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The Legends of Elendor: Educational Gamification as an Influential Factor in Academic Flow and Academic Performance in Socially Depressed Communities

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Abstract: Secondary education needs to find learning strategies that favor student engagement, particularly in socially deprived communities. The objective of this study is to analyze the influence of gamification on educational flow and academic performance. A quasi-experimental pre-test/post-test study has been carried out with 207 secondary school students that compares the gamified cooperative learning method with the directive teaching methodology. The results show statistically significant differences in perceived class flow and academic performance in favor of the gamified group. In addition, it has been analyzed whether these improvements vary according to sex, proving that the gamified methodology is just as effective for girls as for boys. It is concluded that the game systems achieved with gamification favor student engagement because they perceive the tasks as enjoyable and immersive.

Keywords: gamification learning; high school; social deprivation; flow; learning strategies; cooperative learning

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1. Introduction

There is a widespread amotivation problem among adolescent students towards secondary school and its formative process, mainly due to a lack of stimuli that involve them in that process [1].

Directive teaching methodology, in which students receive knowledge, is evolving into new ways of understanding the educational process, with each student becoming an active agent in their education. Students perceive traditional learning as boring and even ineffective. This phenomenon is explained by lower intrinsic motivation, a worse classroom climate, and diffused learning goals [2].

Educational motivation is defined as the positive disposition to learn and to continue doing so autonomously [3]. In turn, learning predisposition has a direct relationship with classroom flow and engagement. Student commitment is part of a dynamic network in which psychological, cognitive, affective, and social factors are connected [4]. Therefore, participation will depend on the student's expectations, background, and personality, as well as the relationships that are formed in the classroom and how the curriculum content is presented [5].

Students' participation is positively related to academic performance, while disengagement leads to low academic performance in different subjects [6]. Learning disengagement can also be linked to a low sense of belonging to the school, disruptive behavior in the classroom, a poor relationship with the teacher and/or classmates, truancy, and long-term school failure, with consequent unemployment or limited job opportunities [7].

Recent studies have postulated that gamification could be a didactic tool for motivating students [3,8–11]. The best-known definition of gamification is using game design elements in non-playful contexts [12]. This is complemented by other definitions such as the use of playful techniques to engage people, motivate action, and promote learning and problem solving [13], or gamification as a process that aims to increase extrinsic and intrinsic motivation and to get people involved in the task [3].

Using gamification as a learning tool in education can provide an attractive and motivating approach given its ability to teach and reinforce curricular content and competencies [9]. The introduction of gamification into the classroom has been studied by various authors [14–20], who report a range of benefits when they are practiced: increased school motivation, a positive willingness to learn, greater autonomy, and increased feedback between teachers and students. When students perceive learning dynamically and find the theme attractive because of gamification elements, motivation becomes the engine of the process, leading to positive results in the classroom.

1.1. Classroom Flow and Its Relationship with Gamification

Classroom flow is a state of total immersion and a fusion of action and awareness associated with positive emotional, motivational, and cognitive experiences [21].

In education, the optimal experience for taking each student to a flow state is one in which the student enjoys the experience as an end and is immersed in it [22]. It is necessary to generate experiences that simultaneously cause concentration, interest, and enjoyment to achieve student engagement [23]. This is since optimal classroom flow that improves the aspects of work (concentration) and play (fun) can be intrinsically significant and fulfil a preventive function regarding negative learning consequences [6].

When the student has an optimal experience, his/her attention is entirely focused on accomplishing the task [24]. It is a spontaneous almost automatic action where the student stops being self-aware or worrying about the time elapsed. Thus, it achieves a high degree of concentration with a particular and limited focus. Another study demonstrated that the concentration and engagement of students who performed gamified educational activities were higher than those students performing directive educational activities; the results showed that students who performed gamified activities enjoyed their creativity and the game elements used as a motivational factor [25].

Having defined objectives allows students to direct their attention and effort towards the relevant activities and so achieve that objective and plan their learning strategies. Designing concrete achievement objectives is an indicator of self-efficacy and mastery experience in recreational activities [26]. In a gamified environment, participants feel more motivated to set goals and to complete the learning tasks. Using badges helps increase motivation for specific tasks and improves the feeling of self-efficacy. However, knowing the progress of other classmates can be a pressure for students [27].

Experiencing the flow sensation produces a loss of time awareness and of the person him/herself. Students are so immersed in the task that they stop being concerned about finishing the class [28]. Those students who participated in the game had a high level of immersion and a holistic understanding of the scientific concepts and their learning was maintained over the long term [29].

1.2. Present Study

Although gamification has been widely studied in high school students, it is difficult to find scientific evidence about it in socio-depressed communities. Therefore, the present research seeks to provide scientific evidence on the relationship between the use of active methodologies, particularly educational gamification, and academic flow through an experimental longitudinal study of learning the Spanish language in high schools from socially deprived areas. An educational gamification project has been implemented with the aim of improving the classroom flow perceived by the students. The design of "The Legends of Elendor" is based on the scientific literature regarding motivation, engagement, and

gamification elements. This research presents a quasi-experimental study in which the following research questions were addressed:

1. Is the use of educational gamification ("The Legends of Elendor") beneficial to the classroom flow compared with a directive teaching methodology?
2. Is the use of educational gamification ("The Legends of Elendor") beneficial to academic achievement compared with a directive teaching methodology?
3. Are there sex differences in the perceived classroom flow and academic achievement when educational gamification is used?

2. Materials and Methods

2.1. Participants

The data come from a longitudinal study of students from five Spanish secondary schools from socially deprived communities in southern Spain. In this region, as established in Decree-Law 7/2013, April 30, on extraordinary and urgent measures to fight poverty and social exclusion (BOJA No. 85 of 05/03/2013), the Zones of Need for Social Transformation (ZNTS) are defined as those concrete and physically delimited urban spaces in whose population structural situations of severe poverty and social marginalization concur. In addition to socio-economic difficulties such as deterioration or deficit of infrastructure and public services, high unemployment rates and hygiene–sanitary deficiencies, socio-educational challenges related to social exclusion, and high rates of absenteeism and school failure also stand out.

A total of 207 students participated in the study, all in their 2nd year of Compulsory Secondary Education (52.2% males, M = 14.2). Of this sample, 135 students participated in the experimental group: 62 males (45.9%) and 73 females (54.1%) with an average age of 14.14 (SD = 0.77), while 72 students participated in the control group: 46 males (63.9%) and 26 females (36.1%) with an average age of 14.4 (SD = 0.67).

The participants were selected through an incidental non-probabilistic sampling based on those centers and teachers who voluntarily volunteered to participate in the study. Four secondary schools with similar socio-cultural characteristics volunteered to participate in the study. The second-year ESO classes were selected and randomly divided into two groups (control group and experimental group). Once the groups were randomized, the sample was collected based on the natural availability of each class. The experimental group was more extensive, with the objective that more students benefited from the program.

The inclusion criteria for both the experimental group and the control group were the following:

(a) Be enrolled in areas of social deprivation.
(b) Be between 13 and 16 years of age.
(c) Participate in at least 75% of the sessions during the investigated period.

In the experimental group, the teachers were trained and accompanied in person for the application of the gamified proposal of The Legends of Elendor. Regarding the control group, a directive methodology was carried out, where each teacher imparted theoretical knowledge and reinforced the content with exercises from the textbook.

Participants' parents received information about the project and gave written informed consent in accordance with the Declaration of Helsinki [30]. Prior to data collection, the students were informed about the nature of the study and were assured of their anonymity. Ethics approval was obtained from the Research Ethics Committee of University of Almería.

2.2. Instruments

The Spanish version of the Flow State Scale [31] was used. This instrument has 36 items that assess the 9 factors comprising the flow state: AC (the balance between the ability level and the challenge) $\alpha = 0.948$; AA (the merging of action and awareness) $\alpha = 0.589$; CG (clear goals) $\alpha = 0.955$; CF (clear direct feedback) $\alpha = 0.938$; CT (concentration on the task) $\alpha = 0.903$; SC (the sense of control) $\alpha = 0.973$; LS (the loss of self-awareness) $\alpha = 0.678$; DT (the distorted sense of time) $\alpha = 0.420$; AE (the autotelic experience) $\alpha = 0.827$. Each factor

contains 4 items that are classified on a 10-point Likert scale, 1 being "totally disagree" and 10 "totally agree".

The academic grades in the Spanish language were also collected in the first trimester (before the intervention) and in the third trimester (after the intervention) for both the control group and the experimental group.

To ensure that the participating students responded correctly to the questionnaires, they were carried out during classes and always in the presence of at least one of the researchers in case they had any questions that needed to be answered.

2.3. Procedure

A quasi-experimental intervention study design with pre and post measurements was chosen to address the research questions.

At Time 1 (T1), the social science achievement and flow test was conducted (see Section 2.4). The flow test was applied for 30 min within the class. Academic achievement (academic scores) of the first trimester were collected by teachers.

The intervention itself comprised fifteen lessons (1 h each). The control group used a directive methodology through directive class and use of the textbook, while the experimental group carried out the gamification program.

After the intervention (T2), the flow test was administered within the class and academic scores for the third trimester were collected.

Design of the Gamification "The Legends of Elendor"

To improve the classroom flow in secondary education, an educational gamification program "The Legends of Elendor" was designed for the Spanish language. It was implemented during the second and third trimesters of the 2021/2022 academic year over a total of 15 sessions of 1 h.

An MDA framework based on game design theory was used [32]. The MDA framework comprises mechanics, dynamics, and aesthetics. The different elements are shown in Table 1, each designed to promote student engagement and classroom flow.

The Legends of Elendor consists of a gamification program with a magical medieval narrative where the students work on the content of the language and social sciences subjects through missions offered by the NPCs (non-playable characters) to save the kingdom and be the heroes and heroines of Elendor [33].

Table 1. Design of The Legends of Elendor.

Flow Elements That Influence in Educational Engagement	Gamified Elements in The Legends of Elendor
Balance between ability level and challenge	Challenge [34], Progression [35]
Concentration on the task	Quests [36]
Clear goals	Achievements [26], Badges [37], Points [38]
Clear and direct feedback	Rewards [39]
Sense of control	Self-expression [40], Decision making [41]
Loss of self-awareness	Fantasy [42]
Distorted sense of time	Narrative [43]

The dynamics and mechanics of gamification sought to promote cooperation and dialogue. The students had to create clans, working on each mission as a group. These missions were signed and based on their performance. They could earn a series of coins and medals. The coins were used to buy in a virtual store within the narrative world. Within the store, you could buy virtual goods both to learn more about the narrative or to improve your avatars or for high performance in all the missions, a slight improvement in the subject's final grade.

In The Legends of Elendor, students were given the virtual map (See Figure 1). In each session, they could access different quests from the narrative related to the curricular content studied in the classroom.

Figure 1. Map of The Legends of Elendor.

In each quest, the group of students could earn badges or virtual goods or experience points depending on how they undertook the mission. For example, to learn the different elements of a constitution and state laws, each student team had to invent a constitution for the elf town. If they carried out their challenge properly, they could win the diploma medal and augment their character's equipment to help them move around the map.

2.4. Data Analysis

Since the sample size was adjusted, the normality and homoscedasticity of the data were previously verified to determine which tests to use. This confirmed the possibility of using parametric tests. A power analysis using G*Power [44] suggested that a sample size of N = 54 was needed to ascertain small to medium effects (f = 0.25) in a mixed within/between-subject design (α: 0.05, power (1-β): 0.80, correlations between repeated measures: r = 0.50).

To analyze whether there were statistically significant differences between the groups in the pre-test measurements, the *t*-test for independent samples was used. To check whether there were differences after the intervention, a MANCOVA was used with the differential scores (post-test measures/pre-test measures) and, using the pre-test measures as covariates, for the effect size partial eta squared was reported.

To determine the changes that occurred between the groups, paired *t*-tests were performed with the pre- and post-test means of each of the groups, reporting Cohen's d as a statistic of the effect size. Finally, a MANOVA was performed to evaluate the influence of the sex variable. The analyses were carried out with the statistical software SPSS 26.0.

3. Results

First, it was verified that the groups participating in the study were statistically equivalent in the pre-test. A Student's *t*-test was carried out (the results are in Table 2), where there are no statistical differences ($p > 0.05$) between the groups at the beginning.

To respond to the first objective of the research, a MANCOVA was carried out with differential scores (post-test/pre-test) and pre-test scores were used as covariates. The results of the tests are shown in Table 3. Statistical differences ($p < 0.000$) were observed in all study variables; effect sizes were also reported to consider the magnitude of the change, which, as can be seen, is big.

Table 2. Student's *t*-test for independent samples of pre-test differences between the experimental groups (gamification) and the control group.

	Control	Experimental		
	Mean (SD)	**Mean (SD)**	***t***	***p***
Balance between ability level and challenge (AC)	27.94 (6.76)	28.03 (6.57)	−0.088	0.930
Merging of action and awareness (AA)	25.42 (6.53)	24.92 (6.61)	0.518	0.605
Clear goals (CG)	31.22 (6.71)	29.6 (7.69)	1.508	0.133
Clear and direct feedback (CF)	26.94 (6.99)	26.4 (7.69)	0.488	0.626
Concentration on the task (CT)	28.39 (6.06)	27.13 (7.52)	1.227	0.221
Sense of control (SC)	27.11 (6.73)	26.98 (7.52)	0.126	0.900
Loss of self-awareness (LS)	25.31 (9.59)	26.5 (8.26)	−0.939	0.349
Distorted sense of time (DT)	24 (7.43)	24.5 (7.13)	−0.477	0.634
Autotelic experience (AE)	26.08 (7.83)	24.9 (8.09)	1.009	0.314
Academic achievement	6.01 (1.48)	5.958 (1.51)	0.301	0.764

Table 3. MANCOVA with differential scores using pre-test scores as covariate (Wilks' lambda was reported).

	Control	Experimental			
Variables	**Mean (SD)**	**Mean (SD)**	**F**	***p***	η_p^2
Balance between ability level and challenge (AC)	0.72 (5.72)	2.43 (11.29)	16.850	<0.001	0.079
Merging of action and awareness (AA)	0.11 (6.73)	3.67 (11.33)	36.137	<0.001	0.156
Clear goals (CG)	2.19 (15.43)	2.43 (12.41)	42.689	<0.001	0.179
Clear and direct feedback (CF)	0.11 (6.45)	3.53 (11.33)	31.466	<0.001	0.138
Concentration on the task (CT)	−0.64 (5.49)	2.86 (11.18)	31.215	<0.001	0.137
Sense of control (SC)	0.03 (5.10)	2.67 (11.33)	24.717	<0.001	0.112
Loss of self-awareness (LS)	1.14 (11.58)	3.08 (11.88)	142.861	<0.001	0.422
Distorted sense of time (DT)	−0.14 (5.38)	3.78 (11.09)	39.213	<0.001	0.167
Autotelic experience (AE)	0.06 (6.87)	6.46 (12.61)	73.499	<0.001	0.273

For a more in-depth study, a paired sample Student's *t* test was performed with each of the observed groups to know the evolution that they feared at the end of the program; the results are reported in Table 4. The control group did not undergo significant changes ($p > 0.050$) and its effect sizes were small. On the other hand, the experimental group changed significantly ($p < 0.05$) in all the variables studied, with respect to the size of the effect reported, ranging from medium to large.

To respond to the second objective, an ANOVA was performed with the differential scores (post-test/pre-test) of the control group (M = −0.1, SD = 1.11) and the experimental group (M = 1.18, SD = 1.25). The test result shows statistical differences (F = 66.456, $p < 0.000$) in favor of the experimental group, with a large effect size ($\eta_p^2 = 0.246$).

Finally, a multivariate analysis was performed to assess the influence of sex on the benefits of the intervention. From the MANOVA inferential analysis, we can conclude that there were no statistically significant differences based on sex ($p = 0.150$, F (10,000) = 1.477, Wilk's lambda = 0.930; $\eta^2 = 0.070$); the effect size confirms this according to the eta squared. Therefore, we can also conclude that the effect of the gamification program on class flow was the same for all participants regardless of sex.

Table 4. Student's *t*-test means and deviations for paired samples of the post-test pre-test differences in the study variables for the gamification and control groups.

	Experimental Gamification Group					**Control Group**				
	Pre	**Post**	**Pre/Post**			**Pre**	**Post**	**Pre/Post**		
	M (SD)	**M (SD)**	**t**	***p***	**d**	**M (SD)**	**M (SD)**	**t**	***p***	**d**
Balance between ability level and challenge (AC)	28.03 (6.58)	30.46 (10.50)	−2.499	0.014	−0.277	27.94 (6.763)	28.67 (6.846)	−1.072	0.288	−0.107
Merging of action and awareness (AA)	24.90 (6.60)	28.59 (10.26)	−3.787	0.000	−0.427	25.42 (6.579)	25.53 (7.203)	−0.140	0.889	−0.015
Clear goals (CG)	29.60 (7.70)	32.03 (9.88)	−2.274	0.025	−0.274	31.22 (6.710)	33.42 (14.927)	−1.207	0.232	−0.190
Clear and direct feedback (CF)	26.40 (7.97)	29.93 (9.24)	−3.616	0.000	−0.409	26.94 (6.993)	27.06 (7.292)	−0.146	0.884	−0.016
Concentration on the task (CT)	27.13 (7.52)	29.99 (9.79)	−2.972	0.004	−0.327	28.39 (6.067)	27.75 (6.060)	0.987	0.327	0.105
Sense of control (SC)	26.98 (7.53)	29.64 (9.43)	−2.733	0.007	−0.311	27.11 (6.738)	27.14 (7.229)	−0.046	0.963	−0.004
Loss of self-awareness (LS)	26.50 (8.26)	29.59 (9.07)	−3.013	0.003	−0.352	25.31 (9.590)	26.44 (8.800)	−0.834	0.407	−0.122
Distorted sense of time (DT)	24.50 (7.14)	28.28 (9.57)	−3.957	0.000	−0.447	24.00 (7.430)	23.86 (7.766)	0.219	0.827	0.018
Autotelic experience (AE)	24.90 (8.10)	31.36 (9.62)	−5.949	0.000	−0.726	26.08 (7.839)	26.14 (8.845)	−0.069	0.945	−0.007
Academic achievement	6.45 (1.77)	7.05 (1.37)	−4.209	0.000	−0.379	6.63 (1.55)	6.47 (1.27)	1.000	0.321	0.112

4. Discussion

The present research focused on the relationship between educational gamification and the classroom flow, as well as on determining whether the sex of the student body influences this relationship. Our results indicate that the student group who performed the gamified activities improved their classroom flow in all their variables, while the students who received a traditional methodology class showed no statistically significant improvements in any area. When investigating whether sex might have influenced the classroom flow, it was verified that there were no differences between males and females within the gamification methodology.

The results of previous research indicate that gamification could be a motivating strategy for students [45]. Our results are in line with the research work that establishes a positive link between educational gamification and classroom flow [46]. In the present research, those students who received traditional classes ended up with worse classroom flow than those who received gamified classes. There was also a statistically significant change in the areas of action and awareness fusion, clear and direct feedback, feeling in control, loss of self-awareness, a distorted sense of time, and autotelic experience.

Regarding the balance between the skill level and the challenge, clear goals, and concentration on the task, it is important to note that in the gamified classes these all increased, whereas there were no significant changes in the control group. It is likely that the lack of short-term goals and difficult progression may have influenced this. Other research [34] has emphasized the importance of having clear, fixed, and relevant objectives for students, whereas offering varying levels of difficulty and/or randomness can negatively influence motivation and flow. In future research, the gamified learning experience will be designed with short- and long-term objectives visible from the beginning for students, with the aim of studying the impact of this change on their classroom flow.

The Legends of Elendor gamification has been beneficial in improving the flow of high-school students. Similar student motivation results were found in research on other gamification programs, thanks to the use of a playful narrative [47] and gamification

elements such as medals, badges, or points [48]. It is likely that the playful and pedagogical design of educational gamification programs directly influences the impact on students. In contrast, poorly posed gamification programs can have very negative effects on classroom flow, such as elevated competition between students, extrinsic-only motivation resulting from the awards, and the loss of the formative element of the playfulness [49].

Regarding our second research question, no sex differences were found in the classroom flow. This research was based on other studies [50,51] in which they considered that learning preferences between boys and girls could vary, as well as their use and preferences regarding the types of games. In contrast, the findings of this study support the idea that teenage girls can enjoy gamification in the same way as teenage boys.

Finally, regarding the study's limitations, there are various aspects that should be pointed out. Firstly, there is a marked lack of research on playful strategies in socially deprived communities with which to compare the results, specifically the use of educational gamification in secondary education and its relationship to classroom flow, particularly in Spanish educational centers. Secondly, although the study was carried out in different secondary schools, it was only undertaken in the south of Spain. In future research, the program should be applied in more schools and in other provinces to obtain a larger sample and to increase the number of variables analyzed, adding other instruments to assess school motivation and the classroom climate.

5. Conclusions

The main conclusion we can draw from this study is that playful strategies such as gamification can play a role in the education system. Our study was designed to understand its influence on classroom flow, showing that the implementation of gamified activities can provide students with a greater autotelic experience. This result coincides with other studies [52] that have demonstrated that educational videogames can be effective at posing challenges that are perceived by the students as interesting and enjoyable, thus facilitating their participation and immersion in the task. Utilizing gamification with attainable challenges and clearly defined goals can therefore facilitate classroom flow and school motivation. When students are motivated by gamified activities, they have a greater sense of fluency, learn better, and are less anxious during the assessment [53]. From early childhood, we have a general psychological predisposition to participate in games [54], therefore using game mechanics in the classroom can be beneficial for students provided it is conducted on a pedagogical design that is not based solely on scoring and rewards.

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