PASAA
Volume 63
January – June 2022

Digital Game-Based Learning (DGBL): The Voice of EFL University Students and Teachers

Atik Umamah
atikumamah@unisma.ac.id
Universitas Negeri Malang, Indonesia
Universitas Islam Malang, Indonesia
Ali Saukah
Universitas Muhammadiyah Kalimantan Timur (UMKT)

Abstract

Digital games have been integrated into the teaching and learning process along with the immense use of digital games by student gamers. This adoption is to facilitate students with a more interesting and exciting classroom atmosphere. This study was conducted in an attempt to describe the voice of EFL university students regarding the integration of digital game-based learning (DGBL) and to examine the difference in their perception based on gender and interest. Besides, teachers' voice was explored to better capture the two-sided perspectives. A total of 86 second-year English students responded to an open-ended questionnaire on gamification acceptance. Four English students and four English teachers were invited to have an in-depth interview to elicit further information about the extent to which they agree or disagree with the incorporation of DGBL. The quantitative data were analyzed using descriptive statistics and an independent sample t-test, while content analysis was applied to analyze the

qualitative data. The quantitative data analysis indicated that EFL students positively perceived the implementation of DGBL in terms of perceived ease of use. Regarding gender, male and female students were not different in their perception, while a significant difference in perception was derived from students' interest in playing digital games. The content analysis implied that EFL students and teachers had similar perceptions regarding the advantages, the challenges, and the criteria of good digital games for learning.

Keywords: *digital game-based learning, perceptions, English language learning*

Introduction

The adoption of digital games in the education setting, what so-called digital game-based learning (DGBL), has extensively increased along with the massive use of digital games by student gamers. DGBL, according to Xu et al. (2019), is defined as an activity that is done digitally and playfully to attain learning objectives and to assess students' learning. In general, the adoption of digital games in the classroom enhanced students' performance in learning and enlivened the classroom atmosphere (Wang & Tahir, 2020). More specifically, a current systematic literature review concluded that game-based learning supported by advanced technology could enable learners to have peer interaction and cooperation, promoted learning motivation, competition, and entertainment, as well as helped learners acquire knowledge to achieve their learning goals (Hwang & Chen, 2022).

Systematic reviews reported that DGBL was widely conducted in developed countries such as Taiwan, the United States, and England (Chang & Hwang, 2019; Hwang & Chen, 2022), which have implemented systematic digital learning through wide-nation programs (Hwang & Chen, 2022). No wonder fewer studies carried out in developing countries were reported since these countries still struggle with access to digital technology. Issues regarding the

adoption of mobile technologies, gaming types, application domains, and learning strategies were some of the most investigated topics (Chang & Hwang, 2019). In addition, a variety of technological tools and applications were also explored (Hwang & Chen, 2022). Challenges in applying DGBL were also critical issues (Hébert et al., 2021; Kaimara et al., 2021; Tsekleves et al., 2016), particularly in developing countries. The challenges mainly deal with technical, financial, and educational-related issues (Tsekleves et al., 2016).

The advantages of digital games were confirmed by the students' positive perception (Ab. Rahman et al. 2018; Bawa, 2019; Licorish et al., 2018; Lin et al., 2018; Taskiran, 2019). The students' perceptions, according to Bolliger et al. (2015), might be different depending on the students' individual differences (e.g. age, gender, major, duration of playing games). However, Chapman and Rich (2018) reported that regardless of individual differences, the students perceived that their gamified course was motivating. Different from the students' perception which has grabbed wide attention, teachers' voice seems to be still neglected as proven by the very limited number of publications reporting this issue (Chik, 2011; Koh et al. 2012). In conjunction with students, teachers based on these studies were reported to perceive the engagement of digital games in the learning context positively.

The findings of the previous studies indicated that both teachers and students noticed the viable potential of digital game integration in their classroom activities. Unfortunately, the previous studies investigated the teachers' and students' perceptions separately, whereas combining the two variables could provide a more fruitful and synchronized result. Concerning individual differences, there is still no conclusive agreement on whether there is a significant difference in the students' perceptions, particularly about gender and interest in playing digital games. Moreover, the studies were conducted dominantly in non-English Language Teaching (ELT) contexts such as physics, chemistry, biology, environmental science or natural science, nursing education (Chang & Hwang, 2019), and mathematics (Sun et al., 2021). The majority of the research was also carried out in developed countries. Knowing the perceptions of teachers and students

in the ELT setting, particularly in developing countries like Indonesia, is paramount of importance. It is to obtain a deeper understanding of the value of digital game-based intervention to advance the teaching and learning process (Bawa, 2019). The perceptions of students and teachers can then be used to provide English language curriculum designers with beneficial information about the teachers' and students' needs (Kayl, 2008), especially concerning the integration of digital games in the ELT classroom activities.

Driven by the aforementioned review above, this study was carried out to investigate students' perceptions of the integration of digital game-based learning (DGBL) in the ELT setting, to see whether there is a significant difference in students' perceptions based on gender and interest in playing digital games, as well as to explore the teachers' perspectives of the DGBL integration in ELT classroom. The results of this study provided educators, policymakers, and digital game developers with fruitful information regarding the potential value of DGBL as well as the students' and teachers' needs for digital games in the ELT setting.

Literature Review

Digital Games-Based Learning (DGBL)

The transformation from offline to online learning especially due to the Covid-19 Pandemic and the explosive use of digital technology have significantly affected students all over the world (Tawafak et al., 2021). Students today who were born as digital natives have been extensively and naturally exposed to digital activities (Prensky, 2001) including digital games. Many of them can be categorized as student gamers. Along with the advanced development of the digital game industry, countless games are viable to be adopted in a learning situation. Many digital games are specifically designed for learning. Digital games are usually called serious games, digital learning, or educational games (Sanchez, 2019).

Over the past decade, digital games played massively by students all over the world have been integrated into an educational setting and have become part of learning ecologies (LE) (Persico et al.,

2019). The wide acceptance of digital games in a learning context by both teachers (Chik, 2011; Koh et al., 2012) and students (Ab. Rahman et al., 2018; Licorish et al., 2018; Taskiran, 2019) leads to the so-called digital game-based learning (DGBL), a form of advancement in learning technology (Wang & Tahir, 2020). DGBL refers to an activity which is done digitally and playfully to attain learning objectives and assess students' learning (Xu et al., 2019). The adoption of digital games in the learning environment is to accommodate the students' needs for a fun and enjoyable learning experience (Licorish et al., 2018; Purgina et al., 2019; Taskiran, 2019).

Summarizing previous research findings, Zou et al. (2021) proposed five critical factors of successful digital games for the education setting i.e. fantasy (offering interesting storylines, engaging scenarios and fascinating settings), identity (involving players as the main characters), interactivity (allowing the players to interact with other players), rewards (giving rewards or scores for the achieved targets), and knowledge improvements (assisting the players to improve target knowledge and skills). In addition, game features such as enjoyment and challenges affect the effectiveness of DGBL (Chen et al., 2015). Enjoyment can be a determining factor in the DGBL (Calvo-Ferrer, 2015) which pertains to achievement (Touati & Baek, 2018). Meanwhile, the game challenges could promote students' learning motivation (Chen & Hsu, 2020) which in turn predicted the students' learning outcomes (Hamari et al., 2016). Competition is also a critical element for both cognitive and non-cognitive aspects of learning (Chen et al., 2020).

Considering the prominent role of DGBL, an abundant body of research has been carried out in various learning contexts across different majors such as mathematics, language learning (Abdul Jabbar & Felicia, 2015), science (physics, chemistry, biology, environmental science or natural science), and nursing education (Chang & Hwang, 2019). Digital games were reported to positively affect students' motivation (Alomari et al., 2019; Bawa, 2019; Bovermann et al., 2018; Chapman & Rich, 2018; Licorish et al., 2018; Lin et al., 2018; Taskiran, 2019), engagement (Alomari et al., 2019; Chen et al., 2019;

Krouska et al., 2022), knowledge reinforcement and retention (Coleman & Money, 2019; Krouska et al., 2022), critical thinking (Chang & Yeh, 2021), self-efficacy (Zou et al., 2021), and learning outcomes (Chen et al., 2019; Licorish et al., 2018; Zou et al., 2021).

Digital Game-Based Learning (DGBL) in Language Learning

The potential role of digital games in the education context has been investigated by an abundant body of research carried out in the last few years. Overall, digital games improved students' learning performance and classroom atmosphere (Wang & Tahir, 2020). A systematic review by Hwang and Chen (2022) summarized that game-based learning supported by advanced technology allowed learners to have peer interaction and cooperation, promoted learning motivation, competition, and entertainment, and at the same time helped learners acquire knowledge to achieve their learning goals.

Digital games have also been adopted in English language learning in EFL/ESL context (Xu et al., 2019). Some studies reported the promising benefits of digital games in English language learning. It was found that the integration of digital games led to an increase in university students' grammar test scores and learning enjoyment (Pitarch, 2018; Purgina et al., 2019). Similarly, the adoption of digital games improved students' e-learning enjoyment in vocabulary classes (Ebrahimzadeh & Alavi, 2017). Another research (Lam et al., 2017; Pitarch, 2018; Zhang et al., 2019) revealed that the use of digital games could improve the students' quality of ideas and expression in writing; thus, it led to positive learning outcomes. The use of digital games also promoted students' English skills such as listening (Pitarch, 2018; Taskiran, 2019), reading (Pitarch, 2018), and speaking (Taskiran, 2019). These previous research findings imply the promising role of DGBL to improve students' affective, cognitive, and social aspects in various fields. The findings of those studies convincingly confirm that the benefits of digital games are not limited to certain courses.

Perception of the Integration of Digital Game-Based Learning

The potential role of digital game-based learning (DGBL) is confirmed by both teachers' and students' positive perceptions of the incorporation of DGBL in the classroom. From the teachers' side, it was reported that teachers perceived the use of digital games in the learning context positively (Chik, 2011; Koh et al., 2012). Therefore, the adoption of digital games in teaching English is essential (Chik, 2011) since the games could lead to students' better learning outcomes in terms of cognitive, psychomotor, and affective aspects (Koh et al., 2012). From the students' point of view, digital games could make them better engaged in the learning activities (Ab. Rahman et al., 2018; Licorish et al., 2018), and improve material understanding (Bawa, 2019; Licorish et al., 2018), strengthen motivation (Bawa, 2019; Lin et al., 2018), lead to enjoyment (Licorish et al., 2018; Taskiran, 2019), and foster their language skills (Taskiran, 2019). These findings imply the promising role of DGBL in improving students' affective, cognitive, and social aspects. However, pre-service teachers perceived the availability of financial resources as a critical challenge for the implementation of DGBL. Financial resources are essential to provide up-to-date equipment, devices and educational software, as well as to facilitate the professional development and training of teachers, school administrators and policymakers (Kaimara et al., 2021). Teachers also considered access to technology as the major challenge in integrating DGBL (Hébert et al., 2021).

To explore the extent to which the students accept gamification in the learning process, Ab. Rahman et al. (2018) introduced Gamification Acceptance Model (GAM) developed based on the Technology Acceptance Model (TAM). This model proposed the correlation between Gamification Perceived Usefulness (GPU), Gamification Ease of Use (GEOU), attitude, and engagement. GPU refers to the students' belief that the use of gamification will improve their learning performance, while GEOU can be defined as the students' expectation that the gamification is effortless. GPU and GEOU are factors that influence the students' attitude towards

gamification. The students' attitude towards gamification affects the students' engagement during classroom activities. The students' engagement consists of skill engagement and interaction engagement. Finally, if the students are more engaged during lessons, their knowledge will be increased and it will improve their learning performance.

This current study adapted the Gamification Acceptance Model (GAM) and the survey instrument constructed by Ab. Rahman et al. (2018) to investigate the students' perception of the integration of DGBL in the English language learning context. Thus, the attitude aspect was not involved in this survey. Besides, it did not measure the statistical correlation between the Gamification Perceived Usefulness (GPU), Gamification Ease of Use (GEOU), and engagement.

The Role of Individual Differences in the Perception of Digital Game-Based Learning Integration

Currently, research on the perception of DGBL integration sheds light on individual differences. Bolliger et al. (2015) reported that gender, age, academic major, and length of playing games significantly influence the students' perception. Male students had more positive perceptions than females, teens outperformed students in their 20s in the perception, students majoring in information systems perceived better than other majors (e.g. economics, international economics, and others), and the students with more frequent playtime viewed digital games adoption in class more positively. However, a different finding was reported by Chapman and Rich (2018). They found that individual differences (e.g. age, gender, hours worked per week, and status) did not influence the students' perception that digital games were motivating. In other words, the advantages offered by the gaming system are not limited to the students' specific individual characteristics. The findings of the previous studies related to the role of individual differences are inconsistent. Moreover, they did not involve interest in playing digital games as a variable to take into consideration. In fact, interest is a significant variable that can influence individuals' choice to do learning activities and how long they

will do those activities (Lepper & Henderlong, 2000). Besides, it can be a predictor to know the nature of activity engagement (Sansone & Thoman, 2005). This study centres on gender and interest, two variables generally linked to digital gaming behaviour. This current research was carried out to answer the following questions:

1) How do university students majoring in English perceive the use of digital game-based learning (DGBL) in English language learning?
2) Is there any significant difference in students' perceptions of the integration of digital game-based learning (DGBL) based on gender and interest in playing digital games?
3) How do English teachers in higher education contexts perceive the integration of digital game-based learning (DGBL) in English Language Teaching?

Methodology

Participants

A total of 86 second-year students majoring in English at a private university in Malang, Indonesia, responded to a questionnaire. They were exposed to digital game-based learning (DGBL) in the previous semesters in different courses such as Writing I and Grammar III. From a total of 86, four students were selected as interviewees based on their responses to questions related to their interest and frequency of playing digital games. Two students represented those who like to play digital games and play very often. Those two students play games every day. They were assigned to S1 and S2 for confidentiality purposes. Meanwhile, the other two students represented those who dislike playing digital games and very rarely play games. They were assigned to S3 and S4 for confidentiality purposes.

Additionally, a questionnaire was distributed to English teachers from the same university. A total of 14 teachers (5 male and 8 female teachers) responded to the questionnaire. Of 14 teachers, 12 teachers had experience in using digital games; however, only two teachers (one male teacher with four-year experience in teaching and

one female teacher with seven-year teaching experience) used more than one type of digital game. Therefore, they were involved in the interview sessions. To ensure confidentiality, their names were assigned to T1 and T2. Meanwhile, only two teachers (one male teacher with more than 10 years of teaching experience and one female with three years of teaching experience) had no experience in using digital games in their classrooms. To ensure confidentiality, their names were assigned to T3 and T4.

Instruments

A gamification acceptance questionnaire adapted from Ab. Rahman et al. (2018) was used in this study. The open-ended questionnaire with a 5-point Likert scale was used to understand how the students perceive the integration of DGBL in three aspects (e.g. perceived usefulness, ease of use, and engagement). The engagement is divided into skill and interaction. The original number of the statements is 18, but only 15 statements were used. Three statements were eliminated since they are related to attitude, not perception. This study focused only on perception. Four questions were added to elicit the students' background information related to gender, interest, and frequency of playing digital games. The questionnaire was translated into the participants' first language to avoid bias and ambiguity.

Table 1

Questionnaire Distribution

No.	Category	Number of Items
1.	Background Information	4
2.	Perceived Usefulness	4
3.	Perceived Ease of Use	4
4.	Student Engagement:	
	Skill Engagement (SE)	3
	Interaction Engagement (IE)	7
	Total	**19**

In addition, a questionnaire was also distributed to English teachers asking about their background information regarding their gender, teaching experience, their familiarity with digital game-based learning, and experience in using digital games. This questionnaire was used to select teachers to be involved in the interview sessions.

In the interview sessions, the students were asked about their agreement or disagreement with the integration of DGBL in their classroom and the reasons, the advantages or difficulties they might encounter in the classroom with DGBL, and the criteria they propose for good digital games for educational purposes. The interviews were done using the students' native language to ensure clarity and to avoid misunderstanding. Meanwhile, the teachers who had experience integrating DGBL were asked five questions regarding the courses where they integrated the DGBL, the reasons or purposes of using digital games, how they used the digital games in their classroom, the difficulties they might encounter in applying DGBL, and the criteria they propose for good digital games for educational purposes. For the teachers with no experience in using digital games, four questions regarding the courses they taught, reasons for not using digital games, the difficulties they face, and the characteristics of good digital games were asked. The interview with the teachers was done in the participants' native language and English.

Data Collection and Procedures

The gamification acceptance questionnaire was distributed online using Google Form. Before the main questionnaire, the students were provided with information related to the research to make sure that they fully understood the research context. In addition, a statement of agreement to participate in the research was given by clicking Yes or No. A total of 86 students responded to a 19-item questionnaire asking about their perceptions of the use of digital games in their classroom. At the same time, an online questionnaire using Google Form was also administered to the teachers to gain their background information and relevant information regarding their experience in teaching and integration of digital games in the

classroom. Information about the research context and a statement of agreement to be the participants of this research were also provided on the first page of the questionnaire. Next, four teachers and four students were invited to join an in-depth interview in separate sessions. The interviews with the students were conducted in a group to provide a more relaxed atmosphere, while the interview sessions with the teachers were conducted individually. Each interview session lasted for approximately 20 minutes and was audio recorded. The interview sessions were conducted three times to make sure that the participants' answers are consistent and to achieve data saturation.

Data Analysis

The data from the gamification acceptance questionnaire were analyzed using descriptive statistics to describe the mean scores. At the same time, an independent sample t-test was conducted to understand whether there is a significant difference in the students' perceptions based on gender and interest in playing digital games. Based on the information from the questionnaire, four students were invited to the interview sessions. Meanwhile, the questionnaire for the teachers was also analyzed to find the appropriate participants to be interviewed. The qualitative data from the interview sessions were analyzed using content analysis consisting of coding data, locating categories and themes, organizing data and themes, and identifying and interpreting findings (Denzin & Lincoln, 2005).

Findings

Before presenting the main findings of this research regarding the perceptions, it is essential to present the participants' demographic information especially related to gender and interest in playing digital games. These data were essential to further be analyzed to see whether there was a significant difference in students' perceptions based on the two variables. As shown in Table 2, 28% of the students were male, while females dominated with 72%. Among the male students, 68% of them liked playing digital games, while 32% of them did not.

Meanwhile, female students who liked playing digital games accounted for 75%, while only 25% of female students did not like playing games.

Table 2

Distribution of Interest Based on Gender and Interest

Gender	Percentage	Interest	Percentage
Male	28%	Like	68%
		Dislike	32%
Female	72%	Like	75%
		Dislike	25%

Regarding the intensity of playing digital games, 10 students (11.63%) played digital games very often, 16 students (18.60%) often played digital games, 33 students (38.37%) sometimes played digital games, 20 students (23.26%) rarely played digital games, and 7 students (8.14%) admitted that they very rarely played digital games.

Students' Perceptions of the Use of Digital Game-based Learning (DGBL) in English Language Learning

Students' Perception Based on the Questionnaire

Descriptive statistics were performed to analyze the students' perceptions. As shown in Table 3, it was found that in general, the students' perceptions of the use of DGBL in English language learning were positive as indicated by the mean of 3.49. The positive perception was in terms of perceived ease of use (3.64) followed by perceived usefulness (3.44) and student engagement (3.40), respectively. The last two aspects were categorized as neutral perceptions. Detailed interpretation of each aspect of perceptions is discussed in the following section.

Table 3

Students' Overall Perception of DGBL Integration

	N	Minimum	Maximum	Mean	SD
Perceived Ease of Use	86	1.00	5.00	3.64	.93
Perceived Usefulness	86	1.00	5.00	3.44	1.06
Students Engagement	86	1.00	5.00	3.40	.93
Overall				**3.49**	

Perceived Ease of Use

As shown in Table 4, perceived ease of use obtained the highest mean, showing the students' positive responses to the use of DGBL. It could be seen that three items (Item 1, 2, and 3) had high means of overall ease of use and flexibility in terms of function and interface. Meanwhile, the last item showed a neutral mode of perception, indicating that the students were not sure that they did not need mental effort in playing digital games in the classroom.

Table 4

Analysis of Perceived Ease of Use

No.	Item	Mean	SD
1	Overall, I believe that digital games are easy to use.	3.88 (Positive)	1.10
2	The digital games' function and interface are clear and understandable.	3.80 (Positive)	1.10
3	I find digital games to be flexible to be used.	3.74 (Positive)	1.06
4	Interacting with digital games does not require a lot of mental effort.	3.14 (Neutral)	1.17

Note: Data in the table are ranked from the highest to the lowest mean score

Perceived Usefulness

As indicated in Table 5, the students' positive perception was only in Item 1, showing the benefit of digital games for learning. The rest items (Item 2-4) showed neutral perceptions regarding the advantages of DGBL for their learning outcomes, improvement in performance, and enhancement in their learning goals.

Table 5

Analysis of Perceived Usefulness

No.	Item	Mean	SD
1	Using digital games is useful in my learning.	3.62 (positive)	1.08
2	Using digital games increases my learning outcomes.	3.41 (neutral)	1.18
3	Using digital games improves my learning performance.	3.38 (neutral)	1.15
4	Using digital games enhances my desire to produce the desired result in my learning.	3.36 (neutral)	1.15

Note: Data in the table are ranked from the highest to the lowest mean score.

Perceived Engagement

Overall, the students had neutral perceptions both in skill engagement (SE) and interaction engagement (IE) as shown in Table 6. Interestingly, the top four responses showed that students experience more interaction engagement than skill engagement. The students' positive perception was found only in terms of excitement/interaction engagement (Item 1) showing that fun was the main reason for the students to play games, especially in the learning context. In addition, they responded to the other six items neutrally. It means that they did not feel that they were engaged in the digital game activities such as interacting with peers (pair or small group discussion), with teachers, and with their learning.

Table 6

Analysis of Perceived Engagement

No.	Item	Mean	SD
1	Digital games contribute to me in having fun in the classroom. (IE)	3.85 (Positive)	1.07
2	Digital games contribute to me in participating actively in small-group discussions. (IE)	3.43 (Neutral)	1.06
3	Digital games contribute to me in helping fellow students. (IE)	3.43 (Neutral)	1.14

No.	Item	Mean	SD
4	Digital games contribute to me in asking questions when I did not understand the lecturer. (IE)	3.40 (Neutral)	1.11
5	Digital games encourage me to listen carefully in the classroom. (SE)	3.30 (Neutral)	1.09
6	Digital games encourage me to take good notes in the classroom. (SE)	3.21 (Neutral)	1.10
7	Digital games encourage me to make sure to study on a regular basis. (SE)	3.16 (Neutral)	1.12

Note: Data in the table are ranked from the highest to the lowest mean score.

Students' Perceptions based on the Interview

To elicit information about the students' perceptions, in-depth interviews were done with four students (two who like playing games and the other two who dislike playing games). The students were asked three main questions related to the reasons for their agreement or disagreement with the use of DGBL, the challenges they face in using digital games in the classroom, and the criteria of good digital games for educational purposes.

Question 1: Do you agree with the implementation of DGBL in the classroom?

When asked whether they agree or disagree with the implementation of DGBL and their reasons, the students who liked playing digital games agreed with the implementation of DGBL. The reason was that they found it helpful and exciting to understand the material. S1, for example, got a more and faster understanding of the material. Meanwhile, S2 stated that, besides helping him to understand the material better, digital games could also remove his boredom during the class.

> Agree… it is better to use digital games than to use only PowerPoint and [verbal] explanation…and if using a game, I can understand faster…It's like I once read this in the game…so I can get more understanding about the material. (S1)

> Agree, Ma'am [with the integration of DGBL]. It is because sometimes we feel bored with the classroom situation…when

> we can play a game in the class, the boredom will be gone. It is exciting, Ma'am…I can understand the material more because when playing games the answer to the questions is usually discussed so we know the correct answer and the explanation. (S2)

Meanwhile, two students who were not fond of playing digital games (S3 and S4) surprisingly answered that they also agreed with the implementation of DGBL. However, S3 gave a condition regarding a time limit. She expected the digital games played in the classroom to have a longer time limit so that she could focus and did not feel panic. Interestingly, though S4 did not like playing digital games in her daily life, she gave a positive response and stated that DGBL could improve her understanding of the material, make her class more interesting, and refresh her mind.

> Yes [agree], but If playing a game in class, the time limit made me panic and not focused. (S3)

> Yes, because it is to avoid monotonous learning…can be used as refreshing. From the game, we can learn and improve understanding…understanding the material. (S4)

Question 2: What challenges did you encounter when the teachers implemented DGBL in your classroom?

The second question asked regarding the challenges the students encounter in the implementation of DGBL in the classroom. Students who liked playing digital games answered that technical issues such as limited Internet access and error in their cellphones as the main problems. S2 further added that the ineffectiveness of digital games due to the unavailability of explanation to the answers was very disturbing.

> Signal…no sufficient Wi-Fi…so usually if we would have a quiz, the lecturer informed us to be ready with Internet quota and if we didn't have any, we could share using tethering… the explanation of the answer was not clear and if I wanted to ask, the lecturer already moved to the next question…sometimes the problems come from the cellphone … It cannot be clicked and it made me confused and emotional. (S1)

> The signal, Ma'am. The learning was ineffective because when playing a game, the game only showed the correct answer without any explanation. The explanation was provided by the lecturer…not provided by the game…sometimes the problems caused by cellphone …cannot be swiped and finally I get out from the game…meaning auto lost. (S2)

Similar to student gamers, students who did not like playing digital games experienced problems with Internet networks. In addition, S3 felt disturbed by the back sound of the digital games, which made her panic and not focused.

Question 3: What are the criteria for good digital games that can be effectively used in the classroom?

The last question asked the students about the criteria of good digital games to be used in the classroom. S2 pointed out that digital games should match the material as well as have a time limit and level. Also, there must be a brief explanation of the material and feedback on the correct answer. It is evident from the interview with S2, asking about their agreement on the integration of DGBL. Meanwhile, S1 recommended that the digital game have various types of questions, provide a time limit to be more challenging, and be affordable.

> Not only in the form of multiple-choice… like in Facebook… It's like there are some flags which can be selected … more various games/the types of the questions… the size is small so it does not consume much quota and is slow if it is used together. It is better to use the offline game without quota… It has a back sound and is free. Time limit setting will be more challenging to stimulate our brain to think faster. (S1)

> First, the game must be appropriate to the students' level…appropriate to the material. If it does not match the material, it is difficult to answer. There must be an explanation for the correct answer so that if we answer incorrectly, we can learn the correct one, so not only playing the game but learning… The use of the level feature in the game is good. For example, we cannot go through the next level if cannot do the basic level. There is also a time limit to challenge us to think faster. If there is no time limit, it will be too long and make me bored. (S2)

The answers of students who were not fond of playing digital games were in conjunction with the student gamers. S3, for example, expected interesting digital games but not with too many pictures or animations. The games must be challenging (game level), have a time set, and provide an explanation for the correct answer. Besides, S4 wanted digital games with pictures, back sound, colours, time settings, and explanations for the materials and the quiz answers. It is depicted in the interview with S3, asking about the criteria of a good digital game.

> There is a time limit but not too short. There is an explanation for the correct answers… an interesting back sound…more fun, and not too many pictures or animations because it can distract my focus. The game level is important, too. (S3)

> There is an explanation of the material before the questions. It must be interesting… in terms of clear back sound and animation…not only the letters [texts]… colourful not black and white, there is a time setting, so it is not too fast. (S4)

The Difference in the Students' Perceptions based on Gender and Interest in Playing Digital Games

Based on the statistical analysis, in terms of gender, there was no significant difference between male and female students in their perceptions of DGBL integration in English language learning as shown in Table 7. The insignificant difference was for all aspects of perception: perceived usefulness, perceived ease of use, and student engagement. It was indicated by the significance value of the three aspects (.223, .351, and .224), which was greater than .05. This means that regardless of gender the students shared similar positive perspectives regarding the incorporation of DGBL.

Table 7

The Difference in Students' Perception Based on Gender

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Usefulness	.047	.829	1.228	84	.223	.30754	.25042	-.19044	.80552
Ease of Use	.016	.900	.937	84	.351	.20803	.22202	-.23348	.64955
Engagement	.153	.696	1.225	84	.224	.27007	.22040	-.16822	.70836

A different finding was obtained from the variable of interest. As can be seen in Table 8, a significant difference was found in all aspects of the perception: perceived usefulness (.002), perceived ease of use (.049), and student engagement (.016). All of the significance levels were less than .05, indicating that students who liked playing digital games perceived DGBL integration more positively than those who did not like playing digital games. Their positive perception was that they found DGBL useful and easy to use. Moreover, they could engage in DGBL activities.

Table 8

The Difference in Students' Perception Based on Interest

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Usefulness	.546	.462	3.124	84	.002	.76639	.24534	.27851	1.25427
Ease of Use	3.918	.051	1.997	84	.049	.44669	.22371	.00181	.89156
Engagement	1.912	.170	2.460	84	.016	.54195	.22032	.10382	.98008

Teachers' Perceptions of Integration of Digital Game-based Learning (DGBL) in English Language Teaching

To answer the last question "How do English teachers in higher education contexts perceive the integration of DGBL in English Language Teaching?", an in-depth interview was conducted with four teachers (two of them have experience in utilizing DGBL, while the other two have no experience at all). The first interview session was conducted with those who were experienced in applying DGBL (T1 and T2), and five questions were asked in the first session.

Question 1: In what courses did you integrate DGBL in your classroom?

The first question was related to the courses the teachers taught when applying DGBL. T1 taught second language acquisition (SLA), information and communication technology (ICT), and grammar courses. Meanwhile, T2 taught information and communication technology (ICT) and Writing III courses. Both teachers used Kahoot! and Hot Potatoes; however, they more frequently used Kahoot!. T1 stated that Kahoot! is easy to access, make, and use. He added that the game also promoted critical thinking and motivation. Similarly, T2 also found Kahoot! easy to use, efficient in time, and interesting. She also mentioned that the digital game could improve students' understanding of the materials, promote motivation, and reduce their anxiety. Further, the two teachers admitted that digital games were applicable for teaching English skills, components and content courses.

> Simply to say, it [Kahoot!] is easy to access, easy to make, easy to use, easy to be applied, and the students particularly love it so much. (T1)

> I think the main point in the teaching and learning process is we have to consider the students' affective [factor]…students' feeling. So, it [Kahoot!] will reduce their anxiety…they feel happy…yeah because they can learn a concept through interesting classroom teaching and learning process. They will be more motivated in the classroom to what…to complete the assignment. (T2)

Question 2: For what purposes did you integrate DGBL in your classroom?

Concerning the use of digital games in the classroom, T1 used digital games mainly to review materials, give quizzes, and perform the mid-term test. Along the same line, T2 also applied digital games to check students' understanding and review materials. She, however, did not think it was appropriate for doing an assessment.

> It can be used to know their comprehension about the theory of SLA…reviewing materials…assess their learning performance in a quiz and mid-term test. (T1)

> I used Kahoot! to check their understanding…yeah to check their understanding. (T2)

Question 3: How did you use digital games in your classroom?

When an elaboration question was asked regarding the way they applied the digital game, they provided the same answers that they made use of digital games by creating their questions, adapting, and adopting the existing questions available in the digital games.

> Mostly I made my questions…but sometimes I used the existing one but I adjust with my materials to make it appropriate. (T1)

> The available one…the existing questions because I don't have time to prepare… we can find many [essay structures] and then the problem is we have to make sure that you know before I decide to use one…to choose one I have played practice around 5-7 games. I just want to make sure that the questions given match the materials that I have explained. I don't want to make the students confused with new things. (T2)

Question 4: What challenges did you encounter in integrating digital games?

Regarding the challenges in integrating DGBL, they mentioned that unreliable Internet access is the main problem. T2 also mentioned that students' boredom might also be a challenge in using digital

games. This boredom appeared when the teacher used the same game repeatedly.

> Yeah, I think we know…infrastructure particularly Internet access is limited, so the students must use their quota to play…but usually I tell them to be ready with quota before playing the games…but sometimes the students have limited quota so they play with their friends. (T1)

> Getting bored, signal…Internet connection. We cannot use that. We cannot use Kahoot! to evaluate students' performance because not for evaluating, only for fun. (T2)

Question 5: What are the criteria for good digital games to be used in the classroom?

The last question was about the characteristics of a good digital game. T1 mentioned that affordability, ease of use, variety of questions, time setting, and self-learning opportunity are essential components. Meanwhile, T2 proposed that digital games must match the materials, have an offline mode, and are interesting as well as challenging in terms of visual aids and features. It is seen from the interviews with T1 and T2 asking about the characteristics of a good digital game and the advantages of DGBL.

> It must be affordable, easy to use, having a lot of choices I mean like not only multiple-choice like true false. It also has a time setting and what is that it can be used for self-learning. (T1)

> Friendly users in terms of how to play…how to use the game…criteria of good …and then match with our materials if we choose the existing game. Like I have told you, I play 6-7 games, so we have to make sure that the material or the questions match with the material. About the internet connection, we can use it offline if it is possible. Visually colourful, back sound yes to encourage the students' adrenaline. (T2)

The next interview was conducted with teachers who had no experience in applying DGBL (T3 and T4). They were asked four main

questions related to the courses they taught, reasons for not using digital games, the difficulties they face, and the characteristics of good digital games were asked.

Question 1: What courses did you teach?

The two teachers mostly teach content courses, not language skills. T3, for example, taught Research on ELT 1 and Research on ELT 2 courses. Meanwhile, T4 taught translation, speaking skills, and teaching English as a foreign language (TEFL) courses.

> I teach content courses like Research on ELT1 and Research on ELT2. (T3)

> I usually teach translation, speaking skills, and teaching English as a foreign language (TEFL) courses. (T4)

Question 2: What are your reasons for not using digital games in your classroom?

When asked why they did not implement DGBL, interestingly, they provided the same answer they were not digitally literate. They also explained that the content courses they taught were not appropriate to be delivered using digital games. In addition, they considered DGBL was more applicable for teaching freshmen, especially to teach language components such as grammar and vocabulary.

> …for university students, it is better for freshmen because they can feel happy and interested in the classroom. My courses [Research on ELT 1 and Research on ELT 2] are not appropriate. Moreover, I cannot play digital games. (T3)

> Language components are appropriate for games such as grammar is very appropriate, pronunciation. Spelling is also appropriate, so it is for freshmen. But actually, I'm not digitally literate and never play games. (T4)

Question 3: What challenges did you think prevented you to use digital games in your classroom?

In terms of difficulties in applying DGBL, T3 surprisingly stated that there was no problem because the institution had already facilitated good Internet access. However, his insufficient knowledge of digital games hampered him to apply DGBL in his classroom. In contrast, T4 considered Internet access, the limited bandwidth, as the source of the problem, which hindered her from integrating DGBL in her teaching.

> Well, I think this institution has already had a good internet connection, so it's no problem. But I must learn at first how to play the games. (T3)

> I think it is part of my reason…The lack of bandwidth because if.. Uhm…digital games need fast network and need big bandwidth and this campus doesn't support that. (T4)

Question 4: What are the criteria for good digital games to be used in the classroom?

Concerning the criteria of good digital games, T3 proposed that digital games must encourage the students to improve their language skills and components, and they must be in line with the learning goals. Similarly, T4 mentioned matching with the learning materials as the main criterion other than having interesting, colourful, and challenging features.

> It must match the learning materials. It has some pictures. (T3)

> I think the games must be appropriate with the materials, colourful, interesting, and challenging. (T4)

Discussion

The finding that students' perceptions of the integration of digital game-based learning (DGBL) were positive confirms earlier research findings (Ab. Rahman et al., 2018; Bawa, 2019; Licorish et al., 2018; Lin et al., 2018; Taskiran, 2019). In general, the students accepted the integration of DGBL in education settings enthusiastically. Further, perceived ease of use gained the highest mean. It is in agreement with the previous findings (Ab. Rahman et al.,

2018; Bolliger et al., 2015). The students considered ease of use as the priority rather than the benefits they could get. This shows that ease of use is undeniably crucial since the inability to use the digital game platforms will hamper their DGBL activities. Thus, it is essential to introduce and instruct the students about the application of DGBL before engaging them in the DGBL activities (Alomari et al., 2019). Another finding is that the students needed mental effort when playing digital games in the classroom. It is because they play digital games for learning purposes, which requires them to think harder than when they only play games for entertainment.

Concerning perceived usefulness, the students perceived that digital games were useful for their learning. The fun and exciting classroom atmosphere they experienced in DGBL activities might be the valid reason for this positive opinion. This kind of learning atmosphere will then lead to an improvement in students' motivation (Alomari et al., 2019; Bawa, 2019; Bovermann et al., 2018; Chapman & Rich, 2018; Licorish et al., 2018; Lin et al., 2018; Taskiran, 2019; Zhang et al., 2019). The neutral perception regarding the advantages for their learning outcomes, performance improvement, and enhancement in their learning goals was in contrast to the previous experimental research reporting the positive effect of DGBL. Some previous research reported that DGBL could promote learning outcomes (Chen et al., 2019; Lam et al., 2017; Licorish et al., 2018; Purgina et al., 2019) and knowledge reinforcement and retention (Coleman & Money, 2019; Purgina et al., 2019). The contrast findings are due to the purpose of playing games in this research context, which is mostly only to review materials or to give quizzes – not to deliver materials and not to play regularly. Thus, the students could not get significant learning improvement.

In terms of students' engagement, this research reported students' neutral opinions both in skill engagement (SE) and interaction engagement (IE). However, their responses showed that they experienced more interaction engagement than skill engagement. It means that they did not feel that they were engaged in the digital game activities such as interacting with peers, teachers, and their

learning. Conversely, two earlier studies unveiled that students' engagement was improved along with the implementation of DGBL (Alomari et al., 2019; Chen et al., 2019). This inconsistent finding might be due to the types of games that were played in the classroom. The game used in this research context was mostly Kahoot!, which was generally played in an individual mode and in a timed setting of around 10-20 seconds for each item, so it did not provide the students with enough chance to have much interaction with peers or to take notes. Besides, the students' engagement was affected by the two previous aspects: perceived ease of use and usefulness. The students would be more engaged in learning activities if they positively perceived that the games were easy to use and useful (Ab. Rahman et al., 2018). As noted earlier, the students' perceived ease of use was high, but in terms of usefulness, they were neutral since the primary concern of playing digital games in this research context was only to provide a material review. Moreover, the games were played only several times. This is likely to influence their engagement.

Based on the interview with the students, it was revealed that the students got more understanding when playing digital games in the classroom. This finding supports the previous findings that knowledge reinforcement and retention could be enhanced through DGBL integration (Coleman & Money, 2019; Purgina et al., 2019). This can be more easily achieved since the students feel exciting which in turn encourages them to be more motivated in learning (Alomari et al., 2019; Bawa, 2019; Bovermann et al., 2018; Chapman & Rich, 2018; Licorish et al., 2018; Lin et al., 2018; Taskiran, 2019; Zhang et al., 2019). Unfortunately, the potential role of DGBL was primarily hampered by insufficient facilities (e.g., unstable Internet connections) as reported by (Hébert et al., 2021; Koh et al., 2012). The availability of IT resources for the DGBL environment cannot be avoided whereas limited resources might lead to poor academic achievement (Oluremi & Olubukola, 2013). In addition, time pressure might disturb the students' focus during the gameplay as reported by Wang and Tahir (2020). Interestingly, one of the students felt distracted by the sound of the game. It reflects that the integration of DGBL does not always

affect students positively, and it is likely due to students' individual characteristics. Certain students with certain characteristics might even feel distracted and might not be able to concentrate because of certain features of digital games (Bolliger et al., 2015). In other words, the challenge in in DGBL integration might come from the intrinsic element of the digital games (moving elements, power-ups, sound effects, scores, animations, etc.) which may distract the players' concentration; thus, they cannot focus on the learning objectives (Calvo-Ferrer, 2015).

Further analysis revealed that there was no significant gender difference in the students' perceptions of the integration of DGBL. Regardless of gender, all students perceived DGBL positively, showing both male and female students were enthusiastic if they could play digital games in their learning activities. It is congruent with the finding of Chapman and Rich (2018). However, it is inconsistent with another report by Bolliger et al. (2015), contending that a significant difference was observed in students' perception based on gender. The different findings are likely to be due to the different sample sizes and research contexts. Furthermore, this study reported a significant difference based on the students' interest in playing digital games. This finding is in agreement with Bolliger et al. (2015), stating that individuals who spent more time playing games were likely to have a more positive perception of DGBL integration than those playing games less frequently. Regarding the criteria of good digital games, what the students expected is in line with the recommendations from a research review stating that the games must offer multiple learning tools and interesting tasks and materials following the students' needs and abilities so that they could explore and complete gaming and learning activities at the same time (Jabbar & Felicia, 2015).

From the teachers' side, it was found that teachers having experience in applying DGBL opined that digital games were applicable for any courses in ELT since they used the digital games for teaching English skills and components. It is proven by some studies reporting the positive impacts of digital games on grammar (Purgina et al., 2019) and writing courses (Lam et al., 2017; Zhang et al. (2019). In contrast,

teachers who had no experience in using DGBL were not digitally literate and did not like playing games. The findings indicated a strong positive correlation between teachers' use of mobile technologies for personal learning and their use in teaching (Lai & Smith, 2018). Furthermore, they thought that games were applicable only for language components to teach freshmen, while their courses were content-related courses that were not appropriate for a gamified learning environment. Inappropriate material was one of the external factors which might inhibit teachers from using ICT (Cosgun & Savaş, 2019). Teachers who did not have experience with new digital practices were likely reluctant to explore the potential role of digital games in their classrooms (Chik, 2011). Their reluctance might be due to a misplaced belief that digital games were beneficial only for motivating students, not improving the students' cognitive aspects (Persico et al., 2019). Concerning the challenges, most teachers admitted that access to technology is the major challenge in the integration of DGBL. This study confirms the previous finding that insufficient facilities could hamper the integration of ICT in general (Cosgun & Savaş, 2019) and especially in the DGBL environment (Hébert et al., 2021; Wang & Tahir, 2020). The distinct perspectives of experienced and non-experienced teachers in incorporating DGBL confirm that the way teachers perceive the integration of DGBL is affected by their teaching level, experience, and subject taught (Koh et al., 2012). The factors affecting the teachers' perception can be classified into personal, professional, institutional, and contextual factors (Mercader & Gairín, 2020).

Finally, to attain effective DGBL integration, some characteristics of good digital games were proposed by teachers. In general, effective digital games must match the learning objectives and materials, offer various types of questions, and provide complete and challenging features (e.g., explanation, time limit and levels). They also recommended friendly-user digital games in terms of ease of access and use. The teachers' expectations are in line with the recommendations from a previous research review. Digital games should provide various learning tools as well as interesting tasks and materials which match the students' needs and abilities so that they could explore and

complete gaming and learning activities at the same time (Jabbar & Felicia, 2015).

Conclusion

In general, EFL students and teachers mainly agree with the integration of digital game-based learning (DGBL) due to its benefits in terms of cognitive and affective aspects. Issues associated with limited IT resources imply a strong demand for facility improvement to create a digital learning environment. Meanwhile, to obtain the maximum benefits of DGBL, digital games must match the materials and offer variety as well as provide interesting features, while still friendly to users. If designed and applied appropriately, digital games can be adopted for all types of courses.

This study centred on the perception of students and teachers in the higher education context. Further research is expected to conduct a similar study involving younger students and school teachers in different levels of education (e.g. elementary, junior, and/or senior high school). Besides, this study considered only two moderating variables: gender and interest in playing digital games. Therefore, other influencing factors such as socio-economic background, age, motivation, frequency of playing digital games, and English proficiency levels need to be further explored.

Acknowledgement

The first author of this paper would like to thank *Lembaga Pengelola Dana Pendidikan/LPDP* (Indonesia Endowment Fund for Education), Ministry of Finance, Republic of Indonesia, for the doctoral scholarship award (grant number: 2020032120965).

References

Ab. Rahman, R., Ahmad, S., & Hashim, U. R. (2018). The effectiveness of gamification technique for higher education students engagement in polytechnic Muadzam Shah Pahang, Malaysia. *International Journal of Educational Technology in*

Higher Education, *15*(1), 41. https://doi.org/10.1186/s41239-018-0123-0

Abdul Jabbar, A. I., & Felicia, P. (2015). Gameplay engagement and learning in game-based learning: A systematic review. *Review of Educational Research*, *85*(4), 740–779. https://doi.org/10.3102/0034654315577210

Alomari, I., Al-Sammarraie, H., & Yousef, R. (2019). The role of gamification techniques in promoting student learning: A review and synthesis. *Journal of Information Technology Education: Research*, *18*, 395–417. https://doi.org/10.28945/4417

Bawa, P. (2019). Using Kahoot to inspire. *Journal of Educational Technology Systems*, *47*(3), 373–390. https://doi.org/10.1177/0047239518804173

Bolliger, D. U., Mills, D., White, J., & Kohyama, M. (2015). Japanese students' perceptions of digital game use for English-language learning in higher education. *Journal of Educational Computing Research*, *53*(3), 384–408. https://doi.org/10.1177/0735633115600806

Bovermann, K., Weidlich, J., & Bastiaens, T. (2018). Online learning readiness and attitudes towards gaming in gamified online learning – a mixed methods case study. *International Journal of Educational Technology in Higher Education*, *15*(1), 27. https://doi.org/10.1186/s41239-018-0107-0

Calvo-Ferrer, J. R. (2015). Educational games as stand-alone learning tools and their motivational effect on L2 vocabulary acquisition and perceived learning gains: Educational games for L2 vocabulary acquisition. *British Journal of Educational Technology*, *48*(2), 264–278. https://doi.org/10.1111/bjet.12387

Chang, C. Y., & Hwang, G. J. (2019). Trends in digital game-based learning in the mobile era: A systematic review of journal publications from 2007 to 2016. *International Journal of Mobile Learning and Organisation*, *13*(1), 68. https://doi.org/10.1504/IJMLO.2019.096468

Chang, W.-L., & Yeh, Y. (2021). A blended design of game-based learning for motivation, knowledge sharing and critical thinking enhancement. *Technology, Pedagogy and Education*, *30*(2), 271–285. https://doi.org/10.1080/1475939X.2021.1885482

Chapman, J. R., & Rich, P. J. (2018). Does educational gamification improve students' motivation? If so, which game elements work best? *Journal of Education for Business*, *93*(7), 314–321. https://doi.org/10.1080/08832323.2018.1490687

Chen, C.-H., Wang, K.-C., & Lin, Y.-H. (2015). The comparison of solitary and collaborative modes game-based learning on students' science learning and motivation. *Educational Technology & Society*, *18*(2), 237–248.

Chen, C.-H., Law, V., & Huang, K. (2019). The roles of engagement and competition on learner's performance and motivation in game-based science learning. *Educational Technology Research and Development*, *67*(4), 1003–1024. https://doi.org/10.1007/s11423-019-09670-7

Chen, C.-H., Shih, C.-C., & Law, V. (2020). The effects of competition in digital game-based learning (DGBL): A meta-analysis. *Educational Technology Research and Development*, *68*(4), 1855–1873. https://doi.org/10.1007/s11423-020-09794-1

Chen, Y.-L., & Hsu, C.-C. (2020). Self-regulated mobile game-based English learning in a virtual reality environment. *Computers & Education*, *154*, 103910. https://doi.org/10.1016/j.compedu.2020.103910

Chik, A. (2011). Digital gaming and social networking: English teachers' perceptions, attitudes and experiences. *Pedagogies: An International Journal*, *6*(2), 154–166. https://doi.org/10.1080/1554480X.2011.554625

Coleman, T. E., & Money, A. G. (2019). Student-centred digital game–based learning: A conceptual framework and survey of the state of the art. *Higher Education, 79*, 415-457. https://doi.org/10.1007/s10734-019-00417-0

Cosgun, G. E., & Savaş, P. (2019). Use of information and communication technology by in-service English teachers for

self-directed professional development. *Electronic Journal of Foreign Language Teaching*, *16*(2). 230–249.

Denzin, N. K., & Lincoln, Y. S. (2005). *Handbook of qualitative research* (3rd ed.). Sage.

Ebrahimzadeh, M., & Alavi, S. (2017). Digital video games: E-learning enjoyment as a predictor of vocabulary learning. *Electronic Journal of Foreign Language Teaching*, *14*(2), 145–158.

Hamari, J., Shernoff, D. J., Rowe, E., Coller, B., Asbell-Clarke, J., & Edwards, T. (2016). Challenging games help students learn: An empirical study on engagement, flow and immersion in game-based learning. *Computers in Human Behavior*, *54*, 170–179. https://doi.org/10.1016/j.chb.2015.07.045

Hébert, C., Jenson, J., & Terzopoulos, T. (2021). "Access to technology is the major challenge": Teacher perspectives on barriers to DGBL in K-12 classrooms. *E-Learning and Digital Media*, *18*(3), 307–324. https://doi.org/10.1177/2042753021995315

Hwang, G.-J., & Chen, P.-Y. (2022). Interweaving gaming and educational technologies: Clustering and forecasting the trends of game-based learning research by bibliometric and visual analysis. *Entertainment Computing*, *40*, 100459. https://doi.org/10.1016/j.entcom.2021.100459

Jabbar, A. I. A., & Felicia, P. (2015). Gameplay engagement and learning in game-based learning: A systematic review. *Review of Educational Research*, *85*(4), 740–779. https://doi.org/10.3102/0034654315577210

Kaimara, P., Fokides, E., Oikonomou, A., & Deliyannis, I. (2021). Potential barriers to the implementation of digital game-based learning in the classroom: Pre-service teachers' views. *Technology, Knowledge and Learning*, *26*(4), 825–844. https://doi.org/10.1007/s10758-021-09512-7

Kayl, H. (2008). Developing an ESL curriculum based on needs and situation analysis: A case study. *Journal of Language and Linguistic Studies*, *4*(1), 30–49.

Koh, E., Kin, Y. G., Wadhwa, B., & Lim, J. (2012). Teacher perceptions of games in Singapore schools. *Simulation &*

Gaming, *43*(1), 51–66. https://doi.org/10.1177/1046878111401839

Krouska, A., Troussas, C., & Sgouropoulou, C. (2022). Mobile game-based learning as a solution in COVID-19 era: Modeling the pedagogical affordance and student interactions. *Education and Information Technologies*, *27*(1), 229–241. https://doi.org/10.1007/s10639-021-10672-3

Lai, K.-W., & Smith, L. (2018). Socio-demographic factors relating to perception and use of mobile technologies in tertiary teaching. *British Journal of Educational Technology*, *49*(3), 492–504. https://doi.org/10.1111/bjet.12544

Lam, Y. W., Hew, K. F., & Chiu, K. F. (2017). Improving argumentative writing: Effects of a blended learning approach and gamification. *Language Learning & Technology*, *22*(1), 97–118. https://dx.doi.org/10125/44583

Lepper, M. R., & Henderlong, J. (2000). Turning "play" into "work" and "work" into "play": 25 years of research on intrinsic versus extrinsic motivation. In C. Sansone & J. Harackiewicz (Eds.), *Intrinsic and extrinsic motivation* (pp. 257–307). Elsevier. https://doi.org/10.1016/B978-012619070-0/50032-5

Licorish, S. A., Owen, H. E., Daniel, B., & George, J. L. (2018). Students' perception of Kahoot!'s influence on teaching and learning. *Research and Practice in Technology Enhanced Learning*, *13*(1), 9. https://doi.org/10.1186/s41039-018-0078-8

Lin, D. T. A., M., G., & Kaur, M. (2018). Kahoot! It: Gamification in higher education. *Pertanika Journal of Social Sciences & Humanities*, *26*(1), 565–582.

Mercader, C., & Gairín, J. (2020). University teachers' perception of barriers to the use of digital technologies: The importance of the academic discipline. *International Journal of Educational Technology in Higher Education*, *17*(1), 4. https://doi.org/10.1186/s41239-020-0182-x

Oluremi, F. D., & Olubukola, O. O. (2013). Impact of facilities on academic performance of students with special needs in mainstreamed public schools in Southwestern Nigeria, *Journal*

of Research in Special Educational Needs, *13*(2), 159–167. https://doi.org/10.1111/j.1471-3802.2011.01228.x

Persico, D., Passarelli, M., Pozzi, F., Earp, J., Dagnino, F. M., & Manganello, F. (2019). Meeting players where they are: Digital games and learning ecologies. *British Journal of Educational Technology*, *50*(4), 1687–1712. https://doi.org/10.1111/bjet.12777

Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the Horizon*, *9*(5), 1–6. https://doi.org/10.1108/10748120110424816

Pitarch, R. C. (2018). An approach to digital game-based learning: Video-games principles and applications in foreign language learning. *Journal of Language Teaching and Research*, *9*(6), 1147–1159. https://doi.org/10.17507/jltr.0906.04

Purgina, M., Mozgovoy, M., & Blake, J. (2019). WordBricks: Mobile technology and visual grammar formalism for gamification of natural language grammar acquisition. *Journal of Educational Computing Research*, *58*(1), 126–159. https://doi.org/10.1177/0735633119833010

Sanchez E. (2019) Game-Based Learning. In A. Tatnall (Ed.), *Encyclopedia of Education and Information Technologies*. Springer. https://doi.org/10.1007/978-3-319-60013-0_39-1

Sansone, C., & Thoman, D. B. (2005). Interest as the missing motivator in self-regulation. *European Psychologist*, *10*(3), 175–186. https://doi.org/10.1027/1016-9040.10.3.175

Sun, L., Ruokamo, H., Siklander, P., Li, B., & Devlin, K. (2021). Primary school students' perceptions of scaffolding in digital game-based learning in mathematics. *Learning, Culture and Social Interaction*, *28*, 100457. https://doi.org/10.1016/j.lcsi.2020.100457

Taskiran, A. (2019). The effect of augmented reality games on English as foreign language motivation. *E-Learning and Digital Media*, *16*(2), 122–135. https://doi.org/10.1177/2042753018817541

Tawafak, R. M., ALFarsi, G. M., Jabbar, J., Iqbal Malik, S., Mathew, R., AlSidiri, A., Shakir, M., & Romli, A. (2021). Impact of

technologies during Covid-19 Pandemic for improving behavior intention to use e-learning. *International Journal of Interactive Mobile Technologies (iJIM)*, *15*(01), 184–198. https://doi.org/10.3991/ijim.v15i01.17847

Touati, A., & Baek, Y. (2018). What leads to player's enjoyment and achievement in a mobile learning game? *Journal of Educational Computing Research*, *56*(3), 344–368. https://doi.org/10.1177/0735633117713022

Tsekleves, E., Cosmas, J., & Aggoun, A. (2016). Benefits, barriers and guideline recommendations for the implementation of serious games in education for stakeholders and policymakers. *British Journal of Educational Technology*, *47*(1), 164–183. https://doi.org/10.1111/bjet.12223

Wang, A. I., & Tahir, R. (2020). The effect of using Kahoot! for learning – A literature review. *Computers & Education*, *149*, 103818. https://doi.org/10.1016/j.compedu.2020.103818

Xu, Z., Chen, Z., Eutsler, L., Geng, Z., & Kogut, A. (2019). A scoping review of digital game-based technology on English language learning. *Educational Technology Research and Development*, *68*, 877–904. https://doi.org/10.1007/s11423-019-09702-2

Zhang, J., Rockwell, G., Graves, R., Graves, H., McKellar, M., & Ranaweera, K. (2019). Introduction to a class-based online writing environment: Gwrit (Game of Writing). *Digital Studies/Le Champ Numérique*, *9*(1), 5. https://doi.org/10.16995/dscn.301

Zou, D., Zhang, R., Xie, H., & Wang, F. L. (2021). Digital game-based learning of information literacy: Effects of gameplay modes on university students' learning performance, motivation, self-efficacy and flow experiences. *Australasian Journal of Educational Technology*, *37*(2), 152–170. https://doi.org/10.14742/ajet.6682