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Influence of Gamification Elements on Students' Academic Performance

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ABSTRACT

Playing games is an important part of a child's cognitive and social development. Students learn more when they are allowed to play and engage in hands-on activities rather than being forced to memorize knowledge (formulas) from books. Enjoyable components must be incorporated into their classes to maintain their attention and increase their performance. The great benefits that gamification offers must be integrated into the basic level of education to limit the easily bored span. Appropriate integration of gamification into classroom activities could raise a positive effect on students' performance and promote a positive attitude toward learning. This study could provide teachers with information and awareness on innovative instructional approaches that can boost students' engagement, motivation, and performance while learning. It can also serve as an eye-opener for teachers in other fields of learning to explore and adopt better instructional approaches to teaching to improve student performance. Training of teachers on the use of gamification-based teaching should be integrated into our educational sector. This research was conducted to determine the influence of gamification elements on student academic achievement.

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1. INTRODUCTION

Studies maintain that the progress of any nation depends on its technological and scientific advancements which are contingent on an effective educational system. Education is a mechanism that allows students to acquire knowledge and develop skills, it is also a critical factor in human and societal development. The teaching and learning process involves Knowledge, skills, values, critical thinking abilities, and many more acquired through education. The role and relevance of educational technology in learning are critical tools used in improving learning outcomes in a variety of settings. Gamification is one of the emerging technologies and strategies that could be used to combat boredom in the classroom, boost student motivation and improve academic performance (Nwachukwu & Johnson, 2020). Gamification is the concept of using game design elements in a non-game context to motivate and increase user engagement to gain knowledge or complete specific tasks. It makes use of the players' instincts to motivate and encourage performance (Shamsuddin *et al*., 2018). Gamification is a game-like concept used in engaging and supportive learning environments that motivate students. Gamification-based teaching is used as game mechanics and elements such as levels, game narratives, quests, progress bars, and achievement systems to engage learners in the teaching-learning process by promoting learning, motivating action, and assisting learners in problem-solving (Rao, 2022). The application of the element of games in the teaching and learning process can arouse the interest of unmotivated students (Zulkifli *et al*., 2019). Gamification elements such as storyline, scores, points, badges, objectives and goals, leader board, feedback, reward, experience, achievement, profile, difficulty challenge, level, virtual products, and progress bar all have a significant impact on students' learning experiences (Koivisto & Hamari, 2014). Gamified activities encourage children to develop social skills such as teamwork, decision-making, and problem-solving while also providing feedback on their progress (Brunder, 2015). Gamification serves as a medium for connecting learners with online learning content while also providing an innovative methodology for feedback-based learning (Lebuna *et al.*, 2022). Scholars have consistently advocated the need to employ modern technology-based instructional strategies that ensure the active engagement of students in classroom activities and motivate them to give attention to the details of the instructional content. Appropriate integration of gamification into classroom activities could raise a positive effect on students' performance and promote a positive attitude toward learning. Nwachukwu and Johnson (2020) ascertained that gamified teaching methods in basic technology significantly improved students' academic performance and showed a significant effect on students' interest. Based on this, this research was conducted to determine the effect of gamification on student academic achievement.

2. METHOD

The method used in this research is a Systematic Literature Review of the problem and area studied. The theory draws on existing literature and research on the influence of gamification elements on students' academic performance. The Researcher collected journal articles from Google Scholar, Research Gate, SINTA, Scopus, and Web of Science.

3. RESULTS AND DISCUSSION

3.1. Concept of Gamification

The terms "gamification" and "game-based learning" are frequently conflated. Gamification is the application of game theory to non-game areas whereas game-based learning is the teaching of course outcomes through games. Gamification is the process of creating opportunities for game-full interactions and experiences that have the potential to

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motivate and engage the user for non-entertainment purposes. Gamification is described as the application of conventional game components (rules of play, point scoring, and competition with others) to engage people in problem-solving. Gamification is a technique for increasing motivating affordances by incorporating game-like experiences and enhancing behavioral outcomes (Ofosu-Ampong, 2020). Gamification is the addition of motivating features to a learning framework or system to improve user engagement using solid game theory and game mechanics. Gamification is used as play-based concepts and dynamics to enhance the teaching-learning process and make it more appealing to students so that they can focus on specific curricular topics (Carrillo *et al*., 2019). Gamification is broken down into two categories: structural and content gamification. Structural gamification is the application of game elements to propel a learner through content with no alteration or changes to the content while Content gamification is the process of modifying content to make it more game-like by including game components, game mechanisms, and game thinking. Gamification is used as gaming concepts and features in the learning environment to affect students' behavior, motivate them and encourage them to participate. Gamification prepares learners to be active and take responsibility for their learning. Gamified classroom promotes improvements in learning, metacognition, evaluation, and the process of conceptual support of the students (Holguin *et al*., 2020). One of the hallmarks of gamification is that it helps players to improve their analytical and multitasking abilities, as well as their use of creativity and imagination. Another feature of gamification is that it helps players to improve their analytical and multitasking abilities, as well as their use of creativity and imagination. Additionally, Gamification may be used in education to give incentives for anticipated behaviors and to guarantee that expected behaviors assist students to achieve positive learning outcomes. A gamified learning experience encourages learners to take on new tasks without fear of real-life repercussions and it fosters student collaboration. A gamified learning experience is more visual than oral and students have been found to remember twice what they see than what they read.

3.2. Influence of Gamification Elements on Students' Academic Performance

Game elements are referred to as well-designed rules, scores, challenges, collaboration, puzzles, and role-playing. Common gamification elements include points, timers, badges, and leaderboards. Gamification elements are useful in addressing learners' engagement, practice opportunities, assessment, and feedback. Gamification elements give users the motivation to do something, the ability to carry out a task by facilitating it, and a trigger to complete the action. Gamification components alter the behavior that leads to the neglect of learning chances by increasing learner engagement and passion for engaging with the information. The merits of gamification components in the learning environment cannot be overlooked because the main objective is to enhance students' engagement, motivation, and comprehension through a fun and engaging learning environment, resulting in excellent student performance. Gamification elements are great strategies to encourage certain behaviors and thus improve academic performance (Landers, 2014). Nah *et al.* (2014) conducted a study review on gamification in education and the synthesis identified points, rewards, progress bars, storylines, and feedback to gamify education. Guler and Guler (2015) stated that gamification elements aid in the development of fundamental abilities, memory muscle, and more complex awareness of the complicated relationships that exist throughout dynamic processes.

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Badges are visual representations of a user's progress that show the degree of skill attained and provide instant feedback; they are one type of extrinsic incentive. Badges are connected with the concept of competencies or skills-based learning as well as the assessment of informal learning and they can be especially useful for subject knowledge and practices. Learners may benefit from badges because they provide more flexible learning pathways and chances for lifetime learning. Badges may be used as instructional aids by associating badges with particular learning goals of a subject or unit of study, allowing students (and instructors) to track their progress (Kehoe & Goudzwaard, 2015). Points are also known as scores, experience points, and skill points. It is a simple way to provide extrinsic feedback on the users' actions. Points are used to reward users through multiple dimensions and different rates. Points can be awarded for a wide variety of tasks such as completing quizzes, attending lectures, taking part in-class exercises, solving puzzles, creativity in assignments, completing practice questions, or correct answers. Storytelling is a natural way for individuals to communicate and present in all kinds of social interactions. Humans tend to narrate stories to tell complicated ideas, concepts, or information in a better way when getting into interacting with others. Storytelling is the conveying of events in words, sound, and images, often by improvisation or embellishment. Crucial elements of stories and storytelling include plot, characters, and narrative point of view (Giakalaras, 2016). Using stories in a classroom can serve as an additional technique that may spark interest, assist in memory and reduce anxiety.

They can create a comfortable and supportive atmosphere in the classroom and build rapport between the instructor and the students. Leaderboards are one of the most competitive gamification elements which encourage learners to surpass their peers to achieve first-place status. Leaderboards have been shown to inspire participants to maintain their performance for longer (Kladchuen & Srisomphan, 2021). However, Mee-Mee *et al.* (2020) revealed that gamification did not significantly improve students' grades as most of them were unfamiliar with the protocol of gamification. Feedback is a powerful tool used in facilitating effective teaching and learning to promote regular feedback about performance between what is known and what is expected to be known (Yusoff *et al*., 2014). Feedback provides information about goals and learning processes both of which are essential to self-efficacy , motivation , and improvement in cognitive and metacognitive performance . Feedback has the potential to encourage student engagement , bolster student enthusiasm to learn, and lead to improved academic achievement (McLaughlin & Yan , 2017). Lister (2015) reveals the extent to which gamification supports student achievement and motivation among college -level students . The findings from the analysis revealed that points , badges , achievements , leaderboards , and levels are the most commonly implemented form of gamification . Barbieri *et al*. (2021) reported that Serious Games' use in education promotes significant changes and mental resources activation. Ogo -Chukwu and Fomsi (2019) examined the influence of gamification on learning outcomes and engagement in the English Language in the Bonny Local Government Area of Rivers State, Nigeria. The findings revealed that learners taught with games had a higher mean score than those taught without games but the difference was not statistically significant , and their engagement level was high.

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3.3. Empirical Studies on the Effect of Gamification-Based Teaching on Academic Performance

Ukala (2018) investigated ways classrooms could be gamified with mobile devices to enhance junior secondary school student's academic participation in Rivers State. Three research questions and three null hypotheses guided the study. The analytical survey involved a sample of 378 teachers from a population of 2,700 teachers spread across Rivers State. The findings revealed among others that the ways the classroom can be gamified through the integration of a new approach to the learning process and pedagogy by incorporating technological change in the classroom using mobile devices as the new generation of learners are immersed in the digital world from birth. The perception of Students on gamifying learning in high schools within African countries, 800 quantitative survey questions were distributed among high school students in these countries. The findings revealed that students are already actively involved in gamified learning activities in class and found them useful for their learning. The effects of leaderboards, a game element on intrinsic motivation. They tested 35 students taking a C programming course at Waseda University for six weeks. They found students improved code metrics under gamification conditions without additional rewards, despite competition-related game elements, such as leaderboards, are not recommended in learning-focused environments.

Caballero *et al*. (2022) determine the influence of gamification on students' academic performance in language classes, specifically in Filipino subjects. This study utilized the purposive sampling technique. Twenty grade seven students were chosen as the sample of the study. Both the control and experimental groups were given a pre-test. The experimental group was exposed to gamification. Both groups were given the post-test and the result was subjected to statistical treatment. The findings revealed that gamification improved the experimental group's academic performance when compared to the control group, implying that it plays a positive impact on the learners' academic success. The students are enthusiastic about the usage of gamification in the Filipino subject . The Effects of Gamification on Developing EFL Learners ' Idiomatic Knowledge : Do Attitudinal Factors Contribute to the Learning of the Idioms with the Game ? The findings revealed that the EG performed significantly better than the CG on the post-test of idioms . Gamification helped EFL learners develop their idiomatic knowledge . The results indicated that Iranian EFL learners presented positive attitudes toward gamification in learning English idioms . In addition , the results revealed that enjoyment , fun, reducing anxiety , involvement , and immediate feedback were the factors that the students mentioned for the instructional games.

Barrio *et al*. (2015) conducted an experimental study to evaluate the perceived learning benefits of gamified student response systems (SRSs) over non-gamified SRSs. A review of the benefits of using SRS in classrooms is presented. The study tested if gamified SRSs lead to improved motivation, attention, engagement, and performance. A gamified SRS was developed by 18 integrating game design elements of reward and competition into the SRS. The study found that the gamified SRSs increased motivation to attend classes, reduced disconnection from the lectures, and improved student confidence in the lesson materials. However, gamified SRSs did not significantly improve engagement over non-gamified SRSs, as students are already highly engaged when using SRSs. Smiderle *et al.* (2020) investigated the effect of ranking, points, and badges on 1st-year courses in programming. The sample size for the study was 40 students. the study revealed a positive effect of these elements on students' learning outcomes.

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4. CONCLUSION

This study could provide teachers with information and awareness on innovative instructional approaches that can boost students' engagement, motivation, and performance while learning. It can also serve as an eye-opener for teachers in other fields of learning to explore and adopt better instructional approaches to improve student performance. Applying gamification techniques in a curriculum can help provide a more inclusive activity through its effect on students' sense of competition, interaction, and motivation. Training of teachers on the use of gamification-based teaching should be integrated into our educational sector.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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