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Gamification in accounting learning: As a key factor to learn playing at a University in Peru

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Abstract: The purpose of this study is to establish the influence of educational gamification on accounting learning among accounting students at a Peruvian university. The methodology adopted for this research included accounting students from the Financial Statement Evaluation (28 students) and Business Finance (15 students) courses. Participants were given pre- and post-tests and engaged in educational games such as Cash Flow, financial simulators, and case studies on financial ratio evaluation. A normality test was performed using the Wilcoxon test. The results showed that, according to the statistical tests applied, 93% of students demonstrated significant improvements in learning in the Financial Statement Evaluation course, and 100% reported significant improvements in the Business Finance course. Games such as Cash Flow and Labsag simulators also showed significant improvements in learning in the aforementioned courses. Students exhibited increased motivation, commitment, and understanding of the course material. Therefore, it is concluded that gamification has led to significant improvements in accounting learning among students at a university in Peru.

Keywords: *Accounting, Finance, Financial statements, Gamification, Learning.*

1. Introduction

Many universities encounter persistent challenges in the teaching–learning process of their academic programs, particularly in the discipline of Accounting. Within this field, Finance poses notable difficulties, as it demands a broad set of competencies, including analytical skills, adequate motivation, proactivity, teamwork, among others [1]. This raises a fundamental research question: What types of educational gamification can enhance accounting learning in a Peruvian university?

Improving accounting learning through engaging, enjoyable, and interactive methods necessarily involves the integration of playful tools, situating the discussion within the domain of educational gamification. Research in this area is essential to determine how such pedagogical strategies influence the development of accounting competencies, specifically in courses such as Financial Statement Analysis and Corporate Finance.

Understanding the implementation of playful approaches embedded in gamified learning is of particular relevance for accounting students [2]. In the current educational model of the university under study, teaching is predominantly competency-based, fostering active learning among students. Within this framework, gamification emerges as a potentially valuable strategy. The application of educational gamification tools not only aims to improve accounting learning but also enriches the teaching experience, supports the integration of gamification elements into the learning process, and promotes student motivation—factors that collectively contribute to improved educational outcomes. Although relatively recent as a formal methodology, gamification is gaining increasing prominence in higher education and is progressively adopted in diverse academic contexts [3]. Indeed, it is generating

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growing interest among researchers and practitioners across multiple disciplines, including education [4].

The implementation of gamification encompasses all stages of the instructional process, from lesson planning by the instructor to the systematic analysis of student perceptions and feedback after engaging with gamified activities [5]. In this regard, the present research proposes a gamification-based instructional program for accounting students, designed in accordance with the fundamental components, dynamics, and mechanics of gamification in the teaching–learning process, as outlined by prominent scholars in the field [6].

The general objective of this study was to evaluate the extent to which educational gamification influences accounting learning among undergraduate accounting students at a Peruvian university in 2023. The specific objectives were:

a) To determine the influence of educational gamification on student learning in the Financial Statement Analysis course.

b) To assess the influence of educational gamification on student learning in the Corporate Finance II course.

The general hypothesis posited that educational gamification exerts a statistically significant influence on accounting learning among accounting students at the selected Peruvian university in 2023. The specific hypotheses were:

i) Educational gamification significantly influences student learning in the Financial Statement Analysis course.

ii) Educational gamification significantly influences student learning in the Corporate Finance II course.

2. Theoretical Framework

Studies conducted by various authors on gamification emphasize the importance of understanding users' needs, defining participation guidelines, and identifying the motivation and commitment required throughout the process [7]. It is also noted that gamification enables the development of teaching strategies that foster student interest in learning by using successful contemporary tools [8]. Therefore, when referring to individuals and the potential of their abilities, it is appropriate to use gamification in education [9].

Regarding accounting education, gamification allows for the analysis of teachers' and students' perceptions of its implementation and the evaluation of the acquisition of competencies required by the subject [10]. Thus, gamification becomes a powerful technological tool that enables students to learn in a more enjoyable way and enhance their learning experience [11]. In higher education, it is also of interest to researchers, as there is a constant pursuit of improved learning outcomes [12, 13] and it offers opportunities to develop motivation, engagement, and especially interest in one's own learning [14]. In addition to generating motivation and fostering a positive attitude toward learning, it encourages goal achievement [15].

Among the studies to be considered as background for this type of research is Silva, et al. [16] which found that game-based learning in accounting education positively influences motivation and attitudes, but not flow, and that flow has no statistical influence. Meanwhile, de Oliveira Durso, et al. [17] determined that gamified accounting courses are positively correlated with the development of skills such as curiosity, leadership, initiative, perseverance, adaptability, collaboration, and critical thinking, although some students may dislike the complexity of the game.

Some authors [18] concluded that the board game "Accounting on the Block" positively impacts student motivation and engagement in accounting education, although improvements are needed in certain aspects. Other authors [19], following the same line of research, found that gamification in accounting and finance training increases motivation, engagement, and understanding of basic concepts, while maintaining interest and enthusiasm for applying concepts in real-world scenarios. Similarly, other authors [13] state that gamification in learning and instruction stimulates motivation,

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engagement, and social influence, but also faces certain challenges and barriers.

Likewise, when studying gamification as part of the teaching process for accounting students, it is noted that gamification techniques significantly improve the learning of information technologies among university students in business-related fields compared to control groups [20].

The main theories supporting educational gamification are: a) Self-Determination Theory, which suggests that individuals have different motivations that regulate all their activities; b) Learning Motivation Theory, closely related to the former, which indicates that students possess various motivations for learning; and c) Flow Theory, which refers to the state individuals enter during educational activities where they lose track of time and experience high levels of satisfaction [21].

On the other hand, other theories argue that to develop a learning strategy, three components must be considered: storytelling, ICTs, and gamification. These elements help address abstract problems, basic concepts, comprehension, and creativity, enabling autonomous learning and the development of cognitive processes [22]. It is also noted that it is essential to understand the elements of gamification before designing didactic strategies. Game elements and techniques are used to enhance students' motivation, skills, and competitiveness, requiring maximum concentration from the player within their own state of flow [23].

3. Methodology

The present study is explanatory and pre-experimental; a pre-test and post-test questionnaire was used as an instrument for students in the Financial Statement Evaluation courses. (28 students) and Business Finance (15 students). Additionally, a gamification plan was implemented in the development of the aforementioned courses. Tools such as Socrative, Plickers, Flippity, Quizizz, Nearpod, Class craft, and Genially were employed in this study.

The independent variable was educational gamification, and the dependent variable was accounting learning; the study participants were accounting students enrolled in the aforementioned courses. For data collection, a questionnaire was used at two different points: a pre-test evaluation and a post-test evaluation. The Wilcoxon statistic was applied to test the hypotheses, with a 5% margin of error.

4. Results

To assess the reliability of the instrument for each variable: For educational gamification and accounting learning, Cronbach's alpha reliability test was used, yielding a coefficient of 0.762 for the first instrument and 0.856 for the second, which indicates high reliability and allows us to apply them to the study sample. These instruments were also subjected to validation by three experts in research and subject-matter content.

4.1. Specific Hypothesis 1 Test

Table 1.
Wilcoxon Sign Rank Test, Before - After Course: Financial Statement Evaluation.

Ranges		N	%	Average Range	Sum of ranks
After - before	Negative Ranges	2a	3%	1,50	3,00
	Positive Ranges	26b	97%	15,50	403,00
	Draws	0c			
	Total	28	100%		

Note: a. After < Before
b. After > Before
c. After = Before.

It can be seen that of the total number of respondents, 93% evidenced significant improvements in the learning of the subject "Evaluation of Financial Statements" and only 3% did not show any improvement in their learning. This is demonstrated by the following test:

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Table 2.
Wilcoxon Sign Rank Test Statistic.

Test Statisticians	
	After - Before
Z	-4.555[b]
Sig. asint. (bilateral)	0.000

Note: a. Wilcoxon Sign Range Test
b. It is based on negative ranges.

According to table 2, the level of significance or p-value was 0.000 less than 0.05, evidencing that the null hypothesis should be rejected and the alternative hypothesis accepted, that is, if educational gamification significantly influenced the learning of the evaluation of financial statements in students of the School of Accounting of a University in Peru.

4.2. Specific hypothesis 2 test

Table 3.
Rank test with Wilcoxon sign, before - after course: Business finance.

		N	%	Average Range	Sum of ranks
After - Before	Negative Ranges	0[a]		0.00	0.00
	Positive Ranges	15[b]	100	8.00	120.00
	Draws	0[c]			
	Total	15	100		

Note: a. After < Before
b. After > Before
c. After = Before.

It can be seen that in the case of the Business Finance course, all students (100%) presented evidence of having improved their learning, which is ratified by the significance test.

Table 4.
Wilcoxon Sign Rank Test Statistic.

Test Statisticians	
	After - before
Z	-3.417[b]
Sig. asin. (bilateral)	0.001

Note: a. Wilcoxon Sign Range Test
b. It is based on negative ranges.

According to Table 4, the significance level (p-value) was 0.001, which is lower than 0.05, indicating the rejection of the null hypothesis and the acceptance of the alternative hypothesis. In other words, educational gamification had a significant influence on the learning outcomes in Business Finance II among accounting students at a university in Peru.

4.3. Gamification Program and Accounting Learning

Overview. This program was implemented to apply gamification techniques in accounting learning, specifically in the courses Financial Statement Analysis and Business Finance. The faculty researchers involved in the project ensured transparency in the application of this method during classroom instruction.

Objective. To evaluate the influence of educational gamification on accounting learning among accounting students at a university in Peru.

Description of the activities. Accounting students formed teams following the instructor's guidelines, with each team consisting of three to five members. This team composition was maintained throughout all stages of the program. A 20-point grading scale was used.

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a) Each team selected an avatar to represent their group.

b) In the classroom, students were categorized into player types: explorers, achievers, socializers, philanthropists, dreamers, lone knights, and partners.

c) Each team was assigned a gamification tool to apply their knowledge.

4.3.1. Course: Financial Statement Evaluation. Topic: Analysis of Financial Statements

Narrative: The accounting students, acting as accounting staff and financial manager, analyzed the financial statements using the horizontal method at the request of the financial management.

Challenge: the students performed an analysis of the increases, decreases, and trends in the company's account balances, for which the following percentage of class sessions was devoted:

Topic 1, overall partial score of level 1 achieved was 100 points, this is the group score achieved in the session, the "partial relative cumulative" score was 33% progress. Achievement. The students analyzed the financial statements and applied the horizontal method, determined the variations in inflows and outflows of funds, and gave recommendations with responsibility. Rewards. The winning team chose a musical genre to sing or dance to, which they shared with their teammates in a video.

4.3.2. Course: Corporate Finance.

a) Topic: Cash flows

Narrative: A team of accounting students, acting as bankers, and teams of players with different professions (lawyer, police officer, doctor, airplane pilot) and an auditor, conducted simulations of the current situation to improve their financial perspective.

The students conducted the simulations in Cash Flow, a game created by Robert Kiyosaki, the renowned author of "Rich Dad, Poor Dad" and "The Cashflow Quadrant"; it's like Monopoly on steroids. Cashflow is an economic life simulator useful for improving financial intelligence, challenging the player to make decisions and accept their consequences. The decisions could range from buying a small apartment to acquiring stocks or purchasing a shopping mall. Their first great lesson is the habit of saving; without it, investment opportunities can hardly be taken advantage of. Another important lesson is learning to break free from the "rat race"; that is, having the ability to recognize that most of us are taught to work, earn a salary, pay off debts, and then go back to work. Getting out of this rat race means thinking intelligently about investing in small and large businesses that will generate additional income. These earnings could cover and even exceed monthly expenses. In this way, you're not dependent on a single job and you achieve the coveted financial freedom. Each game helped improve my relationship with money and showed me that this world isn't as complex as it seems.

Establishing the rules was somewhat difficult, but it was worth learning them and playing. A great opportunity to educate people on a topic so important to finance and, at the same time, have a good time. The students adhered to the rules of the Cashflow game.

For the challenge, the students had to achieve a positive cash flow.

The achievement was demonstrating a cash flow of S/. 100,000, S/. 50,000 and S/. 30,000

The rewards for the winner were to choose a musical genre to sing or dance to, which they could then share with their classmates via video or live performance.

b) Topic: Evaluation of investment projects

Narrative: The teams of accounting students took on the roles of resource management strategists with negotiation skills.

Students form teams according to the course instructor's instructions, which may consist of three or four members.

Each group used an avatar to identify their team.

The students carried out the simulations in Catan, a very popular game today, in which players-built settlements and roads between the board's hexes, generating certain resources throughout the game. Everyone had access to these resources, so they are required to trade. The students follow the rules of the Catan game.

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For the challenge, students had to reach 10 victory points or more during the game.

The achievement was demonstrating resource acquisition by scoring 10 victory points.

The rewards for the winning team were to choose a musical genre to sing or dance to, which they then shared with their teammates via video or by performing live.

4.3.3. Financing Simulators – Lab Sag – Simdef

Narrative: the teams of accounting students took on the roles of financial managers and had to make decisions on aspects such as the company's financial structure and resource allocation.

The students formed teams according to the course instructor's guidelines, which allowed for teams of three or four members.

Each group used an avatar to identify their team.

The students carried out the simulations in LABSAG - SIMDEF.

The students followed the simulator's basic and intermediate manual.

For the challenge, student teams answered the 20 theoretical questions and ran three simulations, ultimately making the company profitable.

The achievement was demonstrating how to make the company profitable by applying the 18 decisions.

The reward for the winner was to choose a musical genre to sing or dance to, which they shared with their classmates via video or by performing live.

5. Discussion

The gamification strategies employed in the study have demonstrated that, through the games utilized, it is possible to apprehend content and, with an appropriate methodology, influence the acquisition of knowledge, practical skills, and the resolution of challenges and problems. Based on achievement-oriented learning, approached in a fun and engaging manner, students feel stimulated to create, understand, and retain new information, to the extent that they are able to learn independently and collaboratively.

Statistical tests applied in the study determined that educational gamification has a significant influence on accounting learning among students of the School of Accounting at a university in Peru. This finding is corroborated by research from various authors, including [8] who argue that gamification employs modern and enjoyable elements to accomplish tasks such as learning, and that it requires careful planning to awaken interest and curiosity in order to foster participation. Likewise, some authors [16-18] established that game-based learning in accounting education positively influences motivation and attitudes, while [13] contend that gamification in learning and instruction enhances motivation, engagement, and social influence.

Gamification—through its tools such as dynamics, mechanics, and components—affects accounting learning, as evidenced by hypothesis testing related to the evaluation of financial statements and Business Finance II. The results showed improvements in accounting learning, with the null hypothesis being rejected through the use of the Wilcoxon test. This was complemented by the implementation of a gamification and accounting learning program.

To determine the influence of educational gamification on learning the analysis of financial statements among students of the School of Accounting at a university in Peru, the study relied on the following premise: financial statements are reports that present the financial and economic situation of companies and must be prepared in accordance with International Financial Reporting Standards and accounting principles. Their objective is to provide information for both internal and external users, enabling prior analysis before decision-making, and reflecting the results of management, as indicated by [24]. Hypothesis testing in the evaluation of financial statements revealed that 26 out of 28 students improved their learning, with a p-value of $0.000 < 0.05$, thus accepting the alternative hypothesis. Decomposing the components of financial statements and applying gamification in their evaluation allowed students to perform this task more effectively. Tools such as Socrative, Plickers, Flippity,

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Quizizz, Nearpod, Class craft, and Genially were employed in this process.

These findings are consistent with Sailer and Homner [25] who state that gamification is an effective teaching method, in which game-based fiction and social interaction play a key moderating role in behavioral learning outcomes. Educational gamification has a potential impact on students' academic performance, engagement, and motivation [26]. Another aspect supporting this view is the recognition that digital competence must be considered a core skill in any educational curriculum [27], particularly given the continuous growth of digital tools in teaching today [28].

In establishing the influence of educational gamification on learning in Business Finance II among accounting students at a university in Peru, Segura and Zamar [29] notes that finance concerns the entire population and that the combination of practical gameplay and theory creates a favorable environment for learning. Games can represent common situations in which students, based on their own experience, overcome challenges through playful actions and technology applied to financial and accounting contexts, fostering the development of content and objectives and encouraging meaningful learning and problem-solving. Hypothesis testing for Business Finance revealed that, out of 15 students, all improved their learning, with a p-value of $0.000 < 0.05$, leading to the rejection of the null hypothesis and acceptance of the alternative. Through the gamification application program, using game-based instruments such as Cash Flow, Catan, and SimDef simulators, students achieved improved learning outcomes.

These results are further supported by Shah and Pandya [19], who conclude that gamification in financial accounting education increases motivation, engagement, and comprehension of the subjects.

6. Conclusions

Gamification is a key tool for significantly improving accounting learning, as statistical tests categorically demonstrate that in the Financial Statement Analysis course the improvement was 98%, while in the Corporate Finance course it was 100%. Among the gamification dynamics applied, interactive quizzes (Socrative, Plickers, Flippity, Quizizz, Nearpod, Class craft, and Genially) generated great enthusiasm, kept interest and excitement alive among all students, and resulted in improved learning outcomes. Cash Flow, Catan, and SimDef simulators allowed students to adopt a role and, based on it, significantly improve their financial decision-making skills, while simulators such as Lab sag, thru financial simulations, substantially enhanced students' analytical capabilities.

Among the limitations identified in the present research is the limited familiarity of instructors teaching finance-related subjects with gamification software packages, many of whom lack digital skills. For future research, it is recommended to implement additional tools for learning various subjects within the accounting discipline, in order to strengthen specific skills.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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