research Design:

The research is quantitative and ex post facto, since, the data is created prior to the study or is self-perceived so it has not been modified or manipulated in the data collection phase (Cohen et al., 2007). The design is observational with a cross-sectional approach, as observation is carried out through Google Forms surveys in June 2023. In this sense, the study presents calculations of correlation and differences between variables.

### 2.3. 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 collection was obtained 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>). 595 responses were obtained, however, when the data were cleaned using the criteria: 1) being a student teacher; 2) not having answered all the questions with the same answer on the Likert scales. After data cleaning 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 año	155	27,24
2 años	143	25,13
3 años	147	25,83
4 años	72	12,65
5 años	47	8,26
6 años	5	0,88
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.

### 2.4. Instruments

The data collection instruments were:

- Gamification readiness with the scale "University students' perceptions of gamification" (Sánchez-Domínguez et al., 2023).
- Gamer profile was measured with the Gamification User Types Hexad (GUTH) scale (Manzano-León et al., 2020; Tondello et al., 2019).
- Screen hours, based on the questions asked by Zapata-Lamana et al. (2021). The questions in our study were:
  - o. How many hours a day do you spend checking email, social networks or surfing the internet?
  - o. How many hours a day do you spend doing homework and studying on your computer, tablet, mobile phone or other electronic device?
  - o. How many hours a day do you usually play video games?
  - o. 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, socio-economic level with the survey conducted by the European Society for Opinion and Marketing Research, validated in Chile by ADIMARK (2000).

### 2.5. 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 does 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 on the willingness to 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  $d$  (Cohen, 1992). The effect size with Cohen's  $d$  (1988) states that values:  $< 0.2$  = no effect;  $2$ ) between  $0.2$  to  $0.5$  = low effect; between  $0.5$  to  $0.8$  = medium effect; and,  $> 0.8$  = high effect.

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

Note:  $d$  = Cohen's effect size;  $\bar{X}$  = Mean;  $\sigma$  = standard deviation.

**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

Evaluation	Teamwork	gamified	Playful activities can speed up the assimilation of content.	4,21	1,29
		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
	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
		traditional	Assessment should only take place at the end of the process	2,21	1,23
	Evaluation time	gamified	Playful strategies help to assess during the whole process and not only at the end.	4,20	1,27
		traditional	Assessment is only necessary to evaluate whether or not students know the content.	2,46	1,25
	Purpose	gamified	Continuous assessment of play activities aims to improve the learning process.	4,04	1,24

Source: Own elaboration based on the categorisation of Sánchez-Domínguez et al. (2023).

The gamer profile is calculated with the mean score obtained, with these data the Pearson correlation test is carried out with the scores obtained in the scale of Perceptions of university students on gamification.

Screen time is 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 are analysed to understand the willingness to gamify 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; and third, the relationship between the daily hours of screen use and learning with gamified systems.

#### 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 of Sánchez-Domínguez et al. (2023). The data are represented with means and standard deviation (Table 2).

The results of the application of the scale of willingness to 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 mean differences between groups with Welch's ANOVA test, significant differences were found in the willingness to gamified classes according to 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 have studied in higher education for one year ( $M=4.01$ ) and those who have studied for five years ( $M=4.78$ ), Games-Howell  $p < 0.01$ . While, calculating the differences with the descriptive data of the sample in table X, no significant differences between groups are found.

### 3.2. Gamer Profile and Learning with Gamified Systems

The results obtained from the application of the GUTH scale show that student teachers have a gamer profile, from highest to lowest: Philanthropist ( $M=23.75$ ); Achiever ( $M=23.38$ ); Free Spirit ( $M=23.21$ ); Socialiser ( $M=22.71$ ); 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 with Table 3 and its subsequent explanation.

**Table 3.** Correlations between willingness to gamified classes and the Gamer Profile.

Category	Subcategory	Type of class	Gamer Profile					
			Philanthropis t	Socialize r	Free spirit	Achieve r	Gamble r	Disrupte r
Methodolog y	Strategies	traditional					,300**	,154**
		gamified	,739**	,660**	,722**	,730**	,406**	
	Participation	traditional					,182**	,222**
		gamified	,738**	,664**	,719**	,715**	,388**	
	Stages	traditional					,142**	
		gamified	,732**	,665**	,704**	,720**	,400**	
	Time	traditional					,144**	,248**
		gamified	,716**	,653**	,687**	,698**	,397**	
	Teamwork	traditional					,180**	,263**
		gamified	,701**	,730**	,664**	,657**	,349**	
Qualification	traditional					,118**	,195**	
	gamified	,736**	,661**	,716**	,724**	,403**		
Evaluation	Evaluation time	traditional					,130**	
		gamified	,709**	,645**	,686**	,688**	,404**	
	Purpose	traditional					,245**	,153**
		gamified	,681**	,617**	,673**	,683**	,393**	

Source: Own elaboration with the categories of Sánchez-Domínguez et al. (2023) for gamified classroom readiness and the categorization of Tondello et al. (2019) for the gamer profile.

When observing the relationships between the gamification readiness of university student teachers with their gamer profile, we found that the profiles Philanthropist, Socializer, Free Spirit and Achiever 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 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 in Table 5 and its subsequent explanation.

**Table 4.** Average hours of screen time per day.

Type of use screen	M	ED
Navegación	3,71	2,15
Estudio	3,20	1,84
Videojuegos	0,56	1,22
TV	1,33	1,54
Total	8,80	3,88

Source Own elaboration.

**Table 5.** Correlaciones entre la disposición a clases gamificadas y las horas de pantalla.

Category	Subcategory	Type of class	Screen hours per day			
			Web browsing	Video Games	Study	TV
Methodology	Strategies	traditional		-,093*		
		gamified	,101*		-,094*	
	Participation	traditional		-,170**		
		gamified	,103*		-,101*	
	Stages	traditional			-,093*	
		gamified	,093*			
	Time	traditional	-,118**	-,092*		
		gamified	,100*		-,119**	
Teamwork	traditional		-,106*			
	gamified			-,136**		
Evaluation	Qualification	traditional	-,095*	-,138**		
		gamified			-,096*	
	Evaluation time	traditional		-,163**		,121**
		gamified	,083*		-,134**	
Purpose	traditional	-,123**	-,102*		,115**	
	gamified			-,090*		

Source: Own elaboration with the categories of Sánchez-Domínguez et al. (2023).

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 negative and significant relationships ( $p < 0.05$ ) 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 willingness to learn with traditional classes.

The hours of 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 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. The university student, the more hours of video games, the greater the willingness to learn with traditional classes in the evaluation category.

#### 4. Discussion

The readiness of student teachers for learning 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 (Khoshkangini et al., 2021; Orji et al., 2017). In this sense, our results indicate that students prefer gamified classes to traditional classes in line with the approaches of the positive impact of gamification in general (McGonigal, 2011) and in education (Kalogiannakis et al., 2021; Kapp, 2012).

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 (J. Chen & Liang, 2022). Our results on the gamer profile show that students, when gamifying, self-identify mostly as philanthropists and to a lesser extent disruptors, results that coincide with studies conducted with Brazilian, Spanish and German populations (Guimarães et al., 2022; Krath & von Korflesch, 2021; Manzano-León et al., 2020). 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 (Sánchez-Domínguez et al., 2023). Consequently, the profiles philanthropist, socialiser, free spirit and achiever have a significant and positive relationship with the willingness to gamified classes.

However, in relation to disruptors, we found a significant and negative relationship with willingness to 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 (Tondello et al., 2019). By this definition, we hypothesised 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, therefore, a possible explanation is that the disruptors challenge the established by their peers, since the other types of players look favourably on learning with methodologies based on gamification.

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 point out that students believe that video games are detrimental to their academic performance, and also believe that the inclusion of video games for learning is not favourable (Marín-Díaz et al., 2020).

The total average number of hours of screen time reported by students is 8.8 hours per day, a result that coincides with the latest work reporting screen time in the Chilean population (Carrasco-Marín et al., 2022). This situation is worrying as it is a sedentary activity that rivals healthy lifestyle habits (Z. Chen et al., 2022). In awareness of this situation we propose that gamified activities in classrooms try to decrease the hours of screen time (Zainuddin & Keumala, 2021), in order to educate in accordance with goals 3, 4 of sustainable development 2030 (Cepal, 2018).

#### 5. Conclusion

In conclusion, Chilean student teachers are favourably 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 more hours of video game use, the lower the disposition to 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 gamification methodology.

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