

THE EFFECTS OF GAMIFICATION ON STUDENT MOTIVATION AND ENGAGEMENT IN THE EDUCATIONAL PROCESS

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Abstract: *This study explored whether the use of gamification strategies in Geography lessons could improve students' motivation, engagement and academic performance compared to traditional teaching methods. The research involved 49 high school students from a prestigious school in Pitești, Argeș County, Romania, who were divided into an experimental group and a control group. The experimental group participated in a gamified learning experience based on a mission-oriented educational scenario that incorporated game elements such as challenges, rewards and collaborative tasks. In contrast, the control group studied the same curriculum through traditional instructional methods supported by digital presentations and visual learning materials. Data were collected using a mixed-methods approach that included a motivational questionnaire, an observation grid assessing students' classroom participation and engagement, and an academic achievement test administered at the end of the intervention. Statistical analyses were conducted to compare the outcomes of the two groups and determine the effectiveness of the instructional approaches. The findings indicate that gamification had a positive and statistically significant impact on students' motivation, classroom participation and academic achievement. Students exposed to the gamified learning environment demonstrated higher levels of interest, active involvement and persistence during lessons, while*

also obtaining better academic results than their peers in the control group. These outcomes suggest that integrating game-based elements into Geography instruction can foster a more interactive, enjoyable and student-centered learning experience.

Keywords: gamification, motivation, interactivity, game-based learning environment

Introduction

Gamification has emerged as one of the most widely discussed instructional approaches in contemporary educational research. Defined as the application of game design elements in non-game contexts, gamification aims to increase users' motivation, engagement, and participation by incorporating features such as points, badges, leaderboards, challenges, and immediate feedback (Deterding et al., 2011). Unlike game-based learning, which relies on complete educational games, gamification enriches existing learning environments by integrating selected game mechanics into conventional educational activities. The increasing digitalization of education and the growing need for student-centered pedagogical approaches have contributed to the widespread adoption of gamification across educational levels. Numerous studies have reported that gamified learning environments can improve learners' motivation, participation, persistence, and satisfaction while creating more engaging educational experiences (Hamari et al., 2014; Zainuddin, 2018). Nevertheless, empirical evidence regarding the effectiveness of gamification remains inconsistent. Whereas several investigations have demonstrated positive effects on learning outcomes and student engagement, others have reported only modest or short-term benefits, particularly when game elements rely primarily on extrinsic rewards (Hanus & Fox, 2015; Mekler et al., 2017). From a theoretical perspective, the educational potential of gamification can be explained through several complementary frameworks. Self-Determination Theory (Deci & Ryan, 2000) suggests that learning environments are more motivating when they satisfy learners' needs for autonomy, competence, and relatedness. Well-designed gamification strategies may support these psychological needs by providing meaningful choices, continuous feedback, opportunities for mastery, and collaborative experiences. In contrast, excessive reliance on external rewards such as points or badges may undermine intrinsic motivation if these elements become the primary reason for participation. Behaviorist perspectives provide an additional explanation for the effectiveness of gamification. According to Skinner's theory of operant

conditioning (Skinner, 1953), behaviors reinforced through positive feedback are more likely to be repeated. Consequently, experience points, virtual rewards, and achievement systems may encourage students to remain engaged with learning activities. However, behavioral reinforcement alone cannot fully explain sustained learning, particularly when students are expected to develop higher-order cognitive skills. Flow Theory (Csikszentmihalyi, 1990) further contributes to understanding why gamified environments often promote sustained engagement. Students are more likely to experience a state of optimal involvement when instructional tasks present an appropriate balance between challenge and individual competence, accompanied by clear objectives and immediate feedback. Such conditions encourage concentration, persistence, and enjoyment throughout the learning process. Although the literature provides substantial evidence supporting the motivational benefits of gamification, important gaps remain. Many existing studies rely on higher education samples, online learning environments, or short laboratory-based interventions. Comparatively fewer investigations have examined gamification in authentic secondary-school classrooms using quasi-experimental research designs that simultaneously evaluate motivation, behavioral engagement, and academic performance. Furthermore, previous research has produced inconsistent findings concerning the relationship between increased motivation and measurable improvements in academic achievement. The present study addresses these limitations by investigating the implementation of a gamified geography lesson in a Romanian secondary-school context. A quasi-experimental design involving an experimental and a control group was employed to compare the effects of gamified and traditional instruction on students' motivation, classroom engagement, and academic performance. The intervention incorporated a narrative mission, collaborative tasks, experience points, badges, and team rankings while maintaining identical curricular content across both groups.

Materials and Methods

Research Design

This study employed a quasi-experimental research design involving an experimental group and a control group to examine the effects of gamification on students' motivation, classroom engagement, and academic performance. Both groups studied the same curricular content under comparable instructional conditions; however, only the experimental group participated in a gamified learning experience. The design enabled comparisons between gamified and traditional

instruction while maintaining ecological validity within an authentic school setting.

Participants

The study was conducted at **Zinca Golescu National College**, Pitești, Romania, during regular geography lessons. The sample consisted of **39 tenth-grade students** enrolled in two existing classes. Nineteen students from the Mathematics and Computer Science programme formed the experimental group, whereas twenty students from the Natural Sciences programme constituted the control group. Participants were selected through convenience sampling because the classes were already established within the school's organizational structure. Although random assignment was not feasible, both groups followed the same curriculum, were taught by the same geography teacher, and completed the intervention under similar instructional conditions.

Educational Intervention

The instructional intervention focused on the geographical study of the city of Pitești. Students in the experimental group participated in a gamified learning activity entitled *The Urban Archive of Pitești*, designed as a mission-based narrative in which they assumed the role of urban explorers responsible for reconstructing a fictional digital archive after the city's database had been compromised. Developed in collaboration with the geography teacher, the intervention aimed to increase students' motivation, engagement, and active participation while maintaining the same curricular objectives as the control group. Students were divided into three collaborative teams and received a learning portfolio containing the narrative introduction, a map of Pitești, the city's emblem, mission instructions, worksheets, visual materials, and the scoring criteria. Team-based organization encouraged collaboration, communication, and shared responsibility throughout the activities. The intervention incorporated several gamification elements commonly identified in the literature, including:

- experience points (XP);
- achievement badges;
- collaborative team challenges;
- narrative storytelling;
- immediate feedback;
- leaderboard rankings.

Students earned experience points (XP) for successfully completing four learning tasks and actively participating throughout the lesson. At the beginning of the activity, all students received a **"Beginner"** badge to introduce the game context and mark the start of the mission. Upon successfully completing the lesson, they were awarded an **"Expert"**

badge. Additional optional badges were available for students who completed more challenging tasks:

- **Artist** - for creatively representing the city of Pitești;
- **Urban Planner** - for analyzing the city's urban functions;
- **Environmentalist** - for evaluating the role of green spaces in the urban environment.

At the end of the lesson, team scores were displayed on a leaderboard to encourage positive competition and sustained engagement. The control group studied the same topic, the city of Pitești, using a traditional teaching approach without gamification. The lesson was supported by an interactive whiteboard, maps, images, worksheets, and structured classroom activities. Students were also allowed to use their mobile phones to access relevant information under the teacher's supervision. Instruction was delivered through teacher explanations, class discussions, and individual or whole-class exercises. Although no game elements such as points, badges, or leaderboards were used, the lesson was designed to remain engaging and interactive. This ensured that both groups received comparable instructional content, allowing differences in outcomes to be attributed primarily to the presence or absence of gamification.

Instruments

Three complementary instruments were used to collect data.

Motivation Questionnaire

Students' motivation was assessed using a short questionnaire evaluating three dimensions:

- interest in the lesson;
- enjoyment of participation;
- willingness to engage in learning activities.

Responses were recorded using a five-point Likert scale.

Classroom Observation Grid

Behavioral engagement was assessed through structured classroom observations focusing on five indicators:

- communicative behavior;
- focused attention;
- initiative;
- task engagement;
- persistence.

Observation data were collected throughout the lesson using predefined evaluation criteria.

Academic Performance Assessment

Learning outcomes were evaluated using the “**Know-Want to Know-Learn**” (KWL) instructional framework. Students completed the “**Know**” and “**Want to Know**” sections before the lesson and the “**Learned**” section after completing the instructional activities. Responses were subsequently converted into quantitative scores using a five-point evaluation rubric based on relevance and accuracy.

Data Analysis

Descriptive statistics were calculated for all variables. Independent-samples t-tests were performed to compare motivation scores between the experimental and control groups, whereas paired-samples t-tests were used to examine learning gains within each group. Cohen's *d* was calculated to estimate effect size. Behavioral engagement data obtained from classroom observations were analyzed descriptively because observations were conducted at class level rather than at the individual student level. Statistical analyses were performed using IBM SPSS Statistics (Version 24).

Ethical Considerations

The study was conducted in accordance with institutional ethical principles governing educational research. Participation was voluntary, and all data were anonymized before analysis to ensure participants' confidentiality. Students and school staff were informed about the educational purpose of the study, and the intervention formed part of regular classroom instruction without affecting students' academic assessment.

Results

Student Motivation

Students who participated in the gamified learning activity reported higher levels of motivation than those who received traditional instruction. Descriptive statistics indicated that the experimental group achieved a higher mean motivation score ($M = 4.82$, $SD = 0.17$) than the control group ($M = 4.45$, $SD = 0.55$). Prior to conducting the independent-samples *t*-test, Levene's test indicated unequal variances, $F = 19.73$, $p < .001$. Therefore, the unequal variances assumed results were interpreted. The analysis revealed a statistically significant difference between the two groups, $t(22.63) = 2.95$, $p = .007$, 95% CI [0.11, 0.64]. The magnitude of the difference was large (Cohen's $d \approx 0.90$), indicating that the gamified instructional approach produced a substantial improvement in students' motivation. These findings support **Hypothesis 1**, suggesting that gamification positively

influences students' motivational engagement during classroom instruction.

Classroom Engagement

Classroom observations demonstrated consistently higher behavioral engagement among students participating in the gamified lesson. The experimental group achieved a mean engagement score of 4.80, whereas the control group obtained a mean score of 3.40, representing a difference of 1.40 points. Higher scores were observed across all behavioral dimensions, including:

- communicative behavior;
- focused attention;
- initiative;
- task engagement;
- persistence.

Qualitative observations further supported these findings. Students in the gamified classroom actively volunteered responses, initiated discussions, collaborated effectively with peers, and maintained sustained attention throughout the lesson. In contrast, participation within the control group was generally reactive, with fewer spontaneous contributions and lower levels of collaborative interaction. Because engagement data were collected at classroom rather than individual level, inferential statistical analyses were not performed. Nevertheless, descriptive findings consistently favored the gamified instructional condition.

Academic Performance

Both instructional approaches resulted in statistically significant improvements in students' academic performance between the pre-test and post-test assessments. Within the experimental group, mean scores increased from $M = 2.68$ to $M = 4.16$, representing a mean improvement of 1.47 points. A paired-samples t -test confirmed that this increase was statistically significant, $t(18) = -6.66$, $p < .001$. Similarly, students in the control group improved from $M = 2.45$ to $M = 3.55$, corresponding to a mean increase of 1.09 points. This improvement was likewise statistically significant, $t(19) = -5.16$, $p < .001$. To determine whether gamification produced greater learning gains than traditional instruction, gain scores (post-test minus pre-test) were compared between groups. Although the experimental group demonstrated greater improvement ($M = 1.47$) than the control group ($M = 1.09$), the difference was not statistically significant, $t(28) = 1.15$, $p = .260$. Consequently, while gamification appeared to promote greater learning gains, the present study does not provide sufficient statistical evidence to conclude that it produces superior academic performance under the conditions investigated.

Summary of Findings

Overall, the findings indicate that gamification exerted its strongest influence on students' motivation and behavioral engagement. Although students exposed to gamified instruction also demonstrated greater improvements in academic performance, these differences did not reach statistical significance. Thus, the study provides robust evidence supporting the motivational and engagement-related benefits of gamification while suggesting that improvements in academic achievement may require longer interventions or additional pedagogical support.

Discussion

The present study investigated the effects of a gamified instructional intervention on students' motivation, classroom engagement, and academic performance in a secondary education setting. Overall, the findings indicate that gamification had a positive influence on students' motivation and behavioral engagement, whereas its impact on academic performance was less pronounced. These findings contribute to the growing body of evidence suggesting that gamification is particularly effective in promoting affective and behavioral dimensions of learning, although improvements in academic achievement may depend on additional pedagogical and contextual factors. The first hypothesis, which proposed that gamification would increase students' motivation, was supported. Students who participated in the gamified geography lesson reported significantly higher motivation than those receiving traditional instruction. This finding is consistent with previous research demonstrating that game design elements, including points, badges, immediate feedback, and meaningful challenges, can enhance learners' intrinsic motivation by making educational activities more engaging and enjoyable (Hamari et al., 2014; Zainuddin, 2018). From the perspective of Self-Determination Theory (Deci & Ryan, 2000), the intervention appears to have supported students' psychological needs for competence, autonomy, and relatedness. The mission-based narrative, collaborative tasks, and continuous feedback likely contributed to students' perceptions of achievement and personal involvement, thereby fostering greater motivation throughout the learning process. The findings also support the second hypothesis concerning classroom engagement. Students exposed to gamified instruction demonstrated substantially higher levels of active participation, sustained attention, initiative, and persistence than those in the control group. These observations align with previous studies reporting that gamification encourages students to become active participants rather than passive recipients of information. The

collaborative nature of the intervention may have further enhanced engagement by encouraging peer interaction, shared problem-solving, and collective responsibility for task completion. Such findings reinforce the view that gamification should not be understood merely as the addition of rewards or competitive elements but as a pedagogical approach capable of creating meaningful learning experiences. In contrast, the third hypothesis received only partial support. Although students in the experimental group achieved greater improvements in academic performance than those in the control group, the difference between groups was not statistically significant. This result is consistent with previous investigations suggesting that gamification does not automatically translate into superior academic achievement (Hanus & Fox, 2015; Mekler et al., 2017). One possible explanation is that the intervention primarily influenced motivational and behavioral variables, which may require longer periods of sustained engagement before producing measurable differences in learning outcomes. Academic performance is influenced by numerous interacting factors, including prior knowledge, cognitive ability, instructional quality, assessment design, and the duration of educational interventions. Consequently, short-term improvements in motivation may not immediately result in significantly higher achievement. Another factor that may explain the absence of statistically significant differences in academic performance relates to the design of the study itself. Both groups were taught by the same teacher, followed the same curriculum, and were exposed to high-quality instructional materials. Consequently, traditional instruction was not ineffective; rather, it also produced meaningful learning gains. Under such conditions, detecting large differences between instructional approaches becomes more challenging. Nevertheless, the greater improvement observed in the experimental group suggests that gamification may provide additional educational benefits that could become more evident during longer interventions or across multiple instructional units. The educational implications of these findings are noteworthy. Rather than viewing gamification as a replacement for traditional teaching, educators may consider it an instructional strategy capable of enriching classroom experiences through increased participation, collaboration, and sustained learner interest. The results suggest that carefully designed gamification can support student-centered learning environments by encouraging active exploration, teamwork, and continuous feedback. Importantly, the effectiveness of gamification appears to depend less on isolated game mechanics and more on thoughtful pedagogical design that aligns game elements with meaningful learning objectives. Several limitations should be acknowledged when interpreting the

findings. First, the relatively small sample size limits the generalizability of the results. Second, the intervention consisted of a single instructional activity, preventing the evaluation of long-term effects. Third, motivation was measured through self-report, which may be influenced by social desirability bias. Finally, although the same teacher instructed both groups and identical curricular content was delivered, the experimental lesson was conducted in an outdoor urban setting, whereas the control lesson took place in a traditional classroom environment. Consequently, some of the observed differences may be attributable not only to gamification but also to the characteristics of field-based learning. Future studies should compare gamified and non-gamified instruction within equivalent learning environments and include larger, more diverse samples across multiple schools. Overall, the present study provides further evidence that gamification represents a valuable pedagogical approach for enhancing students' motivation and engagement in secondary education. While its effects on academic performance remain less conclusive, the findings support the integration of gamified learning experiences as part of broader student-centered teaching strategies.

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the relatively small sample size, consisting of 39 students from a single secondary school, limits the generalizability of the results to other educational settings and student populations. Future research should include larger and more diverse samples to improve the external validity of the findings. Second, the study was based on a single instructional intervention. Although the results demonstrated significant improvements in students' motivation and classroom engagement, a longer intervention period would provide a better understanding of the sustained effects of gamification on learning outcomes. Longitudinal studies are therefore recommended to examine whether motivational benefits persist over time and translate into improved academic achievement. Third, students' motivation was assessed using self-report measures, which may be influenced by social desirability and response bias. Combining questionnaires with qualitative interviews or validated psychometric instruments could provide a more comprehensive understanding of learners' motivational experiences. Another limitation concerns the learning environment. Although both groups followed the same curriculum and were taught by the same teacher, the experimental group participated in an outdoor, field-based gamified activity, whereas the control group received classroom-based instruction. Consequently, part of the observed

increase in motivation and engagement may be attributable to the authentic learning environment rather than exclusively to the gamification elements. Future studies should compare gamified and non-gamified instruction under equivalent learning conditions to isolate the specific contribution of gamification. Finally, the study focused on geography education within a Romanian secondary-school context. Further research should investigate the effectiveness of gamification across different school subjects, educational levels, and cultural contexts to determine the extent to which these findings can be generalized.

Conclusions

The present study examined the effects of a gamified instructional intervention on students' motivation, classroom engagement, and academic performance in a Romanian secondary-school context. Using a quasi-experimental design, the study compared a gamified geography lesson with traditional instruction while maintaining equivalent curricular objectives across both groups. The findings demonstrate that gamification significantly enhanced students' motivation and behavioral engagement. Learners who participated in the gamified lesson reported higher motivation, showed greater initiative during classroom activities, and maintained more sustained attention throughout the learning process than students receiving conventional instruction. These results support previous research suggesting that thoughtfully designed gamification can foster more engaging and learner-centered educational environments. Although both groups achieved significant improvements in academic performance, the difference in learning gains between the experimental and control groups was not statistically significant. This finding suggests that while gamification effectively influences motivational and behavioral dimensions of learning, improvements in academic achievement may require longer interventions, repeated exposure to gamified instruction, or additional pedagogical support. Academic performance is a multidimensional construct influenced by numerous cognitive, instructional, and contextual variables, and therefore should not be expected to change substantially following a single instructional intervention. From a practical perspective, the study highlights the value of integrating gamification into secondary education as a strategy for increasing students' participation, collaboration, and interest in learning. Importantly, the effectiveness of gamification appears to depend on careful instructional design rather than on the isolated use of game elements such as points or badges. Educational activities should therefore be structured around meaningful learning objectives,

authentic challenges, collaboration, and timely feedback. Future research should include larger and more diverse samples, longitudinal intervention designs, and comparisons across different school subjects and educational levels. Further investigations may also explore the long-term effects of gamification on knowledge retention, self-regulated learning, and the development of higher-order cognitive skills. Such research would contribute to a more comprehensive understanding of how gamification can be effectively integrated into contemporary educational practice.

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