ORIGINAL RESEARCH PAPER

The Effect of Badges in gamification Point System on 1st Grade Students' Reading, Writing Skills, and Academic Engagement

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ABSTRACT

Background and Objectives: Learning reading and writing skills in the first grade is crucial and fundamental. It has always been considered highly important for students to learn these skills at an early age. By learning to read in elementary school, students can accurately and comprehensively read various texts, including words, sentences, and simple texts. Strengthening their reading skills enables students to understand and benefit from the information available in books, newspapers, magazines, and other resources, which is essential for effective learning and progress in different subjects. Moreover, learning writing skills is also of great importance in the first grade. With this skill, students can express their thoughts, ideas, and experiences fully and accurately. They can arrange sentences in a logical order, use correct grammar rules, and form paragraphs correctly. This fundamental skill is crucial for written communication in the future and helps students develop strong analytical skills, creativity, and oral communication abilities. Engaging students in the learning process is one of the major challenges faced by teachers. Therefore, the use of an engaging learning method has become a concern for teachers in the field of teaching and learning. This study aimed to investigate the impact of gamification with badges on reading and writing skills as well as academic engagement among first-grade elementary school students.

Materials and Methods: The research population consisted of all female first-grade students in Qazvin province during the academic year 2020-2021. A cluster sampling method was used to select the sample from different classes across the city. The sample size included three groups of 25 students each, divided into two experimental groups (gamification with badges and gamification without badges) and one control group. The research design employed a pretest-posttest design with a control group. The research instruments included researcher-developed reading and writing skill tests and the Rio Academic Engagement Questionnaire. The reliability of each measure was calculated using Cronbach's alpha. Descriptive statistics were used to analyze the data, including means and standard deviations, while inferential statistics included Analysis of Covariance and Tukey's post hoc test using SPSS software.

Findings: The results of the Analysis of Covariance indicated that the use of gamification had a significant effect on reading skills ($F = 6.166$, $p < 0.003$) and writing skills ($F = 4.88$, $p < 0.010$), as well as academic engagement (behavioral: $F = 134.462$, $p < 0.000$; emotional: $F = 43.546$, $p < 0.000$; cognitive: $F = 348.598$, $p < 0.000$; and agentic: $F = 349.853$, $p < 0.000$). Furthermore, Tukey's post hoc test revealed that the gamification with badges group outperformed the gamification without badges group in three subscales of the academic engagement (behavioral, agentic, and cognitive).

Conclusions: The findings of this study demonstrated that the use of gamification had a positive impact on reading and writing skills as well as academic engagement among elementary school students. Some recommendations include utilizing gamification strategies to create interactive, engaging, and lively learning environments, designing gamified learning environments to enhance motivation, participation, collaboration, and engagement, and exploring the effects of gamification (e.g., leaderboard) on increasing students' teamwork abilities.

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
43	1	17

مقاله پژوهشی

تاثیر نشان‌ها در سیستم امتیازدهی بازیوارسازی بر یادگیری مهارت خواندن و نوشتن و درگیری تحصیلی دانش‌آموزان پایه اول ابتدایی

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چکیده

پیشــینه و اهداف: یادگیری مهارت خواندن و نوشــتن در پایه اول ابتدایی همواره از اهمیت بالایی برخوردار بوده اســت. یادگیری مهارت خولندن به دانش‌آموزان این امکان را می‌دهد تا متون مختلف را با دقت و درک کامل بخوانند. این مهارت شــامل خولندن کلمات، جملات و متون ســاده اســت. با تقویت مهارت خولندن، دانش‌آموزان قادر خواهند بود اطلاعات موجود در کتاب‌ها، روزنامه‌ها، مجلات و ســایر منابع را به درســتی درک کنند و از آن‌ها بهره ببرند. این مهارت مهم برای یادگیری موثر و پیشــرفت در دروس مختلف ضروری اســت. از ســوی دیگر مهارت نوشــتن در پایه اول ابتدایی بسیار اهمیت دارد زیرا با این مهارت، دانش‌آموزان می‌توانند اندیشــه‌ها، ایده‌ها و تجربیات خود را به صــورت کامل و صــحیح بیان کنند. آن‌ها می‌توانند جملات را به ترتیب منطقی بچینند، از قواعد گرامری صــحیح اســتفاده کنند و پاراگراف‌ها را به درســتی تشــکیل دهند. این مهارت اســاسی برای ارتباطات نوشــتاری در آینده اســت و دانش‌آموزان را در توســعه مهارت‌های تحلیلی، خلاقیت و ارتباطات کلامی قوی می‌کند. یکی از مسائلی که معلمان با آن روبرو هستند درگیری تحصیلی دانش آموزان در فرآیندیادگیری اســت. بنابراین اســتفاده از یک روش جذاب یادگیری به عنوان یکی از دغدغه های معلمان در حوزه فرآیندیاددهی_یادگیری می باشد. پژوهش حاضر با هدف بررسی تأثیر نشــان‌ها در سیستم امتیازدهی بازی‌وارسازی بر یادگیری مهارت خواندن و نوشتن و درگیری‌تحصیلی دانش‌آموزان پایه اول ابتدایی انجام شده است.

روش‌ها: جامعه آماری پژوهش شــامل کلیه دانش‌آموزان دختر پایه اول ابتدایی اســتان قزوین بود، که در ســال تحصیلی ۱۳۹۹-۱۴۰۰ مشغول به تحصیل بودند. نمونه پژوهش با روش نمونه‌گیری خوشه‌ای انتخاب و در سه گروه ۲۵ نفری به صــورت تصــادفی گمارش شــد. پس از اجرای پیش آزمون گروه آزمایش ۱ (بازی‌وارسازی بانشان گروه آزمایش) ۲ (بازی‌وارسازی بی‌نشان) و گروه کنترل با روش معمول آموزش دیدند. روش پژوهش، روش آزمایشی (طرح پیش‌آزمون- پس‌آزمون با گروه کنترل) بود. ابزار پژوهش شامل آزمون‌هاییادگیری مهارت خواندن و نوشــتن محقق ســاخته و پرســشــنامه درگیری‌تحصیلی ریو بود که پایایی هرکدام با آلفای کرونباخ محاســبه شــد. جهت تجزیه‌وتحلیل داده‌ها در بخش آمار توصــیفی میانگین، انحراف معیار و در بخش آمار استنباطی تحلیل کوواریانس و آزمون تعقیبی توکی با اســتفاده از نرم‌افزار اس‌پی‌اس استفاده گردید.

یافته‌ها: نتایج تحلیل کوواریانس نشان داد که استفاده از بازی‌وارسازی بر یادگیری مهارت خواندن($F= ۶/۱۶۶$، $sig= ۰/۰۰۳$) و مهــارت نوشــتن ($F= ۴/۸۸$، $sig= ۰/۰۱۰$)و درگیری‌تحصــیلی (رفتــاری: $F= ۱۳۴/۴۶۲$، $sig=۰/۰۰۰$، عاملی: $F= ۳۴۹/۸۵۳$، $sig=۰/۰۰۰$، شناختی: $F= ۳۴۸/۵۹۸$، $sig= ۰/۰۰۰$ و عاطفی: $F= ۴۳/۵۴۶$، $sig= ۰/۰۰۰$) مؤثر بوده است، همچنین نتایج آزمون تعقیبی توکی نشان داد که گروه بازی‌وارسازی بانشان

در ۳ زیرمقیاس درگیری‌تحصیلی (رفتاری- عاملی و شـناختی) نسـبت به گروه بازی‌وارسازی بی‌نشان عملکرد بهتری داشته است.

نتیجه‌گیری: یافته‌های پژوهش نشـان داد اسـتفاده از بازی وارسـازی بر یادگیری مهارت خواندن و نوشـتن و درگیری تحصیلی دانش آموزان تاثیر مثبت داشته است. از جمله پیشنهادات پژوهش می‌توان به مواردی مانند بهره گیری از راهبرد بازی وارسـازی برای ایجاد محیط های یادگیری تعاملی، جذاب و بانشـاط؛ طراحی محیط های یادگیری بازی وارسازی برای افزایش انگیزه، مشـارکت، همکاری و درگیری؛ و تاثیر بازی وارسازی (تابلوی پیشگامان) برافزایش میزان کارگروهی دانش آموزان اشاره کرد.

Introduction

Academic progress of students is considered as one of the important indicators in the evaluation of education. All efforts in this system are aimed at achieving this objective. Society as a whole, and particularly the education system, shows interest and concern for the fate, successful growth, and development of children, as well as their societal position. It is expected that students make progress and excel in various aspects, including cognitive dimensions, acquiring skills and abilities, as well as in emotional and personality dimensions [1]. One of the necessities of life in the present era is to possess the skills of reading and writing to participate in society and establish constructive communication with others. Reading and writing serve as the foundation of acquiring knowledge and hold great importance, particularly in the early stages. When it comes to establishing proper communication, there is no better tool than learning one's mother tongue. Learning a language involves understanding the quality, structure, and combination of its words. If we do not have a deep understanding of how to write words correctly, their meanings become ambiguous, and we cannot effectively understand the intentions of others or convey our own intentions to others [2]. In fact, learning the skill of reading is the key to all learning types because most academic learning takes place through reading [3]. One of the issues that

arises in the present era is that even individuals with a high level of literacy often misspell many Persian words, and this problem is growing. In the first grade of primary school, learning the symbols (Persian alphabet) that are necessary for reading and writing is challenging for students and requires extensive practice and repetition for them to gain mastery. Students in this grade sometimes become demotivated due to difficulties in reading words and sentences, as well as dictation, especially in the early stages of dictation. It can be tedious for students to engage in repetitive activities such as rewriting a few lines of words and sentences. As a result, they may become less involved in tasks that relate to reading and writing activities.

Many elementary school teachers are concerned about the level of reading and writing skills that their students are developing. Therefore, it is necessary to help their academic engagement with activities that strengthen their reading and writing skills. Additionally, one of the influential factors in academic progress is academic engagement. The more engaged learners are in academic issues and learning tasks, the more hopeful they can be about their academic success and reducing academic decline. Concerns regarding students' basic skills in their first year of school have heightened during and after the COVID-19 pandemic.

According to a study conducted by Salimi and Fardin [4], which focused on exploring the role of coronavirus in virtual education and the associated challenges and opportunities,

approximately 8.84% of teachers noted that the COVID-19 pandemic has negatively impacted students' learning in virtual education due to the lack of lesson repetition and review opportunities. Learning in the SHAD Virtual Education Network for first-grade elementary students, who are experiencing their first year of schooling, is exhausting and tedious. Teachers frequently discuss students' lack of focus and engagement during the learning process at this level. Therefore, creating learning situations in which students can be more engaged in their assignments is an essential requirement for education in this setting. Utilizing appropriate innovative and active teaching strategies and methods, especially the implementation of technology in the field of education, can significantly contribute to improving conditions and facilitating student learning [5].

New teaching methodologies and technologies suggest creating blended learning environments for students in the 21st century [6-9]. One of the techniques that can be employed for learning and academic engagement is gamification. Gamification is a method used in systems, organizations, and activities to create experiences and motivations similar to those experienced when playing a game, while also incorporating educational goals that have an impact on the user's behavior [10]. Gamification refers to using game mechanics, visual effects, aesthetics, and game-like thinking to engage individuals, enhance motivation, improve learning, and facilitate problem-solving [11]. Gamification enriches the learning environment and supports the learner's collaboration. It has a positive impact on students engaging in beneficial collaborative behavior [12].

Some characteristics of gamification include: learner-managed learning, allowing failure and encouraging retrying without negative consequences [13], increasing joy and engagement in the classroom [14], and creating motivation in students with low literacy skills [15]. These characteristics are attributed to the game thinking element, which is considered to be the most crucial concept behind it." Zichermann and Linder [16] argue that the use of game techniques improves the ability to learn new skills. They also state that the use of game techniques enhances students' performance and motivation and helps them establish better social connections compared to traditional methods. Accordingly, gamification that uses game elements and game thinking in non-game contexts can also pursue these goals.

The goal of gamification is to integrate entertainment with education, and through positive and constructive feedback, it encourages students to engage with more interest, motivation, and stimulation in their learning [17]. Gamification allows learner to replay the gamified environment and review their mistakes, providing the freedom to fail without fear. This freedom to experience failure enables students to learn without fear and increases student engagement [14].

Gamification brings many advantages to the classroom, and the most emphasized benefit is increased student engagement in learning [18]. Therefore, gamification is considered a consistent approach to overcome challenges related to engagement and motivation [19]. Engaging individuals is one of the primary objectives of gamification. The main idea behind gamification is to transform a tedious activity into an engaging one using simple game elements, including points, badges, time, etc. Considering the importance of motivational factors in student learning, the utilization of gamification plays a significant role in the teaching and learning process [20]. Gamification combines intrinsic and extrinsic motivation to increase engagement and

motivation [18]. The engagement of students in gamified learning activities can lead to improved academic performance and better learning outcomes [21]. When students are engaged in a personally gamified lesson, they have an intrinsic motivation to manage their own learning. The experiences of students participating in gamified learning courses demonstrate that they have motivation and positive attitudes towards their own learning [22].

Based on the information and research conducted both in Persian and internationally on the effects of gamification on learning and the factors influencing it, it is evident that numerous studies have been conducted in this field. In addition, domestic research has also focused on the topics of learning and motivation, examining the impact of academic engagement on students and sixth-grade students. However, overall, most studies have been conducted as single-variable studies, meaning that gamified instruction has been compared to traditional instruction in various learning variables. Furthermore, most of the research conducted has been at the elementary level and in a face-to-face setting. In this study, the researcher intends to investigate the impact of traditional instruction, gamified instruction using a coin-based point system, and gamified instruction using a coin-based point system on a leaderboard on the learning of reading and writing skills and academic engagement of first-grade elementary students in the SHAD Virtual Learning Network.

Research Questions:
- To what extent does the use of badges in gamification impact the learning of reading skills in students?
- To what extent does the use of badges in gamification impact the learning of writing skills in students?

- To what extent does the use of badges in gamification impact the academic engagement of students?

Review of the Related Literature

In this section, a summary of the most relevant research conducted in Iran on the subject of the current research is reviewed and discussed. The research objectives and their results are briefly stated. Researches are listed in order of year from the most up-to-date.

Mohammadi [23] conducted a study on the effects of competition and collaboration in gamification on fourth-grade mathematics learning and motivation. The study found that incorporating competitive, collaborative, and team-based elements had a positive impact on learning and motivation, with team-based competition being more effective. Salari [24] evaluated the effectiveness of gamification on academic engagement and learning in sixth-grade students. The study indicated that gamification, particularly through creating a competitive environment, improved learning outcomes. However, the provision of rewards did not significantly impact learning. Dehghanzadeh et al. [25] examined the impact of gamified e-learning on the academic engagement of English language learners. The study recommended incorporating gamification in higher education settings as it effectively enhanced learning outcomes and learner engagement. Mohammad-Hasani and Aghazadeh [26] investigated the influence of digital gamification, multimedia instruction, and educational games on English language learning in seventh grade. The study found significant differences in learning outcomes, with the gamification and educational game groups outperforming the multimedia group. Heydari [27] compared game-based and traditional teaching methods in mathematics

learning for elementary school girls. The study showed that gamification as a teaching approach yielded better results compared to traditional methods. Ghaffari et al. [28] examined the effectiveness of educational games on the academic progress of first-grade students in the Persian language. The findings indicated that educational games were effective in enhancing academic progress, particularly in Persian language skills. Mehrabi [29] examined the impact of different methods, multimedia or Play, on learning multiplication tables in third-grade students. The study found that neither the bingo method nor the slide-making method had a significant effect on learning multiplication tables. The study revealed a significant relationship between using educational dart games and learning basic addition and subtraction concepts.

As in the above section, in this section, the background of research related to the topic of research outside of Iran has been examined. The findings and objectives of the research are briefly stated.

Clavito, et al [30] in a research named "Gamification as an Innovative Strategy to Improve Learners' Writing Skills" which conducted by pre and post-test experimental design found that there is a significant difference in the post-test and pre-test score of the learners in the gamification as an innovative strategy to improve learners' writing skills. Chan Li and Chan Chen [31] conducted a study on using a web-based collaborative reading annotation system (WCRAS) with gamification mechanisms, which resulted in improved reading performance and increased social interaction. Almutairi et al [32] found that incorporating gamification elements, such as leaderboards, in an online course led to better behavioral engagement compared to a regular course. Nand et al [33] discovered that challenge, feedback, and graphics in gamified

educational content significantly improved learning outcomes and engagement. Ortiz-Rojas et al (2019) [34] reported that implementing a leaderboard in engineering education enhanced learners' performance. Hee et al [35] found that intrinsic rewards in a Chinese gamified learning system increased motivation and behavioral intention to continue learning. Zainuddin [36] conducted a study titled "Investigating Learning Performance and Motivation in a Gamified Flipped Learning Environment." The research examined two classes based on the self-determination theory - one with gamified conditions and the other with regular conditions. The study found that students in a gamified learning environment were motivated by competition and showcased characteristics such as pre-class learning motivation, readiness for competition, independence in learning, and social interaction. Additionally, the results demonstrated that a gamified class showed the characteristics of self-determination theory, such as competence, autonomy, and relatedness, and was successful in implementing them. This research revealed that gamification in a flipped learning environment positively impacted student motivation and engagement. Carlson et al [37] showed that implementing a coin counter gamification technique for classroom management had positive effects on various aspects, including classroom enjoyment, student participation, and performance. Seixas et al [18] found that gamification and rewards positively impacted student academic engagement and achievement. Han and Fox [38] surprisingly found that intrinsic motivation, social interaction, satisfaction, effort, and learning performance were better in a traditionally taught class compared to a gamified classroom. Abramovich et al [39] discovered that incorporating badges in

education enhanced learner motivation and provided a personalized approach to acknowledging achievements based on individual knowledge levels.

After reviewing previous research, no studies were found that simultaneously investigated the effect of gamification on reading and writing skills and academic engagement. Based on the existing research conducted at the national and international levels, it can be concluded that most of the studies conducted in the field of gamification have been general in nature or focused on elements such as competition and collaboration. Therefore, there has been a lack of extensive research on the impact of badges, which is one of the elements of gamification. In this study, the researcher directly examines the influence of badges in gamification on the learning of reading and writing skills and academic engagement among first-grade elementary students.

Method

Participants

The research focused on practical purposes and targeted all first-grade students in Qazvin province during the 2020-2021 academic year. A primary school with two first-grade classes was selected using a multi-stage cluster sampling method. Random grouping was done through a pre-test, resulting in three groups with similar conditions: control group, gamification group with badges, and gamification group without badges, each consisting of 25 members. The study followed a pre-test and post-test experimental design with a control group. The difference between the gamification groups was that one received scores in the form of coins and badges, while the other received scores in the form of coins only. The control group received regular instruction.

Instruments

The researcher utilized a test based on Lotf-Abadi's ten-part reading skills test [40] to measure reading skills. The test also included a speed and accuracy reading assessment. The post-reading skill test was designed to be parallel to the pre-reading skill test, comprising 20 points with 5 points for reading speed and 15 points for reading accuracy. For evaluating writing skills, a test was developed by the researcher following the principles of Ragheb's foundational writing skill test design [41]. The pre-writing assessment consisted of six subtests, with the first four focusing on spelling (spelling words, writing sentences, writing image names, writing image names in blank spaces), while the fifth and sixth subtests assessed composition (writing a sentence for an image and writing two sentences for an image). The post-writing skill assessment test mirrored the pre-writing test in design. Academic engagement was measured using the Reeve Academic Engagement Questionnaire [42].

Validity and reliability of the measurement instruments

The reading and writing skills test developed by the researcher underwent face and content validity assessment. Five Elementary education experts, three teachers, and the educational supervisors (head teachers at the first-grade elementary education in the mentioned province) reviewed the test for alignment with textbook objectives, clarity, feasibility, and applicability in first-grade elementary school.

The test was revised based on their feedback, and its face and content validity were confirmed by the advisor and consultant. The reading skill assessment test showed acceptable reliability with a Cronbach's alpha of

0.701, while the writing skill assessment test demonstrated good reliability with a Cronbach's alpha of 0.807. Academic engagement was measured using the Reeve Academic Engagement Questionnaire, consisting of 17 items. The reliability of this questionnaire was found to be above 0.70 in a previous study by Ramezani and Khamesan [43].

Research implementation method/ context

The gamified intervention was designed and implemented by the teacher, who is also the researcher. Because the researcher was the teacher of the class in which the research was carried out, he was familiar with the educational needs of these students, and this helped to include the basic items that should be considered in the plan.

The study consisted of 10 sessions and included a pre-test of reading and writing skills in a SHAD environment. The writing test involved sending test images and instructions to the students in the SHAD classroom group. The reading comprehension assessment involved sending textual images to the SHAD classroom group. Each test had a duration of one hour due to internet speed and SHAD network limitations. An academic engagement questionnaire was also administered. The study had three groups: a regular educational group and two gamified groups (one with badges and one without). The gamified groups experienced

a gamified environment with differences in the point system and rewards. The Forest Command 1 and 2 groups were created for the gamified groups in the SHAD platform. The game "Forest Commander" was developed using Storyline software for Android devices, and the game "See and Write" was created using Kahoot software. The "Forest Commander" consisted of 7 levels with animations or cartoons played at the beginning of each level. Each level had sub-levels with varying numbers of coins. Scores were placed on the leaderboard, creating competition among the players. In the gamified group with badges, players received flags and coins based on their scores. The leaderboard of pioneers was displayed at the end of each stage, and the top performers were chosen as the Jungle Ruler, deputies, and advisors. The gamified group without badges also had top performers chosen for these positions based on the pioneers' leaderboard. After playing the gamified learning environments, a session of the "Right or Wrong" game was conducted, where students had to determine the correctness of words or choose the correct form. Finally, all three groups participated in a simultaneous reading and writing post-test at the end of the instructional sessions. The strategies and methods employed in this research were implemented to enhance students' vocabulary to improve their reading and writing skills.
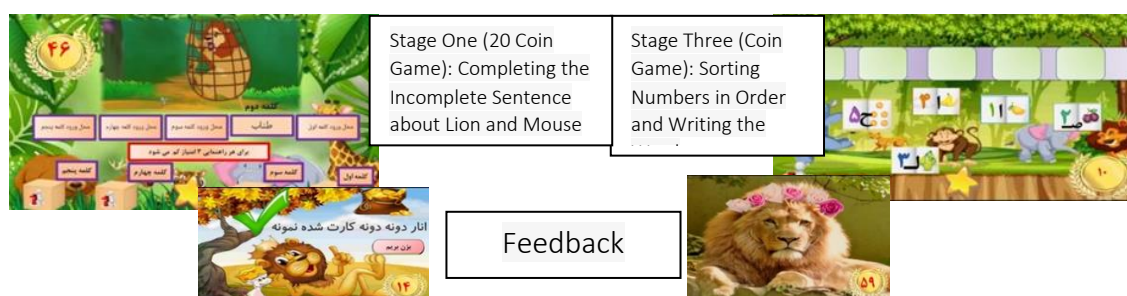
Fig. 1: The Environment of the "Forest Commander" Game

This included mastering how to construct words from symbols and effectively using consonant and vowel combinations. To achieve this, engaging activities such as matching games, puzzles, quizzes, word trains, magic numbers, token balloons, and amazing boxes can be utilized. The ultimate objective is to earn coins and different flags to become the ruler of the forest.

According to Table 1. the pre-test average scores for reading skill were 5.13 (control group), 48.13 (gamification with badges), and 54.13 (gamification without badges). For writing skill, the pre-test average scores were 16.138 (control group), 16.135 (gamification with badges), and 20.138 (gamification without badges). There was no significant difference in initial knowledge among the groups. In the post-test, the average scores for reading skill were 95.16 (control group), 58.18 (gamification with badges), and 64.17 (gamification without

badges). For writing skill, the average scores were 88.254 (control group), 88.264 (gamification with badges), and 88.260 (gamification without badges). The experimental groups showed significantly increased learning compared to the control group, with the gamification with badges group performing better than the gamification without badges group.

Results and findings

Descriptive statistics

In descriptive statistics, the measures of mean and standard deviation were analyzed for each of the control groups, gamification group with badges, and gamification without badges in the pre-test and post-test of writing skill learning, reading skill learning, and academic engagement.

Table 1: Descriptive statistics of the variables of reading and writing skills learning and academic engagement

Variable	Group	Pre-test mean	Post-test mean	Pre-test SD	Post-test SD
Reading skill	Control	13.50	16.95	1/94	1.74
	Gamification with badges	13.48	18.58	1.94	1.22
	Gamification without badge	13.94	17.64	1.92	1.87
Writing skill	Control	138.16	254.88	33.09	14.95
	Gamification with badges	135.16	264.08	42.87	5.90
	Gamification without badge	138.20	260.88	34.91	8.99
Behavioral engagement	Control	16.68	17.36	2.03	2.65
	Gamification with badges	16.72	26.16	1.33	1.14
	Gamification without badge	16.56	22.48	1.29	1.75
Agentive engagement	Control	20.08	20.24	1.97	2.24
	Gamification with badges	2048	33.08	2.38	1.25
	Gamification without badge	20.28	28.04	1.67	1.54

Variable	Group	Pre-test mean	Post-test mean	Pre-test SD	Post-test SD
Cognitive engagement	Control	16.72	16.24	1.83	1.36
	Gamification with badges	16.08	26	1.52	1.44
	Gamification without badge	16.28	20.52	2.05	1.53
Emotional engagement	Control	15.64	16.16	1.38	1.17
	Gamification with badges	15.56	20.08	1.12	1.70
	Gamification without badge	15.16	20.28	1.59	2.33

According to Table 1. the pre-test mean scores for behavioral engagement were 68.16 (control group), 72.16 (gamification with badges), and 56.16 (gamification without badges). For agentic engagement, the pre-test mean scores were 08.20 (control group), 48.20 (gamification with badges), and 28.20 (gamification without badges). The pre-test mean scores for cognitive engagement were 72.16 (control group), 08.16 (gamification with badges), and 28.16 (gamification without badges). For emotional engagement, the pre-test mean scores were 64.15 (control group), 56.15 (gamification with badges), and 16.15 (gamification without badges). There were no significant differences in initial behavioral, agentic, cognitive, and emotional engagement among the students. Therefore, the students had similar levels of engagement in the Persian lesson before implementing the gamification method.

The post-test mean scores for behavioral engagement were 68.16 (control), 16.26 (gamification with badges), and 48.22 (gamification without badges). Agentic engagement scores were 80.19 (control), 08.33 (gamification with badges), and 04.28 (gamification without badges). Cognitive engagement scores were 24.16 (control), 26 (gamification with badges), and 52.20 (gamification without badges). Emotional engagement scores were 16.16 (control), 08.20 (gamification with badges), and 28.20 (gamification without badges). Experimental groups (gamification with badges and without badges) showed significant improvement in behavioral, agentic, cognitive, and emotional engagement compared to the control group. The gamification with badges group outperformed the gamification without badges group in behavioral, agentic, and cognitive engagement.

Inferential statists

To examine the inferential statistics of the impact of badges in a gamified point system on the learning of reading and writing skills and the academic engagement of first-grade elementary students, Analysis of Covariance (ANCOVA) and t-tests were employed. Prior to conducting the ANCOVA, several statistical assumptions need to be examined.

Based on the results of the Kolmogorov-Smirnov test shown in Table 2, for most research variables in the control group, the gamification with badges group, and the gamification without badges group at the pretest and posttest levels, the significance level is greater than 0.05. This suggests that the null hypothesis of data normality is confirmed at a 95% confidence level, indicating that the data follows a parametric distribution. Therefore, parametric tests can be used for further analysis of the data.

Table 2: The results of the Kolmogorov-Smirnov test in different research groups

group	Variable	Assessment Stage	Sample Size	Kolmogorov-Smirnov Statistic	Statistical Significance Level
Control	Learning Writing Skill	Pre-test	25	0.138	0.2
		Post-test	25	0.172	0.54
	Learning Reading Skill	Pre-test	25	0.110	0.2
		Post-test	25	0.155	0.125
	academic engagement	Pre-test	25	0.143	0.2
		Post-test	25	0.222	0.003
Gamification with badges	Learning Writing Skill	Pre-test	25	0.173	0.051
		Post-test	25	0.169	0.062
	Learning Reading Skill	Pre-test	25	0.1	0.2
		Post-test	25	0.173	0.052
	academic engagement	Pre-test	25	0.085	0.2
		Post-test	25	0.174	0.048
Gamification without badge	Learning Writing Skill	Pre-test	25	0.157	0.114
		Post-test	25	0.145	0.183
	Learning Reading Skill	Pre-test	25	0.148	0.162
		Post-test	25	0.166	0.074
	Academic engagement	Pre-test	25	0.128	0.2
		Post-test	25	0.101	0.2

Table 3: Results of Homogeneity of Variances Test

Variable	F	Degrees of Freedom 1	Degrees of Freedom 2	Significance Level
Learning the Writing Skill	2.99	2	72	0.056
Learning the Reading Skill	2.16	2	72	0.123
academic engagement	1.126	2	72	·0.330

Based on Table 3. the significance level in Levene's test for the variables is greater than 0.05. Therefore, the null hypothesis of variance homogeneity is confirmed as one of the assumptions of the covariance analysis.

Another necessary assumption for conducting covariance is the homogeneity of regression coefficients. Based on the observed results of the homogeneity of regression coefficients test in Table 4, it can be concluded that the significance level in all four tests (collinearity effect, Wilks' lambda, Hotelling's trace, and largest root) is less than 0.01. This suggests that the null hypothesis is rejected, indicating a significant difference at a 99% confidence level. Therefore, among the experimental and control groups, there is a significant difference in at least one of the scores related to the variables of writing, reading, and academic engagement (including behavioral engagement, agentic engagement, cognitive engagement, and emotional engagement) in the post-test.

One of the assumptions that needs to be examined for conducting covariance analysis is the homogeneity of regression slopes. Considering that the significance level in Table 5. is greater than the error level of 0.05 for all variables, the condition of homogeneity of regression slopes in the interaction between the variables is satisfied.

Table 4: Results of Homogeneity of Regression Coefficients

Tests	Values	F	Degrees of Freedom 1	Degrees of Freedom 2	Significance Level	Effect Size
Collinearity Effect	0.961	20.96	6	136	0.000	0.481
Wilks' Lambda	0.046	82.187	6	134	0.000	0.786
Hotelling's Trace	20.75	228.320	6	132	0.000	0.912
Largest Eigenvalue	20.749	470.318	3	68	0.000	0.954

Table 5: Results of Homogeneity of Regression Slopes

Variable	Source	Sum of Squares	Degrees of Freedom	Mean Squares	F	Significance Level
Learning the Reading Skill	Group*Pretest	0.948	2	0.474	0.170	0.844
Learning the Writing Skill	Group*Pretest	119.916	٢	59.958	0.521	0.596
academic engagement	Group*Pretest	94.587	٣	24.280	2.684	0.053

Research Questions

Research Question 1: To what extent does the use of badges in gamification impact students' learning of reading skills?

Based on the analysis of the data in Table 4, the F-ratio is 6.166, the effect size is 0.148, and the significance level is 0.003, indicating a significant difference in the post-test scores of the research groups at a 95% confidence level. Table 1 shows that the average learning scores of the gamified groups with badges and badge-less are higher than the control group in reading skill. Therefore, it can be concluded that gamification had a significant impact on the reading skill learning of elementary school students. The eta-squared value in the group row indicates that the effect size was 14.8%.

Based on the comparison of mean values between the control group and the gamification group with badges, the significance level (0.002) is less than 0.05. Therefore, it can be concluded that there is a significant difference between these two groups. On the other hand, in the comparison of mean values between the control group and the gamification group without badges, the significance level (0.303) is greater than 0.05.

Table 6: Results of ANCOVA on the dependent variable of reading skill learning

Source	Sum of squares	Degrees of freedom	Mean squares	F ratio	Significance level	Effect size
Adjusted model	34.305	3	11/435	4.206	0.009	0.151
Mean deviation	419.419	1	419.419	154.281	0/000	0.685
Pre-test reading	0.834	1	0.834	0.307	0/581	0.004
Group	33.528	2	16.76	6.166	0/003	0.148
Error	139.016	71	2.719			
Total	23786.063	75				
Adjusted total	277.322	74				

Table 7: The results of multiple comparison of Tukey's post hoc test, control group, the gamification with badges group, and the gamification without badges group in the post-test of reading skill learning

	Group A	Group B	Mean Difference (A-B)	Standard Deviation Error	Significance Level	Confidence Interval	
						Lower Limit	Upper Limit
Post-test of reading skill learning	Control	Gamification with Badges (Coins and Flags)	-1.63	0.464	0.002	-2.74	-0.519
		Gamification without Badges (Coins)	-0.69	0.464	0.303	-1.80	0.42
	Gamification with Badges (Coins and Flags)	Control	1.63	0.464	0.002	0.5194	2.74
		Gamification without Badges (Coins)	0.94	0.464	0.113	-0.170	2.05
	Gamification without Badges	Control	0.69	0.464	0.303	-0.4206	1.80
		Gamification with Badges (Coins and Flags)	-0.94	0.464	0.113	-2.050	0.17

Therefore, it can be concluded that there is no significant difference between these two groups. Furthermore, in the comparison of mean values between the gamification group with badges and the gamification group without badges, the significance level (0.113) is greater than 0.05. Therefore, it can be concluded that there is no significant difference between these two groups.

Research Question 2: To what extent does the use of badges in gamification impact students' learning of writing skills?

Based on the analysis of the data in Table 8, a significant difference in the scores of the research groups in the post-test of writing skill is observed (F ratio= 4.888, effect size= 0.121, p-value= 0.010 < 0.05, 95% confidence level). The mean scores of writing skill learning in the gamification group with badges (combined points and badges system) and the gamification group without badges (coin-based points system) were higher compared to the control group, suggesting that gamification had a significant impact on the writing skill learning of primary school students. The squared eta value in the group row indicates that the effect size accounted for 12.1% of the variance.

The pairwise comparison of mean scores between the control group and the gamification group with badges (coin and flag system) indicates a significant difference (p-value= 0.009 < 0.05), suggesting that these two groups differ significantly. However, when comparing the mean scores between the control group and the gamification group without badges (coin system), no significant difference is found (p-value= 0.121 > 0.05), indicating that there is no significant distinction between the means of these two groups. Similarly, the pairwise comparison between the gamification group with badges and the gamification group without badges also shows no significant difference (p-value= 0.540 > 0.05) between the means of these two groups.

Table 8: Results of ANCOVA on the dependent variable of writing skill learning

Source	Sum of squares	Degrees of freedom	Mean squares	F ratio	Significance level	Effect size
Adjusted model	1185.592	3	395.197	3.484	0.020	0.128
Mean deviation	323486/230	1	323486.230	2851.622	0.000	0.976
Pre-test reading	94.92	1	94.925	0.837	0.363	0.012
Group	1108.90	2	554.451	4.888	0.010	0.121
Error	8054.195	71	113.439			
Total	5077160	75				
Adjusted total	9239.787	74				

Table 9: Results of the post-hoc Tukey test comparison between the control group, the gamification group with badges, and the gamification group without badges in the post-test of writing skill learning

	Group A	Group B	Mean Difference (A-B)	Standard Deviation Error	Significance Level	Confidence Interval Lower Limit	Confidence Interval Upper Limit
Post-test of writing skill learning	Control	Gamification with Badges (Coins and Flags)	-9.20	3	0.009	-16.40	-1.99
		Gamification without Badges (Coins)	-6	3	0.121	-13.20	1.20
	Gamification with Badges (Coins and Flags)	Control	9.20	3	0.009	1.99	16.40
		Gamification without Badges (Coins)	3.20	3	0.540	-4	10.40
	Gamification without Badges	Control	6	3	0.121	-1.20	13.20
		Gamification with Badges (Coins and Flags)	—3.2	3	0.540	-10.40	4

Research Question 3: To what extent does the use of badges in gamification impact students' academic engagement?

Given that academic engagement consists of four subscales, it has been examined in detail.

To what extent does the use of badges in gamification impact students' behavioral engagement?

Based on the data analysis in Table 10. a significant difference in the level of behavioral engagement among the research groups in the post-test is observed (F= 134.462, effect size= 0.791, p-value: 0.000 < 0.05, 95% confidence level). The mean score of behavioral engagement in the gamification group with badges (coin and flag system) and the gamification group without badges (coin system) is higher compared to the control group, suggesting that gamification has had a significant impact on the behavioral engagement of primary school students. The

squared eta value in the group row indicates that this effect accounts for 88.7% of the variance.

The paired comparison of mean scores between the control group and the gamification group with badges (coin and flag) reveals a significant difference in the sub-scale of behavioral engagement (p-value: < 0.05). Similarly, when comparing the mean scores between the control group and the gamification group without badges (coin), a significant difference is observed in the sub-scale of behavioral engagement (p-value: < 0.05). Furthermore, comparing the mean scores between the gamification group with badges and the gamification group without badges, a significant difference is found in the sub-scale of behavioral engagement (p-value: < 0.05).

Table 10: Results of Covariance Analysis on Behavioral Engagement Variable

Source	Sum of squares	Degrees of freedom	Mean squares	F ratio	Significance level	Effect size
Adjusted model	994/604	3	331/535	91.451	0.000	0.794
Mean deviation	183.752	1	183.752	50.686	0.000	0.417
Pre-test reading	17.964	1	17.967	4.955	0.029	0.065
Group	974.937	2	487.465	134/4	0.000	0.791
Error	257.396	71	3.625			
Total	37552	75				
Adjusted total	1252	74				

Table 11: Results of Post-hoc Multiple Comparison Test (Tukey Test) on Behavioral Engagement Learning Post-test among Control Group, Gamification Group with Badges (Coin and Flag System), and Gamification Group without Badges

	Group A	Group B	Mean Difference (A-B)	Standard Deviation Error	Significance Level	Confidence Interval	
						Lower Limit	Upper Limit
Post-test Behavioral Engagement	Control	Gamification with Badges (Coins and Flags)	-8.8	0.55313	0.000	-10.12	-7.47
		Gamification without Badges (Coins)	-5.12	0.55313	0.000	-6.44	-3.79
	Gamification with Badges (Coins and Flags)	Control	8.8	0.55313	0.000	7.47	10.12
		Gamification without Badges (Coins)	3.68	0.55313	0.000	2.35	5
	Gamification without Badges	Control	5.12	0.55313	0.000	3.79	6.44
		Gamification with Badges (Coins and Flags)	-3.68	0.55313	0.000	-5	-2.35

What is the impact of using badges in gamification on students' agentive engagement?

Based on the analysis of the data in Table 12, a significant difference in post-test agentic engagement between the research groups is observed (F =349.853, effect size=0.908, p< 0.05). The mean score for the agentic engagement component in the gamification group with badges (combined coin and flag system) and the gamification group without badges (coin system) is higher compared to the control group, suggesting that gamification had a significant impact on the agentic engagement of first-grade elementary students. The squared eta value in the group row indicates that the effect size accounted for 90.8% of the variance.

Table 12: Results of ANCOVA on the dependent variable of agentive engagement

Source	Sum of squares	Degrees of freedom	Mean squares	F ratio	Significance level	Effect size
Adjusted model	2098.864	3	699.621	237.60	0.000	0.909
Mean deviation	417.868	1	417.868	141.917	0.000	0.667
Pre-test reading	6.304	1	6.304	2.141	0.148	0.029
Group	2060.245	2	1030.122	349.853	0.000	0.908
Error	209.056	71	2.944			
Total	5747	75				
Adjusted total	2307.920	74				

Table 13: Results of the post-test comparison between the control group, gamification group with badges, and gamification group without badges in terms of agentive engagement

Group A	Group B	Mean Difference (A-B)	Standard Deviation Error	Significance Level	Confidence Interval Lower Limit	Upper Limit
Control	Gamification with Badges (Coins and Flags)	-12.84	0.48917	0.000	-14.01	-11.64
	Gamification without Badges (Coins)	—7.8	0.48917	0.000	-8.97	-6.62
Gamification with Badges (Coins and Flags)	Control	12.84	0.48917	0.000	11.66	14.01
	Gamification without Badges (Coins)	5.04	0.48917	0.000	3.86	6.21
Gamification without Badges	Control	7.8	0.48917	0.000	6.62	8.97
	Gamification with Badges (Coins and Flags)	- -5.04	0.48917	0.000	-6.21	-3.86

The paired comparison of mean scores between the control group and the gamification group with badges (coins and flags) reveals a significant difference in the subscale of agentic engagement (p-value < 0.05). Similarly, when comparing the mean scores between the control group and the gamification group without badges (coins), a significant difference is observed in the subscale of agentic engagement (p-value < 0.05). Furthermore, a significant difference in the subscale of agentic engagement is found between the gamification group with badges (coins and flags) and the gamification group without badges (coins) (p-value < 0.05).

To what extent does the use of badges in gamification impact students' cognitive engagement?

Based on the analysis of the data in Table 14, a significant difference in cognitive engagement between the research groups in the post-test is observed (F = 348.598, effect size=0.908, p-value < 0.05, 95% confidence level). The mean score of cognitive engagement in the gamification group with badges (coin and flag system) and the gamification group without badges (coin system) is higher compared to the control group, suggesting that gamification had a significant impact on the cognitive engagement of first-grade elementary students. The squared eta value in the group row indicates that this effect accounts for 90.8% of the variance.

The comparison of mean scores between the control group and the gamification group with badges (coin and flag system) reveals a significant difference in the cognitive engagement subscale (p-value= 0.000 < 0.05). Similarly, when comparing the mean scores between the control group and the gamification group without badges (coin system), a significant difference is observed in the cognitive engagement subscale (p-value= 0.000 < 0.05). Furthermore, a significant difference in the cognitive engagement subscale is found between the gamification group with badges and the gamification group without badges (p-value < 0.05).

Table 14: Results of ANCOVA on the dependent variable of cognitive engagement

Source	Sum of squares	Degrees of freedom	Mean squares	F ratio	Significance level	Effect size
Adjusted model	1222.978	3	659.407	232.4	0.000	0.908
Mean deviation	210.654	1	210.654	120.092	0.000	0.628
Pre-test reading	26.258	1	26.258	14.969	0.000	0.174
Group	1222.959	2	611.497	348.598	0.000	0.908
Error	124.542	71	1.754			
Total	34171	75				
Adjusted total	1347.520	74				

Table 15: Results of the post-test cognitive engagement comparison using the Tukey follow-up test between the control group, the gamification group with badges, and the gamification group without badges in the learning cognitive engagement

	Group A	Group B	Mean Difference (A-B)	Standard Deviation Error	Significance Level	Confidence Interval	
						Lower Limit	Upper Limit
Post-test Cognitive engagement	Control	Gamification with Badges (Coins and Flags)	-9.76	0.40934	0.000	-10.73	-8.78
		Gamification without Badges (Coins)	4.28	0.40934	0.000	-5.25	-3.30
	Gamification with Badges (Coins and Flags)	Control	9.76	0.40934	0.000	8.78	10.73
		Gamification without Badges (Coins)	5.48	0.40934	0.000	4.5	6.45
	Gamification without Badges	Control	4.28	0.40934	0.000	3.30	5.25
		Gamification with Badges (Coins and Flags)	-5.48	0.40934	0.000	-6.45	-4.50

What is the extent of the impact of using badges in gamification on students' emotional engagement?

Based on the analysis of data in Table 16. it can be concluded that there was a significant difference in emotional engagement between the research groups in the post-test (F= 43.546, effect size= 0.551, p-value= 0.000 < 0.05, 95% confidence level). The mean score of emotional engagement in the gamification group with badges (coin and flag system) and the gamification group without badges (coin system) is higher compared to the control group, indicating that gamification has a significant impact on the emotional engagement of elementary school students. The squared eta value in the group row suggests that this effect accounts for 55.1% of the variance.

The pairwise comparison of means between the Control Group and the Gamification Group with Badges (Coin and Flag System) indicates a significant difference in the sub-scale of emotional engagement (p-value= 0.000 < 0.05). Similarly, the pairwise comparison of means between the Control Group and the Gamification Group without Badges (Coin) also shows a significant difference in the sub-scale of emotional engagement (p-value= 0.000 < 0.05). However, when comparing the means between the Gamification Group with Badges and the Gamification Group without Badges, no significant difference was found in the sub-scale of emotional engagement (p-value= 0.919 > 0.05).

Table 16: Results of the analysis of covariance on the dependent variable of emotional engagement.

Source	Sum of squares	Degrees of freedom	Mean squares	F ratio	Significance level	Effect size
Adjusted model	287	3	92.787	29.186	0.000	0.552
Mean deviation	128.192	1	128.192	40.323	0.000	0.362
Pre-test reading	8.52	1	8.52	2.68	0.106	0.036
Group	276.877	2	138.438	43.546	0.000	0.551
Error	225.720	71	3.179			
Total	27125	75				
Adjusted total	504.08	74				

Table 17: Results of the post-test emotional engagement multiple comparison using the Tukey follow-up test between the control group, gamification group with badges (coin and flag system), and gamification group without badges in the learning emotional engagement

	Group A	Group B	Mean Difference (A-B)	Standard Deviation Error	Significance Level	Confidence Interval	
						Lower Limit	Upper Limit
Post-test Emotional engagement	Control	Gamification with Badges (Coins and Flags)	-3.92	0.51016	0.000	-5.14	-2.69
		Gamification without Badges (Coins)	-4.12	0.51016	0.000	-5.34	-2.89
	Gamification with Badges (Coins and Flags)	Control	3.92	0.51016	0.000	2.69	5.14
		Gamification without Badges (Coins)	-0.2	0.51016	0.919	-1.42	1.02
	Gamification without Badges	Control	4.12	0.51016	0.000	2.89	5.34
		Gamification with Badges (Coins and Flags)	0.2	0.51016	0.919	-1.02	1.42

Discussion

Gamification leads to improved learning activities. A gamified learning environment plays an effective role in teaching and learning processes. Salari's research [24] titled "Investigating the Effectiveness of Gamified Learning on Academic Engagement and Learning shows that gamified learning, through creating a sense of competition, can enhance students' learning outcomes. Providing rewards does not have a significant impact on learning, but gamified learning, through creating a sense of competition and rewards, increases academic engagement. In another research by Ghaffari et al [28], the effectiveness of educational games on the academic progress of first-grade students in Persian Language was studied. The findings showed that educational games can enhance the academic progress of first-grade students in the Persian language, specifically in reading and writing skills, as well as word and image comprehension. Furthermore, the impact of gamification on word recognition and vocabulary recall was found to be significant, leading to improved

word comprehension and content recall. It was found that gamification can positively affect the academic progress of first-grade students when learning the Persian language. This means that when students use gamification, their reading and writing skills improve, they retain the content better, and they have an enhanced understanding of words and vocabulary. In line with the researches, in the current study, based on the higher average scores in the reading and writing skills of students in gamified groups with and without badges compared to the control group and the follow-up test, it can be concluded that gamification has been effective in enhancing students' reading and writing skills. The findings of this study are consistent with the results of the studies by Zainuddin [36], Carlson et al [37], Chen et al [31], Nand et al [33], Mohammadi [23], Salari [24], Agazadeh and Mohammadhasani [26], Heydary [27]. These results are particularly in line with the studies by Ortiz-Rojas and colleagues [34] and Ghaffari et al [28]. The mentioned studies have obtained significant results regarding the impact of gamification on learning. Additionally, the results of this study differ from the results of the studies by Mehrabi [29], Chen [31], He et al [35], Hans Hanus and Fox [38].

Gamification-based learning has positive effects on student participation and engagement. Gamified learning environments attract learners' attention through factors such as focus, communication, confidence, and satisfaction, and gamification elements are designed based on learners' prior knowledge and learning goals. Challenges and skills in these environments are tailored to the abilities of the students. Students feel a sense of satisfaction in these environments and apply what they have learned in other situations. Research shows that gamified learning environments based on the ARCS theory (Attention, Relevance, Confidence, Satisfaction) increase students' interest and engagement in various activities. Various studies demonstrate that game-based e-learning can significantly improve student engagement. Additionally, the use of gamification in education can enhance the level of learning and engagement among students. Features such as challenges, feedback, and graphics play a crucial role in improving the level of learning. Research indicates that incorporating gamification leads to increased student participation and engagement in learning activities. Moreover, the use of educational badges can enhance learner motivation and positively impact their intrinsic motivation. Badge acquisition patterns may vary based on learners' prior knowledge. Overall, the use of gamification in education can facilitate improved student participation and engagement. Considering the increase in the average scores of the sub-scales of academic engagement (behavioral, emotional, cognitive, and agentic) in gamified groups with and without badges compared to the control group, pre-test and post-test comparison and the data obtained from the analysis of covariance, it can be concluded that gamification has been effective in promoting students' academic engagement. The findings of this study are consistent with the research by Nand et al [33], Seixas et al [18], Dehghanzadeh et al [25], and Salari [24]. The mentioned studies have obtained significant results regarding the impact of gamification on increasing student engagement and participation. Based on the results, it can be concluded that there is a significant difference in the mean scores of the sub-scales of academic engagement (behavioral, emotional, and cognitive) between the gamified group with and without badges. These results are particularly in line with the research by Almotairi et al [32], He et al [35], Carlson et al [37], and Abramovich et al [39], which have examined the impact of point systems, leaderboards, badges, and rewards.

Conclusions

This study found that gamification positively impacts learning and academic engagement. Two gamified groups showed improved performance in reading, writing, and engagement. Gamification elements like challenges, competition, feedback, and rewards increased student engagement. Students were highly engaged in the Forest Commander game, playing multiple times and seeking uninterrupted access. The game's challenges and missions aligned with learning objectives and increased in complexity as students progressed. Written and audio feedback, along with rewards, motivated learners. The badge gamified group had a combined badge and coin system, while the badgeless group had only coins. The badge gamified group showed higher academic engagement in three subscales. Both gamified groups had higher academic engagement than the control group.

Gamified environments enhance academic success, creativity, critical thinking, professional skills, and social skills. These environments align with the ARCS motivation theory, capturing attention, relevance, confidence, and satisfaction. They provide tailored challenges and skills, leading to satisfaction and effective application of knowledge. Interactive and multiplayer gamified environments facilitate interaction and collaboration. Gamification offers unique learning experiences and allows for trial and error without fear of failure. It can also be beneficial in therapeutic domains for addressing learning disorders, stress, and attention deficits.

Based on the importance of gamification in education and the results of the current research, some practical suggestions and also some recommendations for future research can be included: Design educational programs using gamification principles and badges to encourage students in the learning process. Select badges based on educational goals to provide a learning environment creatively and attractively. The gamification scoring system should include an effective feedback process for students. Use Badges as a feedback mechanism can help students improve their reading, writing, and academic engagement skills and stay on track for their progress. Raise awareness of the new gamification method in education for teachers and parents through in-service training courses. Conducting similar research with a larger sample size and longitudinal research on the subject of the current research. Conduct similar research on the current research topic in other educational levels.

It should be noted that there were some limitations in the research conducted. For instance, some students were unable to install the "Jungle Commander" game on their mobile phones due to having lower versions of the Android operating system. As a result, they had to use shared devices. Additionally, the study focused solely on 1st-grade female students. It's important to note that boys tend to be more comfortable in game environments due to their frequent use of electronic devices; therefore, the results of the study may differ for them.

Authors' Contribution

The authors contributed equally to the writing of this article. Zohre Morovati performed the initial drafting of the manuscript, Nasrin Mohammadhasani was responsible for Project administration, Writing, Review and Editing, and Yousef Mahdavinasab conducted the manuscript revision and methodology.

Conflicts of Interest

The authors have no conflicts of interest

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