**International Journal of Evaluation and Research in Education (IJERE)**
Vol. 14, No. 1, February 2025, pp. 525~534
ISSN: 2252-8822, DOI: 10.11591/ijere.v14i1.30494 

# Exploring university students' perceptions and engagement in game-based learning

**Burhan Hamadneh[1], Amr Fikry[2], Mohammed Talaat[2], Ahmed Abbas[2], Reham Ghanem[2], Samah Ramzy[2], Mohamed Aly[2], Ahmed Elkilani[2], Sherin Mabrouk[2], Reema Aloqlah[2]**
[1]Department of Special Education, Faculty of Education Sciences, Ajloun National University, Ajloun, Jordan
[2]Basic Sciences Department, Students Affairs College, Imam Abdulrahman bin Faisal University, Dammam, Saudi Arabia

**Article Info**

***Article history:***

Received Mar 6, 2024
Revised Oct 14, 2024
Accepted Oct 22, 2024

***Keywords:***

Engagement
Game-based
Learning
Perception
Students

**ABSTRACT**

Students in academia are facing serious challenges such as engagement, which causes academicians to question the quality and effectiveness of the teaching pedagogy. As such, new adapted innovative technological tools such as gamifications have been introduced to learning activities experiences and skills acquisition. However, little is known about the implementation of such technologies, which have been relatively underexplored in education literature. The primary objective of this study is to identify the perceptions of students and evaluate their engagement considering the use of gamification in the learning process. There were 210 respondents enrolled in the private university in Jordan were surveyed using a quantitative questionnaire. The study used descriptive statistics and independent sample t-test analyses on the data. The results indicated that the students have positive perceptions of game-based technology in both learning and classroom activity engagement. In addition, student perceptions and engagement did not differ significantly based on age or gender, but significant differences based on user experience were identified. These findings provide insight into the dynamic interaction between students and gamified technology to enhance student perceptions and promote meaningful learning. This research also provides implications on gamification literacy education and the pedagogically rich design of educational games to enhance student engagement. The recommendations are enumerated based on the obtained findings.



***Corresponding Author:***

Burhan Hamadneh
Department of Special Education, Faculty of Education Sciences, Ajloun National University
Ajloun, Jordan
Email: B.hamadneh@anu.edu.sa

## 1. INTRODUCTION

In recent years, technological development and internet use have led to the transformation of the learning environment in the field of education [1]. With the dynamic advancement of technology involving digital connectivity and instructional methods, educators have had to implement novel learning techniques, including artificial intelligence, augmented reality, and gamification [2]–[5]. Many of these techniques have been extensively explored, while others, such as gamification, are emerging and still in their infancy [6].

Gamification is relatively new, and higher education has only recently paid attention to the use of gamification in the learning process. Gamification is described as using game thinking and mechanics to meet the needs of learning [7]. As such, it is more than simply games; it inculcates lessons to users in a way that uses game thinking to impart lessons developed through user feedback [7]. Notably, however,

gamification is invaluable in the promotion of skills pertaining to education, psychology, and society [3], [8]. According to Kalogiannakis *et al.* [9], gamification significantly influences students' learning motivation and engagement, as well as their learning outcomes and social interaction. Additionally, based on past findings, digital games can be effectively used to facilitate a digital learning environment that boosts learning motivation and promotes socially interactive and constructive learning surroundings [10], [11]. Other studies' findings support the role of gamification in enriching the experiences of learners and increasing their learning inclination [12]. In addition, Nadeem *et al.* [13] described game-based activities as an effective way to engage and motivate students in learning as well as to help to achieve better outcomes.

Despite related findings supporting the advantages that game-based learning provides in the field of education in the past, the term "gamification" has not yet been given a universal description or definition in the literature; a knowledge base that relates the term to theoretical principles is lacking, and empirical findings on such principles call for supporting validation [6]. In addition, as with any technology in any field, opportunities and challenges abound; the user benefits and experiences of gamification in the education field must thus be outlined [3]. In a related study, Drolia *et al*. [14] mentioned the time effectiveness of gamification and its short-term effects, while several researchers [7], [15] identified internet speed weakness, computer equipment, and game design as challenges related to the technical nuances of gamification. Other related studies, such as Hamari *et al*. [16] have touched upon the negative effects of gamification, including issues linked with task evaluation and system design features. In the same line of study, Yapıcı and Karakoyun [17] revealed that the preparedness of the user to use the applications to acquire technological skills for learning positive academic outcomes constitutes an issue. In addition, Alahmari *et al.* [18] found gamification application use to largely depends on instructors' and students' experiences.

Literature on the topic supports the benefits of game-based learning methods in the field of education, but it remains important to identify and tackle the challenges while leveraging the opportunities brought on by such methods. Only recently have studies initiated an examination of the potential of gamification as a technological tool in the field of education, particularly among university students, and the number of students examined regarding their perceptions of gamification effectiveness remains low [19], [20]. The level of universities' efforts toward facilitating learning through game-based learning techniques is also unclear. These issues and other relevant and related ones have been the impetus for this study to minimize the gap in the literature and to provide answers and recommendations that stakeholders in the learning environment can make use of. Accordingly, this study focuses primarily on identifying students' perceptions of and engagement in gamified applications.

The current study aims to address students' knowledge gap by exploring their perceptions of game-based learning activities in university studies, which can inform the development of effective and engaging learning environment for university students. This research aimed at exploring students' engagement and their perceptions of game-based learning as well as identify individual factor that influence their perception and engagement, and as such, the study questions are as:

i) What is the perception of university students towards the use of game-based learning in learning?
ii) What is the level of the students' engagement with the learning environment when participating in game-based learning activities?
iii) Do males and females' students have the same perception learning engagement level toward game-based learning activities?
iv) Do students' perception and their engagement levels differ based on the age?

## 2. LITERATURE REVIEW

The concept of gamification has been the focus of authors in various fields; it can best be described as the use of game elements in non-gaming applications [6], [7]. Research by Kapp [21] referred to gamification as the integration of game-based mechanics, aesthetics, and game-like thinking into the learning process for user engagement, motivation, and problem-solving. Gamification integrates video game characteristics, such as game mechanics and dynamics, into non-game applications [22]. However, several educational theories (e.g., constructivism, experiential, and flow) suggest that students learn and engage better through experience and interaction [23], [24].

Several authors [25]–[30] have supported the significant influence of gamification on the perceptions and behaviors of students pertaining to engagement, learning, and education. This enhancement stems from the fact that the application of games affects behavior through psychological outcomes, such as motivation and encouragement toward achieving external, utilitarian objectives through the engagement of enjoyable hedonic experiences [16], [31], [32]. According to Devendren and Nasri [29], the perception of students of gamification is influenced by several factors, including device convenience, access to the internet, and curriculum policies (external factors), as well as interest, attitude, awareness, and effectiveness toward

game-based learning (internal factors) [30]. Prior studies also found that the majority of gamified applications positively influenced student perceptions and their attitudes [33], [34]. Another study found gamification used in complex topics promoted interest, motivation, and, in turn, the achievement score of students in comparison to the traditional method used [35].

Studies have also validated the contribution of gamification to student learning through problem-solving and higher order thinking skills development [36]. Additionally, gamification elements improve educational outcomes and transform monotonous activities into enjoyable and engaging assignments in the learning process [37], [38]. Also, similar studies [39], [40] found effective gamification to spur enhanced motivation and, thereafter, enhanced academic achievement. In addition, other research [38], [39] revealed that using gamification via digital applications promotes engagement in the learning process, by heightening attraction and facilitating learning in various situations. Moreover, several researches [41], [42] revealed that gamification can motivate and promote learning, whereas other research [42], [43] showed that gamification enhances the educational awareness of learners and brings about a learning environment that facilitates healthy competition, productivity, and ongoing learning.

Although previous studies supported the advantages of using game-based learning in the learning activities, other studies revealed negative results [35], [43], and their impacts on students' outcomes remain questionable [13], [44]–[46]. For instance, students who practice game-based learning activities failed their tests [35], [43]. Similarly, a study on student performance [9] revealed that students who did not use game-based activities scored higher than their peers. Due to inconsistent results and the increased interest of researchers in the topic of gamification, the literature highlights the urgent need for more research into education-related processes to identify their effects and fill the gap in the literature [3], [16], [47].

Additionally, several previous studies [7], [16] have suggested the need for future studies to examine the perceptions of students toward both game-based learning and their engagement with the technique. It was only recently that studies have been directed toward the potential of gamification as a technological tool, particularly among university students, and to date, studies on the effectiveness of gamification are still lacking [19], [20]. In summary, the literature review reveals that more studies are needed to determine student perceptions of and learning engagement in gamification. Thus, this study aimed to minimize the literature gap and extend existing literature by exploring student perceptions of and engagement in game-based learning.

## 3. METHOD

This study employs a descriptive quantitative approach to answer the research questions. A study with a descriptive survey quantitative research design aims to provide an in-depth examination of data and develop a thorough understanding of the study problem [48], [49]. The decision to use a survey instrument technique was based on the need for a large amount of data to generalize the results, as well as the students' views and the convenience of data collection. The unit of analysis in this study was students enrolled in a university setting, and the sample comprised students at Irbid National University, Jordan. A survey was distributed to 210 students who participated voluntarily. The sample size was justified based on the suggested minimum observation to variable ration of 15-20 per indicator are preferred [50]. Of the total number of participants, 100 were male students, while the remaining 110 were female students. The age of participants ranged from 18–22 years.

### 3.1. Study procedure

The procedure began with collecting data, following the collaboration and approval of the Pontifical Dean of Scientific Research at Irbid National University; the authors then distributed the survey and conducted the necessary quantitative instrument, ensuring that the respondent anonymity was ensured and that they participated voluntarily, which researchers confirmed via verbal agreement. The respondents were introduced to the main objectives of the study and were asked to carefully read the instructions and ask the researcher in case of any difficulty in understanding the instructions. Furthermore, it was emphasized that all items must be answered, because no correct or incorrect answers exist, and there was no time limit for completion. The data gathered through the survey will be used solely for this study's purpose. Data was collected via an online questionnaire, which the teaching staff provided to students from March 11–April 7, in the second semester of the 2022–2023 academic year.

### 3.2. Study measurement

This study employs two variable scales (perception and engagement) from several related literatures [13], [51], [52]. After selecting the study items, the scales were presented to experts for feedback and to establish their validity. Each scale covers several items, measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In the first part of the instrument, respondent demographic

information was obtained (e.g., age and gender); the second part provided scaled-response items to determine student perceptions of and engagement in game-based learning. The scales were validated through Cronbach's alpha (.88 for student perceptions; .83 for student engagement).

Questionnaire data was analyzed in SPSS version 23. The study applied descriptive and inferential statistics—the former summarized the set of data related to the study population for the identification of trends and patterns that reveal the variables relationships, while the latter implemented reasonable predictions, generalizations, and conclusions concerning the sample population. The study also established validity to ensure that the research instruments effectively measured what they were intended to. In line with ethical standards, the study obtained consent from the Faculty of Educational Science at Irbid National University. The participants were informed of study purpose, procedures, and risks and benefits; finally, their informed consent was obtained. They were also reminded that their participation was voluntary and that they could cease participation at any time without compromising their relationship with the institution.

## 4. RESULTS

Data was analyzed in SPSS to answer the research questions using obtaining values of the mean, standard deviation, and ranks, while the third and fourth ones were answered using an independent sample t-test. Based on the obtained values of mean and standard deviation presented in Table 1, the answer to the first part of the first question regarding the perceptions of students regarding using game-based learning was determined; moderate mean values were obtained, ranging from 2.54–3.31. The majority of respondents (67%) showed above-average perceptions toward learning efficiency using gamification, while 33% showed below-average ones. The total mean value for the level of perceptions toward using game-based learning based on the sample member estimates was 2.77 (SD=.779). The highest mean (3.31) was obtained by item 9: "Game-based learning can improve my learning skills" (SD=1.127). This was followed by items 10 and 8: "The use of game-based learning method can be time consuming" and "Game-based learning can help students learn in a more cognitive and collaborative way"—with mean values of 3.14 (SD=1.129) and 2.776 (SD=1.081), respectively. In contrast, the lowest mean (2.54) was obtained by item 4: "Students nowadays are more through digital media or new technology."

Table 1. Descriptive statistics of the perception levels

| Item no. | Mean | SD |
|---|---|---|
| I feel comfortable with the idea of employing game as a learning tool | 2.62 | 1.12 |
| I believe that I will implement game-based learning in my current of future learning | 2.60 | 1.29 |
| Students enjoy learning because it is hands-on motivating and engaging | 2.56 | 1.11 |
| Students nowadays are more through digital media or new technology | 2.54 | 1.10 |
| Game-based learning is simple to set up to help student learn in the classroom | 2.70 | 1.02 |
| Game-based learning is another way to keep students interested in learning | 2.70 | 1.02 |
| Personalized learning is possible with game-based learning | 2.70 | 1.10 |
| Game-based learning can help students learn in more collaborative way | 2.77 | 1.08 |
| Game-based learning can improve my learning skills | 3.31 | 1.12 |
| The use of game-based learning technique can be time consuming | 3.14 | 1.12 |
| Total perception | 2.77 | .779 |

The next part of the first question, concerning the learning engagement level of students through game-based learning was also answered through mean and standard deviation values. Table 2 shows the Mean values were moderate, ranging from 2.83–3.209. Based on the results, the majority of respondents (71%) agreed that learning using game-based techniques significantly incentivized them to fully engage and participate in classroom activities, with only 29% disagreeing with the statement that integrating games in classrooms is effective in increasing student engagement for better learning outcomes. Table 3 shows that the total score of the mean values of engagement level in using game-based learning was 3.08 (SD=.625). The highest mean (3.209) was obtained for Item 15: "The game gives me a positive impact on learning new things"—with a high standard deviation (1.07), followed by Item 12: "The game activities help me acquire knowledge relative to the lesson"—and Item 7: "It is important for me to see my position among my class fellows" (3.20). The lowest mean was obtained for Item 5: "The game-based activities were beneficial to my overall learning" (2.83).

For the third research question, which determines whether significant differences exist in student perceptions of and engagement with game-based learning based on gender and age, results in Tables 3 and 4 indicate no significant differences between the means concerning perception or engagement level based on gender and age. More specifically, although insignificant results were obtained based on gender,

male students obtained higher mean values in their perceptions compared to their female counterparts. The same held true for mean values for learning engagement: 3.088 (SD=.621) for male students and 3.085 (SD=.601) for female students. In terms of age in the sample, older participants obtained higher mean values in their perception compared to participants aged 18–20 years. The same held true for mean values for learning engagement, elder students obtained higher values (M=3.10; SD=.625) than younger students (M=3.07; SD=.628). The significance of the statistical differences was demonstrated at the .05 level, using an independent sample t-test. Overall, no significant difference existed on the study variables perception and engagement based on gender (t=1.693, df=208, p=.092; t=.029, df=208, p=.977) and age groups (t=−.054, df=208, p=.957; t=−.322, df=208, p=.748), respectively.

Table 2. Descriptive statistics of the engagement levels

| Item no. | Mean | SD |
|---|---|---|
| I had fun when playing the game | 3.13 | 1.07 |
| I believe that the games improved my understanding of the covered topics | 3.16 | 1.10 |
| The game-based activities motivated me to arrive at class on time | 2.95 | 1.08 |
| The game-based activities helped me to engage with the class materials | 2.89 | 1.12 |
| The game-based activities were beneficial to my overall learning | 2.83 | 1.16 |
| I saw my comparison with the class | 3.12 | 1.08 |
| I t is important for me to see my position among y class fellows | 3.20 | 1.09 |
| My comparison with the class fellows motivated me to study more | 3.17 | 1.09 |
| Seeing my class fellow doing well made me study more | 3.31 | 1.12 |
| I prefer to play game live during class time | 2.89 | 1.30 |
| I played game activities outside lectures time just for fun | 3.07 | 1.29 |
| The game activities help me acquire knowledge relative to the lesson | 3.03 | 1.27 |
| The game helps me better retention of lesson | 3.20 | 1.12 |
| The game help me more productive in class activities | 3.17 | 1.09 |
| The game gives me a positive impact on learning new things | 3.13 | 1.06 |
| Total engagement | 3.08 | .625 |

Table 3. Differences of the student's perception level according to gender

| Variable | | Mean | SD | t | df | Sig. |
|---|---|---|---|---|---|---|
| Perception | Male | 2.86 | .880 | | | |
| | Female | 2.68 | .665 | 1.69 | 208 | .092 |
| Engagement | Male | 3.08 | .621 | | | |
| | Female | 3.08 | .601 | .029 | 208 | .748 |

Table 4. Differences of the student's perception level according to age

| Variable | | Mean | SD | t | df | Sig. |
|---|---|---|---|---|---|---|
| Perception | 18-20 | 2.76 | .792 | | | |
| | Above 20 | 2.77 | .770 | .054 | 208 | .957 |
| Engagement | 18-20 | 3.07 | .628 | | | |
| | Above 20 | 3.10 | .625 | .322 | 208 | .748 |

## 5. DISCUSSION

This study explored the perceptions of Jordanian university students and their learning engagement regarding game-based learning. The results indicated a general positive perception of using gamification in learning among university students; university students found game-based technology effective. According to students who used game-based learning, game-based learning can improve their learning skills. In addition, many students reported that game-based activities help them to engage with class materials and were beneficial to their overall learning. Using game-based learning activities enhances student interaction and activity, which helps them be more active in class and engage in collaborative learning, thus enhancing engagement in learning activities. As such, game-based learning is suitable in the learning process. It can change the learning environment to be more active and engaged than in a traditional classroom.

The results are consistent with previous studies that reported positive impacts on student perceptions when using game-based learning activities [53], [54], which support the positive perceptions of students toward using gamification tools in learning. Other relevant studies [53], [54] also supported the positive effect of gamification on the motivation and behaviors of users. In this regard, individuals tended to focus on a topic within the appropriate game period and that a gamified competitive learning environment led to enhanced motivation in learners [16], [55]. In other words, studies concerning gamification have supported the technique's benefits in motivating and encouraging learners and in assisting them in their problem-solving in various fields and their communication with other groups [21].

Moreover, gamification makes for an enjoyable learning experience because it boosts social ties, learning processes, specialization ability, ambition to achieve success in a competitive environment, and enthusiasm for changing status, while simultaneously boosting problem-solving and student participation behavior in educational activities [16], [55], [56]. This is in line with Kolb [57] who supported experiential lessons such as gaming help students understand the course concepts as well as enhance the quality of the course content. This was also supported by Chou [39] as game-based promotes students' engagement in the learning process.

In particular, the students examined in this study revealed that the gamification method enhanced their ambitions and increased the level of classroom competition; as such, it is suitable for implementation to transform individual behavior. In line with past studies [27], the findings of this study supported the positive attitudes of students toward a gamified learning course, with the major reasons behind students' positive perception being the enjoyable experience that the technique facilitates, the ability to keep track of learning progress, and the personalized nature of the learning experience. These cited reasons are consistent with existing theory that describes gamification's potential to support the learning process [58], [59]. The popularity of gamification as a learning method from a student perspective stems from the opportunity it provides for self-monitoring and engagement in a competitive and enjoyable learning environment [60].

Previous studies have also explored the effects of individual learner characteristics on the gamification experience; based on these findings, no significant differences exist in using gamification in terms of perceptions of and engagement in the technique which is consistent with prior studies [61]. With regards to this study, both genders had positive perceptions of gamification in the learning process, with no significant differences. Prior studies have also examined other learner characteristics such as age [62]; in this study, no significant difference was found based on age in gamification perception or engagement, which result may stem from students enhanced digital skills and course competence throughout their academic years, as well as from their similar perceptions, satisfaction levels, and awareness of gamification in their daily tasks and learning activities. However, a significant difference was found in the perception and engagement of students with gamification based on their years of using the technique. Student views may differ based on their knowledge and technical skills of using gamification in learning. More experienced students may be more inclined toward using new technologies and exploring their potential than their less experienced counterparts.

The study presents several contributions to literature. First, the study investigated the impact of game-based learning on student perceptions and engagement in learning. While digital education, including the use of technology in educational games, has garnered considerable attention in recent research, a need remains for a more comprehensive exploration of their effects on students learning [63]. Additionally, this study is one of the few Jordanian studies that provides findings from well-designed and implemented research that investigates student perceptions toward technology implementation in the learning process. As such, the findings of this study provide unique insights that may increase efforts to effectively implement technology-based educational games in the learning process by understanding how students perceive game-based learning, both locally and internationally.

The study also presents significant practical implications. Its contributions are based on a consideration of limited empirical studies and original research on student perceptions and engagement in using technological tools and gamification in learning in Jordan, Arab, and the Middle East. As such, to expand the scope of previous studies and bridge the gap in literature, this study has investigated student perceptions and engagement with game-based learning activities. Another contribution is that the individual factors explored, such as gender, have not been sufficiently investigated [13]. Including gender factors in the current study provided a deeper understanding of the research problem and supported the interpretation of the results. Finally, the study revealed that the students showed a positive perception toward game-based learning in the learning process; as such, educational institutions, schools, and teachers should share their experiences and knowledge to adapt the most updated technological tools and applications for students.

### 5.1. Limitations of the study

First, this study uses a descriptive survey method—a questionnaire—as the main instrument to obtain the study sample responses. In this regard, the interpretation of the results was limited based on differences in demographic factors considering perceptions and engagement of gamification in the learning environment. Other research methods may be employed in future studies, namely the qualitative approach, using interviews and observation techniques to contribute to the enrichment of the phenomenon explanation. Lastly, Jordan has several universities, but only one was examined in this study, and as such, future studies may embark on their investigation of other universities and comparison between them (private and public universities) in light of gamification use in learning and teaching.

## 6. CONCLUSION

This study examined university students' perceptions of and engagement in gamification in their learning process and determined the effects of certain factors on both. A survey questionnaire was distributed to 210 participants to determine the level of perceptions of and engagement in gamification at the university. Gamification and other game-based learning techniques and technologies have increasingly become popular in the education field, and with continued developments, it has become necessary to determine the perceptions of students concerning their use of and engagement levels in using the technique in learning activities. The findings showed that students had a moderate level of perception and engagement toward using gamification in learning. This study's findings also indicated no significant differences in gender or age (individual factors) in student perceptions and engagement with gamification in learning, but significant differences based on user experiences with game-based learning were found.

## REFERENCES


[1] Y. Alrashed *et al.*, "Factors affecting students willingness to use gamification in university students," *International Journal of Information and Education Technology*, vol. 13, no. 8, pp. 1222–1229, 2023, doi: 10.18178/ijiet.2023.13.8.1924.

[2] A. Manzano-León *et al.*, "Between level up and game over: a systematic literature review of gamification in education," *Sustainability*, vol. 13, no. 4, p. 2247, Feb. 2021, doi: 10.3390/su13042247.

[3] Z. Zainuddin, S. K. W. Chu, M. Shujahat, and C. J. Perera, "The impact of gamification on learning and instruction: a systematic review of empirical evidence," *Educational Research Review*, vol. 30, p. 100326, Jun. 2020, doi: 10.1016/j.edurev.2020.100326.

[4] N. Kesumawati, N. F. Fuadiah, and B. Utomo, "The students' perceptions of their online learning," *International Journal of Evaluation and Research in Education (IJERE)*, vol. 13, no. 2, pp. 801–808, Apr. 2024, doi: 10.11591/ijere.v13i2.25683.

[5] M. Nadeem, M. Lal, J. Cen, and M. Sharsheer, "AR4FSM: mobile augmented reality application in engineering education for finite-state machine understanding," *Education Sciences*, vol. 12, no. 8, p. 555, Aug. 2022, doi: 10.3390/educsci12080555.

[6] R. S. Alsawaier, "The effect of gamification on students engagement and motivation in three WSU courses," Ph.D. dissertation, Washington State University, USA, 2018.

[7] D. Giddens, "Game it up! using gamification to incentivize your library," *The Australian Library Journal*, vol. 65, no. 4, p. 330, Oct. 2016, doi: 10.1080/00049670.2016.1241204.

[8] E. Zimmerling, C. E. Höllig, P. G. Sandner, and I. M. Welpe, "Exploring the influence of common game elements on ideation output and motivation," *Journal of Business Research*, vol. 94, pp. 302–312, Jan. 2019, doi: 10.1016/j.jbusres.2018.02.030.

[9] M. Kalogiannakis, S. Papadakis, and A.-I. Zourmpakis, "Gamification in science education. a systematic review of the literature," *Education Sciences*, vol. 11, no. 1, p. 22, Jan. 2021, doi: 10.3390/educsci11010022.

[10] S. Papadakis and M. Kalogiannakis, "Using gamification for supporting an introductory programming course. the case of ClassCraft in a secondary education classroom," in *Interactivity, Game Creation, Design, Learning, and Innovation: 6th International Conference, ArtsIT and DLI 2017*, 2018, pp. 366–375. doi: 10.1007/978-3-319-76908-0_35.

[11] K. Y. G. Chan, S. L. Tan, K. F. T. Hew, B. G. Koh, L. S. Lim, and J. C. Yong, "Knowledge for games, games for knowledge: designing a digital roll-and-move board game for a law of torts class," *Research and Practice in Technology Enhanced Learning*, vol. 12, no. 1, p. 7, Dec. 2017, doi: 10.1186/s41039-016-0045-1.

[12] R. Ab. Rahman, S. Ahmad, and U. R. Hashim, "The effectiveness of gamification technique for higher education students engagement in Polytechnic Muadzam Shah Pahang, Malaysia," *International Journal of Educational Technology in Higher Education*, vol. 15, no. 1, p. 41, Dec. 2018, doi: 10.1186/s41239-018-0123-0.

[13] M. Nadeem, M. Oroszlanyova, and W. Farag, "Effect of digital game-based learning on student engagement and motivation," *Computers*, vol. 12, no. 9, p. 177, Sep. 2023, doi: 10.3390/computers12090177.

[14] M. Drolia, E. Sifaki, S. Papadakis, and M. Kalogiannakis, "An overview of mobile learning for refugee students: juxtaposing refugee needs with mobile applications' characteristics," *Challenges*, vol. 11, no. 2, 2020, doi: 10.3390/challe11020031.

[15] O. E. Bjælde, M. K. Pedersen, and J. Sherson, "Gamification of quantum mechanics teaching," in *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education*, Jun. 2014, pp. 218–222.

[16] J. Hamari, K. Huotari, and J. Tolvanen, "Gamification and economics," in *The Gameful World: Approaches, Issues, Applications*, S. P. Walz and S. Deterding, Eds., Cambridge, MA: The MIT Press, 2015, pp. 139–162. doi: 10.7551/mitpress/9788.003.0009.

[17] İ. Ü. Yapıcı and F. Karakoyun, "Gamification in biology teaching: a sample of Kahoot application," *Turkish Online Journal of Qualitative Inquiry*, vol. 8, no. 4, pp. 396–414, Oct. 2017, doi: 10.17569/tojqi.335956.

[18] M. Alahmari *et al.*, "Trends and gaps in empirical research on gamification in science education: a systematic review of the literature," *Contemporary Educational Technology*, vol. 15, no. 3, p. ep431, Jul. 2023, doi: 10.30935/cedtech/13177.

[19] R. Smiderle, S. J. Rigo, L. B. Marques, J. A. P. de M. Coelho, and P. A. Jaques, "The impact of gamification on students' learning, engagement and behavior based on their personality traits," *Smart Learning Environments*, vol. 7, no. 1, p. 3, Dec. 2020, doi: 10.1186/s40561-019-0098-x.

[20] F. L. Khaleel, N. S. Ashaari, and T. S. M. T. Wook, "The impact of gamification on students learning engagement," *International Journal of Electrical and Computer Engineering (IJECE)*, vol. 10, no. 5, p. 4965, 2020, doi: 10.11591/ijece.v10i5.pp4965-4972.

[21] K. M. Kapp, *The gamification of learning and instruction: game-based methods and strategies for training and education*. New York: John Wiley & Sons, 2012.

[22] J. Simões, R. D. Redondo, and A. F. Vilas, "A social gamification framework for a k-6 learning platform," *Computers in Human Behavior*, vol. 29, no. 2, pp. 345–353, Mar. 2013, doi: 10.1016/j.chb.2012.06.007.

[23] C. T. Fosnot, *Constructivism: theory, perspectives, and practice*. New York, NY: Teachers College Press, 2013.

[24] U. Umirziyaev and V. Abdurakhmonov, "Flow theory," *Eurasian Journal of Social Sciences, Philosophy and Culture*, vol. 12, no. 2, pp. 261–264, 2022.

[25] R. Nadlifatin *et al.*, "Factors affecting students' intention of gamification for learning model in the covid-19 pandemic era at Indonesia: a confirmatory factor analysis," in *2nd International Conference on Business and Management of Technology (ICONBMT 2020)*, 2021, pp. 322–32. doi: 10.2991/aebmr.k.210510.050.

[26] T. Aldahash and A. Alenezi, "The success factors of implementing web-based gamification according to the viewpoint of female English teachers for public education stages," *International Journal of Information and Education Technology*, vol. 11, no. 12, pp. 603–614, 2021, doi: 10.18178/ijiet.2021.11.12.1571.

[27] D. Dicheva, C. Dichev, G. Agre, and G. Angelova, "Gamification in education: a systematic mapping study," *Educational Technology and Society*, vol. 18, no. 3, pp. 75–88, 2015.
[28] A. Berglund and I. Jedel, "Higher education students' perceptions of point-based gamification in a learning management system," in *The 7th International GamiFIN Conference*, 2023, pp. 144–153.
[29] A. Devendren and N. M. Nasri, "Systematic review: students' perceptions of the use of gamification," *International Journal of Academic Research in Business and Social Sciences*, vol. 12, no. 8, pp. 144–164, Aug. 2022, doi: 10.6007/ijarbss/v12-i8/14268.
[30] C. R. Tan and Z. Tasir, "Effect of using the Plickers app in learning the topic of gamification-based affixes on third-year students," (in Malay), *Malaysian Journal of Social Sciences and Humanities*, vol. 7, no. 3, 2022, doi: 10.47405/mjssh.v7i3.1340.
[31] J. Looyestyn, J. Kernot, K. Boshoff, J. Ryan, S. Edney, and C. Maher, "Does gamification increase engagement with online programs? a systematic review," *PLOS ONE*, vol. 12, no. 3, p. e0173403, Mar. 2017, doi: 10.1371/journal.pone.0173403.
[32] S. Deterding, D. Dixon, R. Khaled, and L. Nacke, "From game design elements to gamefulness: defining 'gamification,'" in *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, New York, NY, USA: ACM, Sep. 2011, pp. 9–15. doi: 10.1145/2181037.2181040.
[33] C. K. Yen, A. Ismail, and M. M. Mustafa, "A gamification approach to teaching and learning mandarin as a foreign language," (in Malay), *Journal of Advanced Research in Social and Behavioural Sciences*, vol. 19, no. 1, pp. 51–56, 2020, [Online]. Available: https://akademiabaru.com/submit/index.php/arsbs/article/view/1383.
[34] A. Ali, L. N. Abbas, and A. M. Sabiri, "Effectiveness of gamification learning in students achievement for complex number topic," (in Malay), *Online Journal for TVET Practitioners*, vol. 6, no. 2, pp. 108–122, 2021.
[35] F. A. A. Al-Nashiri, "The role of gamification in developing English language skills among secondary school students in Jeddah," in *Knowledge Enrichment for Conferences and Research*, 2020.
[36] C. Malamed, "Book review: 'the gamification of learning and instruction: game-based methods and strategies for training and education' by Karl Kapp," *eLearn*, vol. 2012, no. 5, May 2012, doi: 10.1145/2207270.2211316.
[37] C. Wolf, S. Bott, I. Hernandez, and L. Grieve, "Teaching about the health care industry through gamification," *American Journal of Pharmaceutical Education*, vol. 82, no. 4, p. 6422, May 2018, doi: 10.5688/ajpe6422.
[38] F. Xu, J. Weber, and D. Buhalis, "Gamification in tourism," in *Information and Communication Technologies in Tourism 2014*, Cham: Springer International Publishing, 2013, pp. 525–537. doi: 10.1007/978-3-319-03973-2_38.
[39] Y. Chou, *Actionable gamification: beyond points, badges, and leaderboards*. Packt Publishing Ltd, 2019.
[40] J. F. F. Flores, "Using gamification to enhance second language learning," *Digital Education Review*, no. 27, pp. 32–54, 2015,
[41] J. Mejia, "Impact of gamification and shared situated displays on smartphone application engagement," M.S. thesis, Grand Valley State University, USA, 2013.
[42] W. Sauerland, J. Broer, and A. Breiter, "Motivational impact of gamification for mobile learning of kanji," in *Proceedings of EdMedia 2015--World Conference on Educational Media and Technology*, 2015, pp. 1518–1527.
[43] D. Y. Lee and M. R. Lehto, "User acceptance of YouTube for procedural learning: an extension of the technology acceptance model," *Computers & Education*, vol. 61, pp. 193–208, Feb. 2013, doi: 10.1016/j.compedu.2012.10.001.
[44] S. Bai, K. F. Hew, and B. Huang, "Does gamification improve student learning outcome? evidence from a meta-analysis and synthesis of qualitative data in educational contexts," *Educational Research Review*, vol. 30, p. 100322, Jun. 2020, doi: 10.1016/j.edurev.2020.100322.
[45] M. Ekici, "A systematic review of the use of gamification in flipped learning," *Education and Information Technologies*, vol. 26, no. 3, pp. 3327–3346, May 2021, doi: 10.1007/s10639-020-10394-y.
[46] N.-Z. Legaki, N. Xi, J. Hamari, K. Karpouzis, and V. Assimakopoulos, "The effect of challenge-based gamification on learning: an experiment in the context of statistics education," *International Journal of Human-Computer Studies*, vol. 144, p. 102496, Dec. 2020, doi: 10.1016/j.ijhcs.2020.102496.
[47] A. Rapp, F. Hopfgartner, J. Hamari, C. Linehan, and F. Cena, "Strengthening gamification studies: current trends and future opportunities of gamification research," *International Journal of Human-Computer Studies*, vol. 127, pp. 1–6, Jul. 2019, doi: 10.1016/j.ijhcs.2018.11.007.
[48] J. Bloomfield and M. Fisher, "Quantitative research design," *Journal of the Australasian Rehabilitation Nurses' Association*, vol. 22, no. 2, pp. 27–30, Sep. 2019, doi: 10.33235/jarna.22.2.27-30.
[49] P. C. Enwereji, A. van Rooyen, and A. Terblanche, "Exploring students perceptions on effective online tutoring at distance education institution," *Electronic Journal of e-Learning*, vol. 21, no. 4, pp. 366–381, Nov. 2023, doi: 10.34190/ejel.21.4.3131.
[50] J. F. Hair, B. J. Babin, R. E. Anderson, and W. C. Black, *Multivariate data analysis*, 8th ed. Cengage Learning, 2019.
[51] N. Iman, M. Ramli, and N. Saridewi, "Kahoot as an assessment tools: students' perception of game-based learning platform," *Jurnal Penelitian dan Pembelajaran IPA*, vol. 7, no. 2, pp. 245–259, Nov. 2021, doi: 10.30870/jppi.v7i2.8304.
[52] N. M. Jamaatthuddin and S. Or-Kan, "An examination on the students perceptions towards the effectiveness of using game-based learning in learning the English language for students in higher education," *International Journal of Academic Research in Business and Social Sciences*, vol. 11, no. 8, pp. 1689–1714, Aug. 2021, doi: 10.6007/IJARBSS/v11-i8/10891.
[53] C. Cheong, J. Filippou, and F. Cheong, "Teaching business process management with simulation in graduate business programs: an integrative approach," *Journal of Information Systems Education (JISE)*, vol. 25, no. 3, pp. 233–244, 2014.
[54] D. Des Armier, C. E. Shepherd, and S. Skrabut, "Using game elements to increase student engagement in course assignments," *College Teaching*, vol. 64, no. 2, pp. 64–72, Apr. 2016, doi: 10.1080/87567555.2015.1094439.
[55] J. Hamari, "Transforming homo economicus into homo ludens: a field experiment on gamification in a utilitarian peer-to-peer trading service," *Electronic Commerce Research and Applications*, vol. 12, no. 4, 2013, doi: 10.1016/j.elerap.2013.01.004.
[56] M. T. Saritaş and Ö. Yildiz, "Gamification and flipped classrooms in education," (in Turkish), *Akademik Bilişim*, vol. 4, no. 6, 2015.
[57] A. Y. Kolb and D. A. Kolb, "Experiential learning theory as a guide for experiential educators in higher education," *Experiential Learning & Teaching in Higher Education*, vol. 1, no. 1, pp. 7–44, 2015.
[58] J. L. Plass, B. D. Homer, and C. K. Kinzer, "Foundations of game-based learning," *Educational Psychologist*, vol. 50, no. 4, pp. 258–283, Oct. 2015, doi: 10.1080/00461520.2015.1122533.
[59] D. Davis, G. Chen, C. Hauff, and G.-J. Houben, "Activating learning at scale: a review of innovations in online learning strategies," *Computers & Education*, vol. 125, pp. 327–344, Oct. 2018, doi: 10.1016/j.compedu.2018.05.019.
[60] H. Bicen and S. Kocakoyun, "Perceptions of students for gamification approach: Kahoot as a case study," *International Journal of Emerging Technologies in Learning (iJET)*, vol. 13, no. 2, pp. 72–93, Feb. 2018, doi: 10.3991/ijet.v13i02.7467.
[61] K.-K. Fan, P. Xiao, and C. Su, "The effects of learning styles and meaningful learning on the learning achievement of gamification health education curriculum," *EURASIA Journal of Mathematics, Science and Technology Education*, vol. 11, no. 5, pp. 1211–1229, Sep. 2015, doi: 10.12973/eurasia.2015.1413a.

[62] Y. Attali and M. Arieli-Attali, "Gamification in assessment: do points affect test performance?" *Computers & Education*, vol. 83, pp. 57–63, Apr. 2015, doi: 10.1016/j.compedu.2014.12.012.
[63] Y. Li, D. Chen, and X. Deng, "The impact of digital educational games on student's motivation for learning: the mediating effect of learning engagement and the moderating effect of the digital environment," *PLOS ONE*, vol. 19, no. 1, p. e0294350, Jan. 2024, doi: 10.1371/journal.pone.0294350.

## BIOGRAPHIES OF AUTHORS

**Burhan Hamadneh** is a Professor in Special Education at Ajloun National University. His current research interests include students' learning and development, special education and technology. He can be contacted at email: B.hamadneh@anu.edu.jo.

**Amr Fkry** is a Senior Assistant in Education department at the Imam Abdulrahman bin Faisal University in Saudi Arabia. His research interests are related to psychology, education and technology. He can be contacted at email: afsalem@iau.edu.sa.

**Mohammed Talaat** is a Lecturer in Computer Science department at the Imam Abdulrahman bin Faisal University in Saudi Arabia. His research interest lies in technology, e-learning, and technology. He can be contacted at email: mtjali@iau.edu.sa.

**Ahmed Abbas** is a Senior Assistant Professor in Computer Science department at the Imam Abdulrahman bin Faisal University in Saudi Arabia. His research interest in technology, e-learning, and technology. He can be contacted at email: amabas@iau.edu.sa.

**Reham Ghanem** is an Assistant Professor in mathematics and education at the Imam Abdulrahman bin Faisal University. Dr Reham's research interests lie in the basic sciences and higher education. He can be contacted at email: raghanem@iau.edu.sa.

**Samah Ramzy** is a Lecturer in the Self-Development Department at Imam Abdulrahman bin Faisal University. Her research interests are related to psychology, education, and technology. She can be contacted at email: srabdulghani@iau.edu.sa.

**Mohamed Aly** is Assistant professor working in students' Affairs College at Imam Abdulrahman bin Faisal University in Saudi Arabia. His current research interests include students' learning and technology. He can be contacted at: maasman@iau.edu.sa.

**Ahmed Elkilani** is Assistant Professor working in Imam Abdulrahman bin Faisal University in Saudi Arabia. His current research interests include students' learning, physical education and technology. He can be contacted at email: amelkilany@iau.edu.sa.

**Sherin Mabrouk** is an assistant professor working in Education Department at Imam Abdulrahman bin Faisal University. Her current research interests include learning and technology. She can be contacted at email: shmabruk@iau.edu.sa.

**Reema Aloqlah** is an Assistant Professor in education at the Imam Abdulrahman bin Faisal University. She is passionate about raising the quality of teaching and learning of students at the university settings. She can be contacted at email: rmaloqlah@iau.edu.sa.