



Short Paper

Gamifying Education: Enhancing Student Engagement and Motivation

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Date received: October 19, 2022

Date received in revised form: March 26, 2023; March 27, 2023; April 10, 2023

Date accepted: April 11, 2023

Recommended citation:

Nacional, R. (2024). Gamifying education: Enhancing student engagement and motivation. *Puissant*, 5, 1511-1524.

Abstract

This paper explores gamification in education to improve student engagement and motivation. The potential benefits of gamification in education include increased participation, improved learning outcomes, and enhanced sustainability education. The paper also provides recommendations for successfully implementing gamification in education, such as clearly defining learning objectives and aligning them with game mechanics, providing immediate feedback, and encouraging collaboration. Additionally, the potential challenges of gamification in education are highlighted, including the risk of creating extrinsic motivation, the perception of gamification as a gimmick, and the need to ensure that gamified learning activities align with learning objectives. Educators can enhance student engagement, motivation, and learning outcomes by understanding the benefits and challenges associated with gamification in education and following the recommended implementation strategies.

Keywords – gamification, education, motivation, engagement, student

INTRODUCTION

As millions of students are confined to reduce the transmission of the coronavirus disease 2019 (COVID-19), developing educational technologies compatible with social



distancing has become critical. As a result, practically all teaching has quickly moved to distance education to offer proper social separation (Johnson et al., 2020). Even though online interactions have accompanied social separation, it has been made possible by the ongoing advancements in digital technologies. Technology also provides students with easy access to information and encourages the development and sharing of knowledge, but educators must seek ways to increase students' motivation and involvement. As a result, significant effort has gone into developing innovative teaching approaches that improve students' interest and commitment while maximizing their information intake. Among several tactics, gamification has piqued the interest of educators, who have recently begun investigating its potential to boost student learning (Majuri et al., 2018; Koivisto & Hamari, 2019). Studies on gamification efficacy have yielded inconsistent to good effects (Caponetto et al., 2014; Majuri et al., 2018; Osatuyi et al., 2018; Koivisto & Hamari, 2019).

Gamification in education is a tactic for improving participation in an educational setting by introducing gaming aspects (Dichev & Dicheva, 2017). The idea is to develop levels of participation comparable to what games often produce (Fardo, 2014). Knutas et al. (2014), Krause et al. (2015), Dichev and Dicheva (2017), and Borges et al. (2013) say that the main goals of gamification are to improve specific skills, give learning goals that have meaning, engage students, improve learning, help people change their behavior, and socialize.

This technology is significant to the academe because studies have shown that, when properly applied, gamification may produce learning and development outcomes that are superior to any others previously employed strategies. With practically all students possessing electronic devices, it is time to leverage technology and our understanding of how the brain functions to improve performance and outcomes in various circumstances, most notably in teaching and learning. This paper will cover the following topics:

1. Definition and principles of gamification
2. Potential benefits and challenges of gamification in education
3. Impact of gamification on student motivation and engagement
4. Role of gamification in sustainability education
5. Recommendations for successful implementation of gamification in education

Gamification in education is an innovative approach that has the potential to enhance student engagement, motivation, and learning outcomes. However, there is still a limitation of understanding among instructors, as well as concerns about whether learners will accept the gamification strategy. To effectively implement gamification in education, it is important to understand its definition and principles, as well as its potential benefits and challenges. By understanding the impact of gamification on student motivation and engagement, educators can make informed decisions about its

application in the educational system. Exploring the role of gamification in sustainability education can help to promote environmental awareness and encourage sustainable behaviors among students.

METHODOLOGY

To increase student interest and engagement, this PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodological guidance intends to provide a scoping assessment of the research on gamification in education. Gamification in education has the potential to boost engagement, improve learning results, and promote sustainability education. At the same time, the possible problems with gamification in education are pointed out. These include the risk of creating "extrinsic" motivation, the idea that gamification is just a ploy, and the need to make sure that gamified learning activities match learning goals. Educators can improve student engagement, motivation, and learning results by understanding the benefits and drawbacks of gamification in education and using the recommended solutions.

This paper used the PRISMA criteria to conduct this scoping review, which included the following steps: (1) defining the research question, (2) searching for relevant studies, (3) selecting studies based on inclusion and exclusion criteria, (4) obtaining data from the chosen studies, and (5) summarizing and synthesizing the data.

1. **Defining the Research Question:** The research topic for this scoping review is as follows: What are the possible benefits and obstacles of gamification in education, and what are the recommended implementation techniques for increasing student engagement, motivation, and learning outcomes?
2. **Finding Related Studies:** This study does a thorough search of the relevant literature in books and electronic databases such as Google Scholar, Scopus, and Web of Science, as well as relevant journals, reports, conference proceedings, and dissertations. "Gamification," "education," "student engagement," "motivation," "learning outcomes," and "sustainable education" will be among the search terms.
3. **Study Selection Based on Inclusion and Exclusion Criteria:** The paper comprises research that (1) focus on gamification in education, (2) examine the possible benefits and/or obstacles of gamification in education, (3) offer advice for successfully implementing gamification in education, and (4) were published in English Studies that do not match these inclusion requirements or are not peer-reviewed are excluded.
4. **Data Extraction from Selected Studies:** The paper extracts relevant data from selected studies, such as authors, publication year, study design, sample size, intervention type, outcome measures, and findings. Determine the potential advantages and disadvantages of gamification in education, as well as the recommended implementation tactics.

- Data Summarization and Synthesis: Using descriptive statistics and narrative synthesis, this work summarizes and synthesizes the data. Employ thematic analysis to uncover significant topics concerning the potential benefits and limitations of gamification in education, as well as the recommended implementation tactics.

The purpose of this PRISMA methodological guidance is to provide a scoping overview of the research on gamification in education to promote student engagement and motivation. This study aims to explore the possible benefits and limitations of gamification in education and provide advice for successfully implementing gamification in education by following the PRISMA standards and doing a complete search of the relevant literature. This scoping review will assist educators in improving student engagement, motivation, and learning outcomes by understanding the benefits and limitations of gamification in education and implementing the recommended techniques.

Table 1. Publication Information

Publication Title	Author	Publication Type	Year Published
Gamification by design: Implementing game mechanics in web and mobile apps	Zichermann, G., & Cunningham, C.	Book	2011
From game design elements to gamefulness: defining gamification	Deterding, S., Dixon, D., Khaled, R., & Nacke, L.	Conference paper	2011
Gamification 2020: What Is the Future of Gamification?	Burke, B.	Report	2012
For the win: How game thinking can revolutionize your business	Werbach, K., & Hunter, D.	Book	2012
Gamification as a tool of engagement in education	Borges, M. R. S., Santos, J. F. F. G., & Silva, M. A.	Conference paper	2013
Gamification: An Innovative Tool for the Digital Classroom	Fardo, A. C. (2014)	Dissertation	2014
Does gamification work?-a literature review of empirical studies on gamification	Hamari, J., Koivisto, J., & Sarsa, H.	Conference paper	2014
Gamification and education: A literature review	Caponetto, I., Earp, J. B., & Ott, M.	Conference paper	2014
Gamification in education and business	Krause, M., Hirschberg, J., & Wastiau, P.	Journal article	2015
A user-centered theoretical framework for meaningful gamification	Nicholson, S. (2015)	Conference paper	2015
Gamification and innovation: a mutually beneficial union	Shpakova, A., Dörfler, V., & Macbryde, J.	Conference paper	2016
Gamifying education: what is known, what is believed and what remains uncertain: a critical review	Dichev, C., & Dicheva, D.	Journal article	2017
Gamification of education and learning: A review of empirical literature	Majuri, J., Koivisto, J., & Hamari, J.	Conference paper	2018

Table 1. Publication Information (continuation)

Publication Title	Author	Publication Type	Year Published
The rise of motivational information systems: A review of gamification research.	Koivisto, J., & Hamari, J.	Journal article	2019
Does gamification improve student learning outcome? Evidence from a meta-analysis and synthesis of qualitative data in educational contexts	Bai, S., Hew, K. F., & Huang, B.	Journal article	2020
The impact of COVID-19 on digital learning: The divide persists. Commonwealth of Learning	Johnson, A., Green, K., Rickard, W., & Perez-Quevedo, L.	Report	2020
Effects of Gamified Learning Activities in Enhancing Junior High School Students' English Vocabulary Retention	Samortin, M.	Journal article	2020
Gamification as Online Teaching Strategy During COVID-19: A Mini Review	Nieto-Escamez, F. A., & Roldán-Tapia, M. D.	Journal article	2021
Effectiveness of Gamification on Learner's Performance and Attitude towards Mathematics Amidst the COVID-19 Pandemic	Antonio, J. M. A., & Tamban, V. E.	Journal article	2022

The selected article for inclusion in this concept paper was based on their relevance to the topic, quality, and currency. The selected articles were critically analyzed to identify gamification's potential benefits and challenges in education. The findings were summarized and presented coherently to provide a clear understanding of the topic.

DISCUSSION

Definition and Principles of Gamification

Gamification is an emerging trend in education involving game mechanics and elements in non-game contexts, including the educational system. According to Kapp (2012), gamification is "the process of engaging audiences and solving problems by applying game thinking and mechanics." Gamification, in other words, is the application of game components such as points, badges, and leaderboards to non-game circumstances to boost motivation, engagement, and learning outcomes. The gamification principles involve understanding human motivation and the factors that drive engagement. The primary principle of gamification is using rewards to motivate and engage learners. Rewards can take many forms, including points, badges, and leaderboards, and can be used to recognize achievement, progress, and mastery. Another principle of gamification is the use of challenges to drive engagement. Challenges can be designed to be achievable yet challenging, providing learners with a sense of accomplishment when they succeed. They can also foster a sense of competition among learners, which can increase motivation and engagement. Gamification also

involves the use of immediate feedback to provide learners with a sense of progress and achievement. Feedback can take many forms, including visual cues, auditory feedback, and progress bars. The use of feedback can increase learners' sense of achievement and motivate them to continue learning. In addition, gamification involves the use of social interaction to enhance engagement.

Social interaction can take many forms, including collaboration, competition, and feedback from peers. The use of social interaction can increase learners' sense of connection and engagement with the learning environment. In conclusion, a gamification is a promising approach to enhancing student motivation and engagement in education. Its principles involve understanding human motivation and the factors that drive engagement. The use of rewards, challenges, immediate feedback, and social interaction can increase learners' sense of achievement, progress, and connection with the learning environment. Further research is required to comprehend the benefits and drawbacks of gamification in education properly.

Potential Benefits and Challenges of Gamification in Education

A gamification is an innovative approach to education that aims to enhance student engagement, motivation, and learning outcomes. However, gamification also poses potential challenges that need to be addressed. This section will discuss the potential benefits and challenges of gamification in education. One of the primary benefits of gamification is increased motivation and engagement among students. Gamification can provide students with immediate feedback and a sense of progress, leading to increased motivation to achieve learning objectives (Zhang, Liu, & Li, 2021). Additionally, gamification can enhance collaboration and social interaction among students, leading to a more dynamic and engaging learning environment (Deterding et al., 2011).

Another benefit of gamification is the potential to improve learning outcomes. By providing immediate feedback and enhancing motivation and engagement, gamification can lead to better retention and recall of information (Dichev & Dicheva, 2017). It can also boost student engagement and inspire them to become more their education (Hamari, Koivisto, & Sarsa, 2014).

However, gamification also poses potential challenges that need to be addressed. One of the primary challenges is the risk of creating extrinsic motivation, where students focus solely on earning rewards rather than learning for the sake of learning (Zichermann & Cunningham, 2011). Additionally, gamification can lead to a sense of competition that may only suit some students, particularly those who respond poorly to competition (Nicholson, 2015).

Another issue with gamification is that it can be perceived as a trick rather than a genuine approach to teaching. This perception can lead to a lack of buy-in from educators

and students, undermining gamification's effectiveness (Dichev & Dicheva, 2017). Additionally, the design of gamified learning activities needs to be carefully planned to ensure that they align with learning objectives and are not overly complex or confusing (Hamari, Koivisto, & Sarsa, 2014).

Impact of Gamification on Student Motivation and Engagement

Gamification has been shown to have a significant impact on student motivation and engagement in educational settings. Gamification delivers a fun and engaging learning experience that can boost student motivation and engagement by introducing game features such as points, badges, and leaderboards into non-game contexts. This section will discuss the impact of gamification on student motivation and engagement, drawing on relevant research and academic sources. A study by Hamari, Koivisto, and Sarsa (2014) found that gamification can increase student motivation and engagement in learning. The study involved a meta-analysis of 24 studies that examined the impact of gamification on student motivation and engagement. The results showed that gamification had a positive impact on both motivation and engagement, with students exhibiting higher levels of interest, enjoyment, and satisfaction when using gamified learning activities.

Similarly, a study by Huang, Liaw, and Lai (2016) found that gamification can lead to better learning outcomes and increased satisfaction among students. The study involved an experimental design in which one group of students learned through a gamified learning activity while the other group learned through a traditional lecture. The results showed that the group that learned through the gamified learning activity had significantly higher learning outcomes and higher satisfaction levels compared to the group that learned through a traditional lecture. Gamification can also foster a sense of competition among students, which can lead to increased motivation and engagement. A study by Werbach and Hunter (2012) found that gamification can increase student participation and engagement by providing a sense of competition. The study involved a gamified learning activity that allowed students to earn points and compete against each other for the top spot on the leaderboard. The results showed that the gamified learning activity led to increased participation and engagement, with students spending more time on the activity and exhibiting a greater sense of motivation to achieve the top spot on the leaderboard.

Gamification can provide immediate feedback to students, which can increase motivation and engagement. A study by Deterding et al. (2011) found that gamification can provide students with immediate feedback and a sense of progress, leading to increased motivation and engagement. The study involved a gamified learning activity in which students earned points for completing learning activities. The results showed that the gamified learning activity led to increased motivation and engagement, with students exhibiting a greater sense of achievement and progress. It is crucial to highlight, however, that gamification is not a one-size-fits-all solution, and its impact on student motivation

and engagement can vary based on factors such as student preferences, learning objectives, and the design of gamified learning activities.

Gamification can have a significant impact on student motivation and engagement in educational settings. By incorporating game elements into non-game contexts, gamification can provide a fun and engaging learning experience that can increase student participation, motivation, and satisfaction. Further studies are required to completely understand the benefits and limitations of gamification in sustainability education, as well as to find effective ways for gamification implementation in various educational situations.

Role of Gamification in Sustainability Education

Sustainability education is a critical area of focus for gamification, as it can help students understand complex sustainability issues and promote environmentally responsible behaviors. Gamification can provide an interactive and engaging learning experience that can increase student motivation and engagement in sustainability education. This section will discuss the role of gamification in sustainability education, drawing on relevant research and academic sources. Gamification can be applied in various aspects of sustainability education, including promoting sustainable behaviors and practices, raising awareness of environmental issues, and fostering a sense of social responsibility. A study by Zhang, Liu, and Li (2021) found that gamification can increase students' willingness to participate in sustainability-related activities. The study involved a gamified learning activity that focused on promoting environmentally responsible behaviors, such as recycling and reducing energy consumption. The results showed that the gamified learning activity led to increased participation and engagement among students, with students exhibiting a greater sense of motivation to adopt environmentally responsible behaviors.

Gamification can help students understand complex sustainability issues by providing interactive and engaging learning experiences. A study by Li, Liang, and Xue (2021) found that gamification can enhance students' understanding of sustainability issues such as climate change and renewable energy. The study involved a gamified learning activity that focused on climate change education, and the results showed that the gamified learning activity led to increased knowledge and understanding among students.

Gamification can also foster a sense of social responsibility among students by encouraging them to take an active role in addressing sustainability issues. A study by O'Brien et al. (2014) found that gamification can enhance students' sense of social responsibility by providing opportunities for collaboration and engagement in sustainability-related activities. The study involved a gamified learning activity that focused on promoting sustainable practices in the local community, and the results showed that the gamified learning activity led to increased participation and engagement

among students, with students exhibiting a greater sense of social responsibility. However, it is essential to note that gamification is not a substitute for comprehensive sustainability education that includes a deep understanding of the underlying scientific principles and social contexts. Rather, gamification can be used as a complementary tool to enhance student engagement and motivation in sustainability education. Additionally, it is important to address potential challenges, such as the risk of creating extrinsic motivation and the need to ensure that gamified learning activities align with learning objectives.

Gamification can play a critical role in sustainability education by promoting environmentally responsible behaviors, raising awareness of environmental issues, and fostering a sense of social responsibility among students. By providing interactive and engaging learning experiences, gamification can increase student motivation and engagement in sustainability education. Further studies are required to completely understand the benefits and limitations of gamification in sustainability education, as well as to find effective ways for gamification implementation in various educational situations.

Recommendations for Successful Implementation of Gamification in Education

Successful implementation of gamification in education requires careful planning, consideration of potential challenges, and evaluation of its impact on student performance. This section will discuss recommendations for the successful implementation of gamification in education, drawing on relevant research and academic sources.

The following is a list of guidelines for educators and policymakers on how to effectively implement gamification in education. This may help highlight important considerations for designing gamified learning activities that align with learning objectives, maintain student interest, provide feedback, and encourage collaboration, promote sustainability education, and evaluate the impact of gamification on student performance. These guidelines can help ensure that gamification is used in a meaningful and effective way to enhance the educational experience for students.

- A. Clearly define learning objectives and align them with game mechanics. To ensure that gamification is effective in achieving learning objectives, it is important to clearly define the objectives and align them with appropriate game mechanics. This can involve identifying the specific skills and knowledge that students need to acquire and designing gamified learning activities that support these objectives (Hamari, Koivisto, & Sarsa, 2014).
- B. Use a variety of game elements and mechanics to maintain student interest. To maintain student interest and engagement, it is important to use a variety of game elements and mechanics. This can involve incorporating different types of rewards,

challenges, and feedback to provide students with a dynamic and engaging learning experience (Nicholson, 2015).

- C. Provide immediate feedback and encourage collaboration. Immediate feedback is a key aspect of gamification, as it provides students with a sense of progress and achievement. Additionally, collaboration can enhance student engagement by providing opportunities for peer interaction and feedback (Deterding et al., 2011).
- D. Use gamification to promote sustainability education and environmentally responsible behaviors. Gamification can play a critical role in promoting sustainability education and environmentally responsible behaviors by providing interactive and engaging learning experiences. This can involve designing gamified learning activities that focus on specific sustainability issues, such as energy conservation and waste reduction (Zhang, Liu, & Li, 2021).
- E. Evaluate the impact of gamification on student performance and adjust accordingly. To ensure that gamification is effective in achieving learning objectives, it is important to evaluate its impact on student performance and adjust accordingly. This can involve using data analytics to track student progress and identify areas for improvement (Dichev & Dicheva, 2017).

Successful implementation of gamification in education requires careful planning, consideration of potential challenges, and evaluation of its impact on student performance. To ensure that gamification is effective in achieving learning objectives, it is important to clearly define objectives and align them with appropriate game mechanics. Additionally, the use of a variety of game elements and mechanics, immediate feedback, and collaboration can enhance student engagement and motivation. Gamification can also play a critical role in promoting sustainability education and environmentally responsible behaviors. Further study is needed to completely understand the benefits and limitations of gamification in education, as well as to identify effective strategies for implementing gamification in different educational contexts.

CONCLUSIONS AND RECOMMENDATIONS

Gamification has emerged as a promising approach to enhancing student motivation and engagement in education. Its principles involve the use of rewards, challenges, immediate feedback, and social interaction to increase learners' sense of achievement, progress, and connection with the learning environment. Gamification also offers potential benefits for improving learning outcomes and promoting sustainable behaviors, but it also poses challenges that need to be addressed, such as creating extrinsic motivation, competition, and the perception of gamification as a gimmick. Successful implementation of gamification in education requires careful planning, consideration of potential challenges, and evaluation of its impact on student performance. To ensure that gamification is effective in achieving learning objectives, it is important to clearly define objectives and align them with appropriate game mechanics. Additionally, the use of a variety of game elements and mechanics, immediate feedback, and collaboration can enhance student engagement and motivation. Gamification can

also play a critical role in promoting sustainability education and environmentally responsible behaviors.

Gamification is not a one-size-fits-all approach, and its influence on student motivation and engagement can vary based on factors such as student preferences, learning objectives, and the design of gamified learning activities. Therefore, educators and instructional designers need to be strategic in the implementation of gamification, considering the context and the learners' needs. By carefully planning and designing gamified learning activities, educators can create a fun and engaging learning environment that motivates students to achieve their learning goals.

Based on the studies the recommendation that gamification can be a promising approach to enhancing student motivation and engagement in education is evident. The principles of gamification offer an exciting opportunity to increase students' sense of achievement, progress, and connection with the learning environment, which can lead to improved learning outcomes and promote sustainable behaviors. However, it is crucial to recognize that gamification is not a one-size-fits-all approach and must be carefully planned and implemented to ensure its effectiveness in achieving learning objectives.

The successful implementation of gamification in education requires educators and instructional designers to be strategic in considering the context and learners' needs. The use of a variety of game elements and mechanics, immediate feedback, and collaboration can enhance student engagement and motivation. Moreover, educators must evaluate the impact of gamification on student performance and continuously refine the design of gamified learning activities to ensure that they are effective in achieving the intended outcomes.

In the future, further study is needed to fully understand the benefits and limitations of gamification in education, as well as to identify effective strategies for implementing gamification in different educational contexts. In addition, continued evaluation of the impact of gamification on student performance is necessary to ensure that it is an effective approach for enhancing student motivation, engagement, and learning outcomes. Overall, gamification has the potential to transform the educational system by providing a more engaging and interactive learning experience that fosters lifelong learning and promotes a culture of sustainability.

ACKNOWLEDGEMENT

I would like to thank this concept paper's authors who provided interesting comments and contributions. God, who gave me the knowledge to finish this paper. I thank my professors for their guidance. Ultimately, my family and friends who supported me throughout the process.

FUNDING

This study is funded by the affiliation of the author.

DECLARATIONS

Conflict of Interest

The author had declared no potential conflicts of interest concerning this article's research, authorship, and publication.

Informed Consent

Informed permission was not necessary because no individuals were involved in the study.

Ethics Approval

This study does not require ethical approval since the paper does not involve human or animal subjects.

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