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Abstract

The development of digital technology in leaps and bounds has resulted in offering different learning options and alternatives in physical education. In this regard, technology techniques, like gamification, have been utilized in several areas of education, leading to the identification of its several usage benefits. Nevertheless, there is a lack of studies concerning how gamification would enhance students' skills in physical education. Therefore, this study systematically reviews gamification in the physical education literature from 2015 to 2022, focusing on 27 indexed papers published in international databases. Based on the results, most studies had positive findings on gamification effectiveness in physical education samples. Besides, based on the findings, gamification studies primarily focused on how physical skills can be enhanced among physical education students. The findings contribute to the way technology enhances students' skills in physical education. To this end, more studies are required to mitigate the remaining gaps in gamification literature.

Introduction

In the current educational institutions, the main objective is to achieve comprehensive and integrated learner development that encompasses the cognitive, emotional, physical, and social aspects of the students (Rasheed et al., 2021). Developments in digital technology have resulted in innovative transformations in teaching and learning processes (Jdaitawi, 2020a; Jdaitawi, 2020b; Jdaitawi et al., 2019). Literature dedicated to education has been largely focused on gamification in light of its use and implementation in different environments to assist in achieving aims and objectives in learning (Julieth et al., 2020). Based on the studies, playing electronic games, including fencing games, can develop innovation and decision-making in students, enhance their problem-solving, and learn fencing laws via the inculcation of general information and educational initiatives, which eventually have a positive effect on the abilities of learners and their integration into the IT and technology realm (Rasha, 2011).

The advantages that can be reaped from gamification have been mentioned often in literature, and these include

easy access, flexibility, promotion of critical thinking skills, and achievement of positive results. It also promotes motivation, engagement, participation, and collaboration among students in their process of learning (Vanduhe et al., 2019), and these form-critical factors worth examination for further enhanced training and learning (Stiegler & Zimmermann, 2014). In a related study, Liu et al. (2016) claimed that gamification elements can enhance educational results and facilitate enjoyment, assignment completion, and engagement in learning. In the physical education field, the gamification method has been shown to motivate individuals' ongoing performance of physical activities (Arufe-Giráldez & Fortnite, 2019; Fernandez-Rio et al., 2020), enhance their participation in physical activities and positive changes in their behavior (Xu et al., 2022), promote behaviors to improve health (Uechi et al., 2018), and positively impact emotions, motivations, and viewpoints towards doing physical activities (Goodyear et al., 2021). Based on the literature reviews in the past few years concerning the gamification field, several studies have been unearthed to be dedicated to it (Xu et al., 2022; Yang et al., 2021), with one of them being focused on physical education (Kappen et al., 2019) that revealed the benefits of exergames physical activities to older adult health and their wellness. In a similar study (Arufe-Giráldez et al., 2022) conducted a review of 17 papers and revealed the role of gamification in physical education as it enhances motivation and commitment towards doing physical exercise among users.

Notwithstanding the positive benefits highlighted in studies, other studies' findings remained inconclusive, specifically those regarding the potential role of gamification in facilitating students' learning in different settings (Chiraz, 2022; Hanus & Fox, 2015; Kıyançiçek & Uzun, 2022). This is clear from Landers and Armstrong (2017), who reported that gamification had no significant effect on instructional outcomes when combined with low learners' attitudes towards this learning technique, and Thornton and Francia (2014), who found that implementing gamification may not apply to the whole curriculum as it may lead to negative outcomes (Alomari et 2019). Similar studies revealed that gamification methods may not replace traditional methods as this may not be the best way to achieve positive student learning outcomes (Ding et al., 2018; Van Roy & Zaman, 2018).

To compound the findings further, based on a call-in gamification finding, the technique is difficult and challenging to implement at different education levels (Hamari et al., 2014; Koivisto & Hamari, 2014; Rapp et al., 2019; Zainuddin et al., 2020). This indicates the need for more studies to be conducted to examine gamification in various levels and fields of education, especially in physical education (Arufe-Giráldez et al., 2022; Uechi et al., 2018). In more current reviews of gamification literature, the authors call for more studies to examine the technique in the context of physical education considering the lack of studies in this field (Arufe-Giráldez et al., 2022; Uechi et al., 2018) and as such, this study extends the literature on gamification by conducting a review of dedicated studies in the physical education field from different databases.

Objectives and Questions of the Study

The objective of this study is to review the literature concerning gamification in physical education. Thus, the following research questions are examined:

1. What skills can be achieved by users of gamification in physical education?

2. What are the top education levels focused on by gamification physical education studies?
3. What are the advantages and disadvantages related to gamification in physical education?

Methods

Study Design

The study used content analysis, specifically meta-analysis to analyze the 27 published journal articles on gamification from 2015 to 2022. Content analysis is a design used often in the field of physical education. According to Arksey and O'Malley (2002) and Kitchenham (2004), meta-analysis steps involve establishing inclusion criteria for the research under consideration, identification of relevant studies, and selection of studies. Regarding the inclusion criteria, gamification studies trends, particularly studies from 2015 to 2022, were adopted. Based on the criteria, the study should have a statistical result report, it must not be a review, it must be available in English, and it must be related to gamification in physical education/activity. The examined articles are published in ScienceDirect, Scopus, Elsevier, and ISI databases. A total of 27 research publications satisfied the inclusion criteria, as they were considered to be suitable for the study objectives based on the assessments of clear outcomes, descriptions of technology, variables and outcomes presentation, author's name, grade level, variables, study results, and findings.

Results

The First Question States: What Skills Can Be Achieved by the Gamification User in Physical Education?

The study results showed that many skills can be enhanced when using gamification, and these include learning, cognitive, social, personal, and health behavior skills (see Table 1). Regarding enhanced learning skills and experiences, the authors revealed that gamification was successful in enhancing the participation of the user in the course, the learning outcomes and experience in various fields of studies, and their positive contribution to their education process (Altmeyer et al., 2021; Parra-González et al., 2021). According to Parra-González et al. (2021), gamification offered lessons that garnered better scores in the relationships among students, autonomy, and collaboration.

Based on the analysis, the findings reported by Quintas et al. (2022) showed that gamification led to enhanced learning performance, motivation, collaboration, and interaction, and similarly, Ferriz-Valero et al. (2020) evidenced the positive effect of gamification on the performance of students' learning, and Liu and Lipowski (2021) reported that sports gamification is successful in promoting learning motivation and performance among college going students. It can be stated that gamification does bring about obtaining learning skills and positive learning attitudes and behaviors among learners.

Added to the above, the findings from the reviewed studies indicated support for the significant positive effect of gamification on the cognitive abilities of the learners, with the inclusion of their perception and thinking abilities (Serrano-Durá et al., 2021; Melero-Cañas et al., 2021). According to Melero-Cañas et al. (2021), gamification activities enhance the cognitive performance of students, and Serrano-Durá et al. (2021) reported that perception

abilities are also enhanced through gamification activities. As for other skills, Edgar de et al. (2020), Maher, et al. (2022), Joo et al. (2019), Mazéas et al. (2022), and Real-Pérez et al. (2021) found gamification to have a positive impact on personality and social skills through its influence over motivation and physical performance and heightened physical activity engagement.

Table 1. A Summary of the 27 Gamification Studies

Authors	Publication Year
Altmeyer et al.	2021
Parra-González et al.	2020
Quintas et al.	2020
Ferriz-Valero et al.	2020
Liu and Lipowski	2021
Serrano Durá et al.	2021
Melero-Cañas et al.	2021
Edgar de et al.	2020
Maher et al.	2022
Joo et al.	2019
Mazéas et al.	2022
Real-Peres et al.	2021
Lambe et al.	2022
Uechi et al.	2018
Kappen et al.	2020
Lee et al.	2019
Soriano-Pascual et al.	2022
Camacho-Sánchez et al.	2022
Montiel-Ruizet et al.	2023
Parra-González et al.	2020
Caputo et al.	2021
Corepal et al.	2018
Kostenius	2018
Montesinos	2022
Pérez-Muñoz et al.	2022
Oyelere et al.	2022
Suguis	2022

Therefore, it is clear that gamification can facilitate the gaining of personal skills and positive behaviors among users. However, in a related study, Lambe et al. (2022) showed that gamification had no significant effect on the individual's physical fitness, whereas others like Uechi et al. (2018) showed that gamification positively promoted healthy behavior and engagement in health behavior change interventions. Similarly, Kappen et al. (2020) found that gamification is effective in facilitating behavioral changes in users via enhancing their health engagement

and motivation in the domain of wellness and health. Some other studies (Gao et al., 2016; Lee et al., 2019; Murtagh et al., 2015) revealed a significant relationship between gamification and a decrease in all-cause and cardiovascular mortality through walking exercise and enhanced body composition.

What are the Top Education Levels Used in Gamification Physical Education Studies?

In this study, the focus is on gamification in the field of physical education and its different levels. The study carried out a systematic review of the physical education level and the target group in the previous studies from preschool, primary school, and secondary school to higher education and learning centers. The review results are presented in Table 2. The majority of the prior relevant studies on gamification for physical education focused on university students (29.6%), with the primary aim directed towards encouraging students, clarifying topics, enhancing students' overall learning experience, motivating students, and engaging them through the features in the gamification system. The remaining studies focused on primary school students (25.9%), secondary school students (18.6%), and different centers (25.9%).

Table 2. Gamification Studies Based on Educational Levels

Education Level	Number	Percentage %
Primary School	7	25.9%
Secondary School	5	18.6%
Higher Education	8	29.6%
Centers	7	25.9%

What Are the Advantages and Disadvantages Related to Gamification in Physical Education?

Gamification, based on the reviewed published studies, offers several benefits when used for physical education. Among these are enhanced learning experiences and motivation of students and the promotion of positive learning attitudes and engagement (Altmeyer et al., 2021; Parra-González et al., 2021). Additionally, another benefit is the positive influence of gamification use on the students' cognitive abilities via enhanced perception and cognitive performance (Serrano-Durá et al., 2021). Moreover, gamification contributes to promoting personal, social, and health behaviors (Mazéas et al., 2022; Lee et al., 2019; Murtagh et al., 2015; Gao et al., 2016) and it influences motivation and physical performance and physical activity engagement of users (Maher et al, 2022; Joo et al., 2019; Mazéas et al., 2022; Real-Pérez et al., 2021).

However, along with its advantages, past studies also mentioned the disadvantages of gamification use in a physical education environment, among which are the design challenges and content set, which need careful consideration when making it appear neutral but not trivial and boring (Furdu et al., 2020). Other studies, such as Kalogiannakis et al. (2021) and Bjaelde et al. (2014) also mentioned computer equipment and game design weaknesses and issues connected to the technical aspect of the system. Some other disadvantages involve preparedness in the application use whereby students and teachers need preparation and the technological skills needed to use digital media in the learning and teaching process.

Discussion

This study conducted a systematic review of 27 published articles on gamification and its use in physical education. Based on the findings of the reviewed works, gamification significantly affects students' skills and abilities and brings about positive outcomes. The majority of the studies (Altmeyer et al., 2021; Mazéas et al., 2022; Real-Pérez et al., 2021; Lee et al., 2019; Murtagh et al., 2015; Gao et al., 2016; Fernández-Batanero et al., 2019) supported the potential of gamification use in improving several skills, such as cognitive, learning, social, personal and health change behaviors. The study highlights the primary role of gamification applications in physical learning, as evidenced by the expectation that students can leverage the application benefits while acquiring new learning experiences (Asigigan & Samur, 2021). The results may be connected to the fact that most of the activities available in gamification applications are practice-based instruction, thus supporting the effectiveness of technology-assisted instruction methods for physical activities.

Moreover, according to the reviewed studies' findings, most studies were conducted among higher education students and their physical education, with the teaching-learning process carried out through technology devices (Atilgan & Tukel, 2021). This is an expected finding because several courses in higher education provide more opportunities for using gamification features compared to schools characterized by limited resources (Kalogiannakis et al., 2021). The review supports the positive outcomes of gamification activities in the physical activities field (Mazéas et al., 2022; Real-Pérez et al., 2021), with the curriculum content playing an essential role in determining the implementation of the gamification technique in the said field.

Gamification's usefulness in enhancing learning, social, personal, and cognitive skills is well documented albeit some limitations and disadvantages need to be resolved, considering gamification is a relative novelty with yet-to-be-discovered full potential and operations. Limitations mentioned in the studies were related to experiences and skills although gamification applications are indubitably useful and hold promising potential in physical education and the development of several skills. This study suggests that further studies examine the topic and extend the literature in different settings, educational courses, and contexts.

Conclusion

This study was conducted as a systematic review of 27 studies on gamification use in the physical education field culled from several databases. The findings highlighted the effectiveness of gamification in enhancing physical education and several skills and behaviors (Arufe-Giráldez et al., 2019; Xu et al., 2022). They also supported that the focus of most studies on gamification in physical education was primarily placed on higher education settings because of the student's curriculum and available resources.

Gamification is effective in learning physical activities although studies in this field are still lacking despite the need to validate the results. Lastly, the conducted systematic review of relevant literature indicated challenges concerning gamification implementation in physical education. Among these are the limited availability of internet connection and access and personal issues like attitudes, preparation, and acceptance of users.

Limitations and Recommendations

This systematic review has some notable limitations despite the efforts directed towards presenting information regarding how gamification is used in physical education courses for successful outcomes and achievement of students. The results supported the claim that despite the existing challenges of gamification implementation and the teachers' development of best practices for learners' skills development, it has the potential to satisfy the students' needs in this technology era. But before the best outcomes and the endeavor to use gamification can be fruitful, it is necessary to provide training to users so that they will acquire the required skills to use gamification for developing the curriculum. This study review is confined to quantitative studies, and thus further studies are recommended to include qualitative studies in their systematic review.

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