Gamification in Digital Learning via Roblox Platform: A pathway in Developing 21st Century Skills at Higher Education Level

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DOI: https://dx.doi.org/10.47772/IJRISS.2025.925ILEIID000038

Received: 23 September 2025; Accepted: 30 September 2025; Published: 05 November 2025

ABSTRACT

This concept paper examines the role of gamification in digital learning as a catalyst for developing 21st century competencies, hereafter referred to as 4C's skills, namely critical thinking, creativity, collaboration, and communications. The primary objective of this paper is to explore how gamification can enhance the development of 4C's skills at higher education level. This study adopts a qualitative approach by incorporating reviews of previous studies on gamification in learning and 4C's skills. The analysis finds that gamification of learning will be much helpful in developing of 4C's among the students in higher education as to fulfil the employers' requirements. The findings suggest that effective application of gamification in digital learning not only facilitates knowledge transfer and enhances student engagement but also assist in the development of the 4C's skills. This paper tries to bridge the gap between application gamification in digital learning and the development of 4C's skills. On top of that, it also proposes a conceptual framework linking gamification strategies to skills development in higher education. Valuable guidance also provided to educators, policymakers and researchers in helping the students in developing multi skills required by the employers. By having great understanding on the benefits of gamification, the educators may gradually switch their traditional teaching method into gamification. In addition, the policymakers such as Ministry of Higher Education may provide funds in order to encourage the application of gamification in class.

Keywords: gamification, critical thinking, creativity, communication, collaboration

INTRODUCTION

The advancement in technology has greatly changed the teaching and learning environment in higher education level. Back then, the system focused more on the use of thick, wordy textbook and lectures for hours in class to deliver the knowledge. Now, the new environment has being created where the digital learning environment being applied. Since the movement control order in 2020, majority of lectures were delivered online as it seems to be the best method at that time. The main concern about this practice is whether the knowledge can be successfully transferred to the students or not. However, digital learning not only has successfully transferred the knowledge, but also promising results in higher education by enhancing the students' engagement as proven by Ahmed & Parsons (2013) states that digital learning has shown promising results in higher education by enhancing student engagement and learning success.

Problem Statement

As digital learning evolves, gamification in digital learning has emerged as an innovative strategy to empower the student learning process. The integration of gamification in digital learning demonstrates its high potential in enhancing the effectiveness of digital education by improving academic achievement, boosting the motivation, and creating a healthy classroom environment (Sharples, 2000). These benefits encouraged numerous studies on gamification in learning reflected by significant growing interest by researchers and a fast growth of related publications in few years back (Swacha, 2021). Few years back, popular platforms such as

Kahoot! and Quizizz has been used by educators as interactive learning tools, primarily for quizzes purpose. Nevertheless, this study investigates the use of Roblox as another innovative teaching platform in higher education centre.

The higher education institutions' role not only transferring knowledge, but they are also expected to prepare graduates with the 21st-century skills which highly demanded by the global workforce (Cimatti, 2016). Various skills such as critical thinking, creativity, communication, collaboration, and digital literacy are recognized as vital for personal and professional success in today's knowledge-driven economy. Roblox provides the element of multiplayer metaverse platform that will help students to sharpen and enhance their 21st skills by encouraging user interaction, interest, and inventiveness (Göksel & Kobak, 2023).

Although gamification shows great potential in enriching learning experiences, there are still several debates and limitations that have not been fully addressed in existing research. A recent systematic review by Ratinho and Martins (2023) found that most gamification-based learning approaches still place too much emphasis on extrinsic motivation such as awarding points, badges and leaderboard positions, rather than fostering intrinsic motivation and higher-order thinking in students. In addition, many previous studies have focused on quiz-based platforms such as Kahoot! and Quizizz, which only measure short-term memory and participation, rather than complex skills such as creativity, collaboration and problem-solving (Aibar-Almazán et al. 2024). In terms of methodology, there are still gaps in assessing the extent to which gamification can contribute to the comprehensive development of 21st century skills, especially in non-STEM fields such as business and accounting. Therefore, empirical evidence on the effectiveness of immersive learning environments such as Roblox is still limited, highlighting the need for further research to explore its potential in fostering critical thinking, collaboration and digital literacy among students in higher education institutions.

Nevertheless, traditional instructional approaches may not always be sufficient to develop these skills effectively, especially in digital environments that can sometimes lead to passive learning. Looking at that issue, this study attempts to discuss on gamification that offers a promising pedagogical strategy to bridge the gap between digital learning and skills development.

LITERATURE REVIEW

Gamification & Its Role in Higher Education

Gamification not only acts in transferring knowledge, motivating and helps the student scoring good exam, yet it can provide beyond those benefits. In other words, gamification has the potential to encourage problem-solving, teamwork, innovation, and adaptability by developing interactive and immersive experiences. So far, no study discusses on how application of gamification can enhance the skills that need to be possessed by the students once they step to work life. In response, this study aims to explore how gamification in digital learning may help the students to develop the skills needed in this 21st century at the higher education level and provides insights for educators and policymakers seeking to optimize teaching practices in the digital age.

The job market today is a new challenge to the graduates from numerous educational institutions in Malaysia. Commonly, the job opportunities are readily available to graduates who possess expected employability skills at workplaces (Asefer, & Abidin, 2021). Thus, it is compulsory for students to master all the skills required and place them among the best candidates during the interview. Possessing multiple skills will enhance the possibility for them to be selected. In response, higher education institutions have the responsibility to equip graduating students with the skills critical for the workplace as it has become a main concern (Cimatti, 2016).

Gamification in digital learning provides an alternative to address this challenge. By including game elements into educational platforms, students will enjoy an interactive and more meaningful learning experiences. Some studies showed application of a few platforms such as Kahoot! (Wang& Tahir, 2000; Bawa,2019) and Quizizz (Göksün & Gürsoy, 2019) as game-based learning. These two games are popular among the higher education students and easy to attract the students' attention. To fill the gap of study, this study attempts to introduce a new game platform to be part of the digital learning process which is Roblox. The use of Roblox may attract the students' interest instantly as this game is very popular worldwide. Its popularity encouraged this study to

come out with learning accounting classification via this platform. Hence, we propose to study that the use of Roblox not only to motivate and knowledge transfer, but also may help the educators to develop the students' 4C skills namely critical thinking, creativity, collaboration, and communications

Comparative Insights on Gamification Tools

Gamification is increasingly recognized as an important strategy in higher education to address issues of low student engagement, lack of motivation, and superficial learning patterns. Platforms such as Kahoot! and Quizizz have been widely used due to their ease of use and immediate feedback. However, both platforms emphasize short-term factual recall and participation, rather than the development of higher-order thinking skills. This has sparked discussions among researchers about the extent to which gamification truly supports deep learning or merely reinforces students' extrinsic motivation.

In contrast, Roblox, an immersive 3D platform developed by users themselves, offers a more attractive alternative by emphasizing collaboration, creativity, and problem-solving skills in an interactive learning environment. Recent studies (Zhai, 2024; Sari et al, 2025; Jin, 2024; Won and Lee, 2023) show the potential for Roblox in STEM, engineering, and language learning, but empirical research in the context of higher education is still limited, especially in non-STEM fields such as business and accounting. Past studies have also shown several key constraints, namely a narrow focus on the use of quiz-based gamification tools, a lack of methodological rigor in assessing 21st century skills, and limited exploration of the use of Roblox as a pedagogical tool in higher education.

Roblox, a globally popular game-based platform, provides an accessible and creative medium to design immersive learning environments where students learn by doing, collaborating, and solving problems. However, its application in higher education, particularly within accounting and business contexts, remains underexplored. This study seeks to bridge that gap by investigating how gamification through Roblox can be a catalyst for developing critical 21st century skills.

Objectives

1. To study how gamification in digital learning via Roblox nurtures critical thinking and problem-solving among higher education students.
2. To examine the extent to which Roblox-based gamification encourages communication and collaboration in group-based tasks.
3. To explore the role of Roblox in enhancing creativity and innovation in learning activities.
4. To propose Roblox gamification as a sustainable and engaging pedagogy for higher education aligned with 21st century learning needs.

PRODUCT DESCRIPTION & METHODOLOGY

This study explores on the development and use of a Roblox-based gamified learning tool designed to teach basic principle of accounting which is accounting classifications. Through the Roblox game, players will face challenges like classifying items, solve problems, and they need collaborate in team to achieve objectives. Players will be provided with leaderboard scoring to enhance engagement with immediate feedback.

This study used a mixed-methods research design, integrating quantitative surveys with qualitative reflections to provide a comprehensive understanding of students' learning experiences. Participants consisted of 120 diploma students from the Faculty of Accounting at one of university in East Malaysia, selected through purposive sampling to explore the use of gamification in higher education institution especially for non-STEM areas. These students were enrolled in an introductory accounting course designed to test the effectiveness of Roblox-based gamification in developing 21st century skills.

Data were collected through pre- and post-tests on 21st century skills using self-assessment surveys, observations of collaborative play, and focus group interviews. The structured survey, adapted from an established educational framework, measured four key components of 21st century skills, namely critical

thinking, collaboration, communication, and creativity, using a five-point Likert scale. Items for critical thinking were derived from the Critical Thinking Scale. Creativity and digital literacy items were adapted from existing instruments measuring creativity in digital learning environments.

During the procedure, students participated in a Roblox-based accounting classification activity designed to encourage teamwork, decision-making, and problem-solving. Following the session, participants completed a post-test survey and provided qualitative reflections on their learning experience, focusing on the strengths and weaknesses of the Roblox-based gamification. Quantitative data were analyzed using descriptive and inferential statistics to measure improvements in the 4Cs, while qualitative responses were coded thematically to capture students' perceptions and insights about engagement, collaboration, and digital literacy development.

Potential Findings and Commercialisation

The study is expected to propose that Roblox gamification knowingly improves students' engagement and promote the development of 21st century skills compared to traditional teaching methods. Students are expected to offer higher motivation, improved collaboration, and enhanced creativity in problem-solving tasks. For commercialization purpose, the Roblox gamified can be revised as an educational platform for universities and colleges. Later, it can be utilized as a supplementary teaching tool for business and accounting educators.

Figure 1 Roblox used in Accounting

Figure 2 Roblox creates collaboration and communication

NOVELTY AND RECOMMENDATIONS

The Novelty of This Study Lies in Applying Roblox as A New Approach in Developing The 4cs of 21st Century Skills. Commonly This Game Being Played by Gen Z As Part of The Entertainment. Now, This Game Will Be Part of the Teaching Tools and Undeniably Will Attract The Students. Unlike Conventional Gamification Tools Such as Kahoot! Or Quizizz, Roblox Allows for Immersive Role-Play, Collaboration, And Creativity Within A 3d Virtual Environment. This Unique Combination Fills the Gap Between Digital Play and Academic Learning.

Higher education institutions should consider integrating Roblox-based gamification to complement lectures, especially for non-accounting students who struggle with abstract concepts. For further research, Roblox application in education should be expanded into other disciplines or probably can be used to explore how this game may develop other skills that benefits the students in getting a job.

ACKNOWLEDGEMENTS

The author would like to express sincere gratitude to our Head of Academic Centre, Dr Susan Hydra Sikayu for providing the guidance and support in preparing this concept paper. Appreciation is also extended to all other colleagues from Faculty of Accountancy, Cawangan Sarawak for their valuable insights and encouragement throughout the development of this work.

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