The Winding Path towards Implementing Digital Game-based Learning (DGBL) in an Educational Context: the Voices of Pre-service Teachers

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Abstract

There has been increasing interest in the implementation of digital game-based learning in language teaching contexts. This study used a mixed-methods design to unpack the attitudes of Iranian pre-service teachers of teaching English as a foreign language (TEFL) towards the implementation of digital game-based learning. Pre-service teachers of TEFL participated in the survey (n=101) and interviews (n=32). The construct of the questionnaire was validated using factor analysis. The results indicated that the pre-service teachers had favorable perspectives on DGBL. The participants perceived that DGBL could enhance collaborative and interactive learning, develop students' problem-solving skills, and create authentic language learning contexts. The perceived challenges of DGBL included teachers' lack of knowledge about DGBL, the lack of digital facilities in classes, and the lack of availability of suitable educational digital games. The participants believed that DGBL could be very effective for adolescents, effective for young learners, moderately effective for young adults, and slightly effective for adults. Regarding the language learning skills, it was perceived that the implementation of game-based learning could be very effective for teaching vocabulary and pronunciation, and effective for teaching speaking, listening, and grammar; however, the participants believed that digital games could be slightly effective for teaching reading comprehension and writing. In the interviews, the pre-service teachers pointed out that they had limited/no use of digital games in their teaching. The pre-service teachers proposed some suggestions for facilitating the implementation of DGBL. The suggestions include training teachers about the principles of digital game-based learning, equipping classes with the digital facilities required for digital game-based learning, engaging EFL teachers in digital game development projects, and fostering teachers' digital literacy levels. Factors such as the age of the learners, levels of proficiency, and teachers' and students' attitudes towards and readiness for DGBL were regarded as important in implementing DGBL. The study offers several implications for renewing current EFL courses and TEFL teacher training/education programs.

Keywords: TEFL; pre-service teachers; digital game-based learning; attitudes; implementation

Introduction

DGBL and the utilization of digital games for educational purposes have become the focus of attention of researchers and scholars of educational technology. Therefore, a large number of articles have been published in this field of research. In language learning contexts, the use of digital games has gained increasing popularity, therefore, researchers of computer-assisted language learning (CALL) have considered digital game-based language learning as an important research focus (Peterson, 2010). More specifically, CALL research has dealt with issues such as DGBL and young language learners (e.g. Sylvén & Sundqvist, 2012), DGBL and language learner autonomy (e.g. Chik, 2011), DGBL and communication (Wu, Chen, & Huang, 2014), DGBL and vocabulary learning (Ebrahimzadeh & Alavi, 2016), and DGBL and mobile-assisted language learning (MALL) (Kassem, 2018).

A considerable body of research has also been directed toward students' learning with the aid of digital games. Implementing DGBL needs the cooperation and positive responses of teachers. Equipping teachers with the competence of implementing DGBL can have a direct impact on incorporating digital games in educational settings. Having taken these issues into account, this study used a mixed-methods design to assess the current opportunities, affordances, and challenges of implementing DGBL in the language teaching context of Iran. Because research on pre-service teacher trainees' perspectives on the applicability of digital game-based learning is limited, this study can have pedagogical and theoretical implications for re-considering current English as a foreign language (EFL) courses in Iran and paving the way for creating more interactive learning environments in language teaching and learning contexts.

Theoretical framework

Integrating DGBL into educational curricula has been an important aim of many educational institutions and universities. One major step towards integrating DGBL in educational settings is to provide pre-service and in-service teachers with appropriate teacher training/education on the use of digital games in educational settings (Foster & Shah, 2020). In foreign language teaching contexts, the role of teacher education in raising EFL pre-service teachers' awareness of the potential of digital game-based learning is undeniable and important. Moreover, pre-service teachers' attitudes and behaviors regarding DGBL should be taken into account. Future (pre-service) teachers should receive proper instruction and training on how to use various digital tools, including digital games in their teacher education/training programs (Blume, 2019). Alyaz and Genc (2016) argue that when teachers are concerned about the use of digital games for teaching purposes, they are mostly worried about the pedagogical and technical challenges that DGBL might impose on them. They further suggest that teacher training programs are required to enable teachers to integrate DGBL into their pedagogy.

With regards to the principles of DGBL integration in teacher education programs, Foster and Shah (2020) point out some important principles based on the findings of previous research. The first principle suggests that teachers play pivotal roles in implementing DGBL. More specifically, teachers can play a mediating role in engaging students in game-based learning and accomplishing curricular goals and missions. The second principle refers to the fact that digital games are a part of the curriculum. This issue implies that teachers should be able to identify the limitations and strengths of each

digital game based on the specifications of educational curricula and be supported to adapt and improve digital games for their educational purposes. Therefore, when games are considered an integral part of the curriculum, teachers may play the most important roles in the selection, adaptation, and identification of suitable digital games.

The other considerable issue in support of game-based learning is that the use of digital games can facilitate the process of learning. Teachers should supervise the process of game-based learning before, during, and after using the digital game in the classroom. In this way, teachers can identify and accommodate learners' motivational, cognitive, emotional, and socio-cultural needs and requirements. In teacher training/education programs, teachers should learn how to take systematic and scientific procedures to teach with digital games effectively. The next principle provides insight into the fact that digital games should be used concerning contextual and pedagogical factors. Thus, teachers should have a clear understanding of the contextual and pedagogical factors which can result in the successful implementation of DGBL. More importantly, research has shown that teachers' competence to implement DGBL develops over time and gradually. Teacher education programs should take effective measures to establish long-term goals and plans to foster teachers' confidence and ability to use digital games, and their ability to combine DGBL with pedagogical and curricular goals. Finally, a change in teachers' identity should take place in teacher education programs. Teachers should consider DGBL as a part of their professional development process and promote their teaching identities after becoming able to teach with digital games effectively (Foster & Shah, 2020).

Integrating gamification in EFL instruction has also been the focus of attention in recent years. Implementing gamification in EFL instruction can have significant impacts on students' learning behaviors, cognitive ability, self-determination, interest, emotional status, and traits (Flores, 2015; Sailer et al., 2014). Moreover, developing gamified learning environments in EFL contexts can contribute to easier learning of language skills and more collaboration in the EFL class. Gamification enables EFL teachers to develop meaningful learning contexts and learning processes which "move away from just a game thinking mentality to a techno-constructivist mentality" (Flores, 2015, p. 50).

Research on digital game-based learning in EFL/TEFL contexts

Müller et al. (2018) used an experimental design to evaluate the effectiveness of a web-based game for learning English idioms. Two groups of EFL students from Japan and Iran took part in the study and played an idiom game called *Idiomatico*. The findings of the study indicated that the use of the game facilitated the learning of idioms for students in both contexts. The results also showed that attitudinal and motivational factors played a pivotal role in students' learning and acceptance of the game. In Saudi Arabia, Alamr (2019) explored teenagers' use of digital games for learning EFL. The findings indicated the positive and valuable effects of digital games on EFL students' perceptions. The kind of digital game was shown to affect students' learning achievement. Playing digital games had also an impact on students' social interaction levels and speaking and listening skills. Wu et al. (2014) assessed the effect of a digital task i.e. a collaborative board game platform on EFL students' learning gains. They reported that the students who played the digital game improved in terms of their communicative competence in

comparison to those who did not play the game. It was also revealed that the use of the digital game created an interactive environment for students in which they were able to foster their speaking skills. The study provided insight into the fact that collaborative learning through the use of digital games in the EFL classroom can have a positive effect on EFL students' learning achievement. Concerning the impact of games on EFL students' writing competence, Lin et al. (2018) suggested that the use of games along with implementing the flipped learning approach can have a positive effect on students' ability to write. Furthermore, those learners who learned in flipped learning environments had fewer writing mistakes and errors compared to those who attended traditional learning environments.

With regards to EFL teachers' attitudes towards DGBL, Li (2017) reported on the results of a mixed-methods study about 76 Chinese teachers of EFL. The findings illustrated that the EFL teachers held positive perspectives on the use of digital games for teaching EFL. The teachers participating in the study thought that using digital games could promote students' motivation levels and facilitate the process of vocabulary learning. However, incorporating digital games into the EFL syllabus/curriculum was a significant challenge. The teachers also stressed the removal of administrative and financial barriers to implementing DGBL in EFL contexts. In a similar study, Zohud (2019) investigated the potential of DGBL from the perspectives of Palestinian and Spanish teachers of EFL. Interviews and questionnaires were utilized for collecting the data. Results indicated that both Palestinian and Spanish teachers of EFL had favorable perceptions of the use of digital games for learning EFL. The findings also suggested that using digital games could help students learn English vocabulary items, increase students' motivation to learn new words, encourage independent and active learning in EFL students, and strengthen students' memorization skills. In contrast, the results showed that the teachers did not make use of digital games for their teaching and lacked the knowledge to use digital games for their teaching. Moreover, the younger teachers used digital games more frequently than the older teachers. More recently, Blume (2020) carried out a research study on German EFL pre-service teachers' attitudes towards and use of digital games for learning EFL. The results revealed the positive attitudes of pre-service teachers, but their limited/no use of digital games for teaching/learning EFL. Taufik et al. (2020) examined Indonesian EFL teachers' use of digital games in EFL courses. It was argued that only a few teachers were able to implement game-based learning in the EFL course. The majority of the EFL teachers were in favor of implementing game-based learning due to its benefits and advantages for EFL students. There were some limitations such as the internet connectivity and speed, the lack of class time, and the difficulty of training students on how to use the digital game.

Significance of the study

The integration of CALL and pedagogical applications of technology in EFL instruction have attracted tremendous attention (Dashtesani, 2016; Hong, 2010). Game-based learning and teacher education is a topic that has been mostly uninvestigated by EFL researchers. Furthermore, previous research has also emphasized the training of pre-service teacher trainees in game-based learning (Blume, 2020; Foster & Shah, 2020). Pre-service teacher trainees of TEFL in Iran should attend MA courses and receive formal

training/education. Since the study can have implications for teacher education courses of TEFL, pre-service teacher trainees who were studying the modern principles and theories of language teaching and pedagogy were considered for this study. The findings of the study can have implications for the renewal of the type of training/education pre-service teacher trainees receive. The findings of the study will enable TEFL decision-makers and teacher trainers/educators to adopt more modern and needs-based instruction for pre-service teacher trainees.

The literature on digital game-based learning shows that the majority of research findings are linked to the affordances and benefits of DGBL; however, research on the challenges of DGBL for pre-service teacher trainees is still lacking. The perspectives of pre-service teacher trainees, who are studying at the higher education level, can provide promising insights into the obstacles and limitations of DGBL. Having taken these issues into account, the present study was conducted to fill in this research gap and explore both the instructional, pragmatic, and attitudinal merits and limitations of implementing DGBL in the higher education context of Iran. The study can have applications and implications for the EFL context of Iran and many other contexts in which the use of digital games for educational purposes might be problematic and challenging.

Research questions

The present study explored five research questions relevant to digital game-based learning:

1. What were the Iranian TEFL pre-service teacher trainees' attitudes towards digital game-based language learning?
2. What were the Iranian TEFL pre-service teacher trainees' perspectives on the challenges of digital game-based language learning?
3. What were the Iranian TEFL pre-service teacher trainees' perspectives on the suitable student age range and language learning skills/sub-skills for effective implementation of digital game-based learning?
4. What were the Iranian TEFL pre-service teacher trainees' suggestions for integrating digital game-based learning into the language learning curriculum?
5. What were the Iranian TEFL pre-service teacher trainees' perspectives on factors affecting their adoption of game-based learning?

Methodology

A mixed-methods design was considered for this study. "Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e. g., use of qualitative and quantitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration" (Johnson et al., 2007, p. 123). Since peoples' attitudes are complex and complicated constructs, both qualitative and quantitative data sources should be collected to provide supplementary and confirmatory data. Findings that were confirmed by both instruments were reported in

this study. The triangulated data obtained from both instruments were considered to increase the credibility and validity of the findings of the study.

Participants

The participants of the survey study were 101 pre-service teachers who were MA students of TEFL studying at seven Iranian universities. The pre-service teachers had an age range of 25-32 years. Based on their reports, all the teachers knew the concept of digital games and had played at least one digital game before the time of the data collection. Those participants who had no prior experience in using digital games were excluded from the study. The sample comprised 65 female and 36 male pre-service teachers. From the same sample, a total of 32 pre-service teachers participated in the interviews. The participants reported that they had a moderate level of digital literacy. All the participants took part in the study voluntarily.

Instruments

Questionnaires were distributed among pre-service teachers of TEFL. The questionnaire was designed based on previous research about digital game-based learning(Bar, 2018; Berg Marklund, 2015; Blume, 2020; Flores, 2015; Foster & Shah 2020; Li, 2016; Sailer et al., 2014; Taufik et al., 2020). Apart from the demographic information, 63 items were included in the survey. Six factors were taken into account for constructing the instrument. The first factor analyzed the attitudes of pre-service teachers toward digital game-based learning (scales: *strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree*). The second factor explored the challenges of implementing digital game-based learning (scales: *not challenging at all, slightly challenging, undecided, challenging, and strongly challenging*). The third factor scrutinized the suitable student age range for effective digital game-based learning (scale: *not effective at all, slightly effective, moderately effective, effective, and very effective*). The fourth factor examined language learning skills suitable for effective game-based learning (scale: *not effective at all, slightly effective, moderately effective, effective, and very effective*). The fifth section dealt with suggestions for integrating digital game-based learning into the language learning curriculum (scales: *not important at all, slightly important, moderately important, important, and very important)*. The last factor sought factors affecting EFL teachers' adoption of game-based learning (scales: *not important at all, slightly important, moderately important, important, and very important*).

The reliability analysis (Table 1) showed that the questionnaire had a high level of consistency (Cronbach's Alpha=0.884). Moreover, exploratory factor analysis and the Cronbach's Alpha test were considered and run for each section, including the first section on attitudes of pre-service teachers towards digital game-based learning (KMO=0.767, Bartlett's test of sphericity=557.224, df=190, sig= 0.000, 6 factors), the second section on the challenges of implementing digital game-based learning (KMO=0.758, Bartlett's test of sphericity=287.491, df=91, sig=0.000, 5 factors), the third section on the suitable student age range for effective digital game-based learning(KMO=0.571, Bartlett's test of sphericity=88.162, df=6, sig=0.000, 2 factors), the fourth section on language learning skills suitable for effective game-based learning (KMO=0.714, Bartlett's test of sphericity=208.759, df=21, sig=0.000, 3 factors), the fifth

section on suggestions for integrating digital game-based learning in the language learning curriculum(KMO=0.834, Bartlett's test of sphericity=228.860, df=36, sig=0.000, 2 factors), and the last section on factors affecting EFL teachers' adoption of game-based learning(KMO=0.716, Bartlett's test of sphericity=123.924, df=36, sig=0.000, 3 factors). Acceptable reliability levels and factorial structures were achieved for each section of the questionnaire. Measures to ensure the content and face validity of the questionnaire were also taken into account.

Table 1
The reliability of the questionnaire sections

Section	Number of items	Cronbach's Alpha
1. Attitudes of pre-service teachers toward digital game-based learning	20	0.801
2. Challenges of implementing digital game-based learning	14	0.710
3. The suitable student age range for effective digital game-based	4	0.622
4. Language learning skills suitable for effective game-based learning	7	0. 605
5. Suggestions for integrating digital game-based learning in the language learning curriculum	9	0.805
6. Factors affecting EFL teachers' adoption of game-based learning	9	0.624

Furthermore, interview questions were written in line with the factors considered in the survey. The questions explored participants' attitudes towards digital game-based learning, challenges of implementing digital game-based learning, the appropriate student age for implementing digital game-based learning, the language skills suitable for implementing digital game-based learning, suggestions to facilitate the implementation of digital game-based learning, pre-service teachers' current use of digital games for educational purposes, and factors which affect the implementation of digital game-based learning. The content of the questions was validated by inviting three experts of educational technology and CALL to evaluate the content and appropriateness of the questions. The interviews were semi-structured.

The ethical issues related to the voluntary participation of the participants in the study and issues relevant to confidentiality were all included in a consent form and the

participants signed the consent form. The participants were told that the research data were used for research purposes and not any other purposes.

Data analysis

The results were presented using the mean and standard deviation for each item of the survey. The Cronbach's Alpha test was considered for reliability analyses. Exploratory factor analysis was also taken into account for the construct validation of the survey. The statistical software SPSS 16 was utilized for conducting quantitative analyses. The interviews were conducted and the content of the responses to each question was analyzed. Based on thematic analysis, the frequent themes were extracted and reported in the study.

Results

Attitudes towards digital game-based learning

The survey results

The results shown in Table 2 indicate the positive attitudes of pre-service teachers towards digital game-based learning. The teachers had a general agreement on some benefits of digital game-based learning such as enhancement of students' memory capacity, learning through problem-solving, promotion of students' critical thinking, consideration of different learning styles, creation of interactive learning environments, introduction of a variety into language teaching, provision of authentic learning, development of student-centered learning, increase of student engagement, increase of students' motivation, improvement of digital literacy, collaborative learning, learning by doing, opportunities for repeated practice, and improvement of students' social skills.

Table 2
TEFL pre-service teachers' attitudes towards digital game-based language learning

Survey items	Mean	SD
1. Using digital games in language teaching enhances students' memory capacity	4.00	0.762
2. Using digital games in language teaching helps students learn through problem-solving	4.11	0.747
3. Using digital games in language teaching fosters students' critical thinking skills	4.18	0.841

4. Different learning styles can be considered using digital games in language teaching	4.03	0.854
5. Using digital games in language teaching creates interactive learning environments	4.34	0.667
6. Using digital games in language teaching provides variety to teaching techniques/practices	3.99	0.714
7. Using digital games in language teaching provides authentic learning situations	4.07	0.828
8. Using digital games in language teaching strengthens student-centered learning	3.98	0.916
9. Adequate feedback can be provided using digital games in language teaching	3.35	1.161
10. Using digital games in language teaching can increase student engagement	4.21	0.697
11. Digital games can be easily included in the lesson plan	3.46	1.091
12. Using digital games in language teaching increases students' motivation for learning	4.05	0.887
13. Using digital games in language teaching promotes teachers'/students' digital literacy	4.13	0.757
14. Using digital games in language teaching reduces students' anxiety in the classroom	3.74	0.796
15. Digital games can be used with different language teaching methods/ approaches	3.86	0.895

16. Using digital games in language teaching encourages collaborative learning	4.33	0.763
17. Using digital games in language teaching provides teachers with tools to evaluate students in different ways	3.79	0.875
18. Students will learn by doing using digital games in language teaching	4.00	0.872
19. Using digital games in language teaching provides repeated practice for students	4.09	0.750
20. Using digital games in language teaching teaches students' social skills	4.18	0.841

Likert scales: 1. Strongly disagree; 2. Disagree; 3. Neither agree nor disagree; 4. Agree; 5. Strongly agree

The interview results

The interview results were generally in line with the results of the survey. The majority of the pre-service teacher trainees were positive about DGBL. They believed that DGBL could make language teaching more interactive and collaborative.

> *What I can say is that digital games are very useful tools for language teaching. Nowadays, I can see a wide range of digital games on the Internet and smartphones. Games can add more interaction to the EFL class and engage students with language learning tasks and activities in a more effective way. I am generally positive if digital games are to be used in the language learning context of Iran subject to solving some problems and limitations in this regard* (Pre-service Teacher Trainee 3).

They also mentioned that by implementing DGBL, language learning would be more authentic and close to real-life situations.

> *This is an interesting idea in my view. Digital games are used by our students, especially younger ones, in their real lives outside the constraints of the classroom. Based on my observations, students are very keen on playing digital games nowadays. Of course, there is a generation gap issue between our young students and us, but we should be willing to respond to this need of students which is digital game-based learning* (Pre-service Teacher Trainee 18).

The participants further pointed out that DGBL allowed students to learn using problem-solving skills and promoted discovery learning.

> *I play digital games myself and am interested in using them for recreational purposes. One important benefit of using digital games for EFL students is the fact that students can learn through problem-solving. Games can expose students to some problems and they should discover some solutions to solve the problems of the games* (Pre-service Teacher Trainee 22).

The participants also mentioned that the use of digital games could give EFL teachers more pedagogical and instructional options.

> *The EFL context of Iran is flourishing in my view. I think the use of some technologies such as digital games can improve the status quo and give more pedagogical opportunities to Iranian EFL teachers* (Pre-service Teacher Trainee 8).

Challenges of implementing digital game-based learning

The survey results

The findings related to the challenges of implementing digital game-based learning are illustrated in Table 3. The perceived challenges comprised unavailability of suitable digital games, teachers' unfamiliarity with digital games, learners' inability to use digital games, the lack of access to needs-specific digital games, cultural resistance to games as educational tools, the lack of required digital facilities in the classroom, the low digital literacy levels of teachers and students, the lack of involvement of teachers in the process of digital game development, educational directors' lack of attention to digital game-based learning, and teachers' lack of knowledge about digital game-based learning.

Table 3
TEFL pre-service teachers' perspectives on the challenges of digital game-based language learning

Survey items	Mean	SD
1. The combination of digital games with the language learning curriculum	3.10	1.338
2. Conformity of digital-based learning with teaching/learning objectives/goals	3.21	1.252
3. Unavailability of suitable digital games for language teaching/learning	4.11	0.747
4. Teachers' unfamiliarity with digital games	3.91	0.789

5. Learners' inability to use digital games	4.14	0.813
6. The lack of access to needs-specific digital games for language teaching	4.00	0.872
7. Cultural resistances to games used for educational purposes	4.30	0.6
8. The lack of digital facilities to use digital games in the class	4.12	0.765
9. The lack of enough learner debriefing about the educational aims of the game	3.22	1.270
10. The low digital literacy levels of teachers /students to use digital games for educational purposes	4.16	0.659
11. The lack of involvement of teachers in the process of digital game development	4.05	0.867
12. The lack of class time to allocate to the game-based learning	3.52	1.316
13. Educational directs' lack of attention to game-based learning	4.20	0.707
14. Teachers' lack of knowledge about Implementing digital game-based learning in language teaching contexts	4.31	0.612

Likert scales: 1. Not challenging at all; 2. Slightly challenging; 3. Undecided; 4. Challenging; 5. Strongly challenging

The interview results

The interview results indicated that the majority of the participants were aware of the potential challenges and limitations of DGBL. One challenge mentioned by the participants was their lack of knowledge about educational games and how to use them. They mentioned that they were not able to choose effective games for their teaching practices.

> *I believe that I am not competent enough to use digital games. I lack both pedagogical and technological knowledge on how to use digital games for my teaching purposes. I am of the opinion that digital games cannot be used when we,*

as teachers, are not competent enough on how to use them and how to integrate them into our teaching practices (Pre-service Teacher Trainee 4).

As a teacher, I do not know what type of digital game can be suitable for what type of purpose. For example, I do not know what digital games can be useful for fostering students' grammar knowledge. In my point of view, teachers must be aware of the potential of each type of digital game for improving students' achievement and learning (Pre-service Teacher Trainee 5).

The participants also complained that many educational games were unavailable for teachers and the available games were common games produced for entertainment purposes and not educational ones.

Are there suitable and scientifically-developed digital games for educational purposes? I doubt you can find quality ones in Iran. I suppose the first problem is that in our educational institutions access to digital games is not easy. I think institutions should have a repertoire of digital games which are suitable for educational purposes. I am dubious whether all common digital games can be used for language learning. I think we need to facilitate teachers' access to digital games in our educational system (Pre-service Teacher Trainee 17).

The participants also pointed out that EFL classes in Iran were not equipped with the digital facilities required for DGBL.

See! What I usually say here and there is that the first condition for using any technology is the provision of relevant digital facilities. No technology can be used without having the required facilities and equipment. Digital game-based learning is not an exception (Pre-service Teacher Trainee 30).

The suitable student age range for effective digital game-based learning

The survey results

Table 4 demonstrates the findings of the survey regarding the age range factor for implementing digital game-based learning. The results show that the pre-service teachers believed that digital game-based learning can be very effective for adolescents, and effective for young learners. However, it was reported that digital game-based learning can be moderately effective for young adults and slightly effective for adults.

Table 4

TEFL pre-service teachers' perspectives on the suitable student age for implementing digital game-based learning

Survey items	Mean	SD
1. Young learners (5-12 years old)	4.30	1.044
2. Adolescents (13-18 years old)	4.62	0.691
3. Young Adults (19 and 39)	3.90	1.072
4. Adults (older than 40 years old)	2.94	1.215

Likert scales: 1. Not effective at all; 2. Slightly effective; 3. Moderately effective; 4. Effective; 5. Very effective

The interview results

The majority of the participants believed that digital games could be most effectively used for younger students due to their high level of digital literacy and their increasing interest in using digital games.

> *Ideally, digital games are interesting for younger groups of learners. Of course, this does not mean that older learners cannot benefit from digital game-based learning, but they usually do not have enough ability and may be interested to use digital games and technology* (Pre-service Teacher Trainee 10)

The pre-service teacher trainees also reported that teenagers were the most interested students for whom DGBL can be implemented.

> *In my view, teenagers are really enthusiastic about digital games. They use them actively and commonly for fun and entertainment. They can be trained to use digital games for learning as well. Most teenagers are willing to learn about digital games* (Pre-service Teacher Trainee 32).

> *All my teenage students play digital games and talk about them every day. Using digital games for teaching these students is a very good idea. I am sure they'll welcome this idea too* (Pre-service Teacher Trainee 25).

Some participants also mentioned that subject to some training and awareness-raising, adults can take interest in using digital games as well.

> *Both adults and young learners like digital games. The games are designed for all age groups, but adults may need more training and focus to use and take interest in digital games. Young learners are gamers themselves and can adapt themselves*

to the conditions of digital game-based learning very quickly (Pre-service Teacher Trainee 6).

Language learning skills suitable for effective game-based learning

The survey results

Based on the findings of Table 5, the participants believed that the implementation of game-based learning can be very effective for teaching vocabulary and pronunciation. They also perceived that the use of digital games can be effective for teaching speaking, listening, and grammar. However, the participants reported that digital games can be slightly effective for teaching reading comprehension and writing.

Table 5
TEFL pre-service teachers' perspectives on language learning skills suitable for effective game-based learning

Survey items	Mean	SD
Using digital games for teaching:		
1. Reading comprehension	1.56	1.043
2. Listening	4.30	0.944
3. Speaking	4.44	0.877
4. Writing	1.81	1.426
5. Pronunciation	4.50	0.856
6. Grammar	4.32	0.927
7. Vocabulary	4.81	0.644

Likert scales: 1. Not effective at all; 2. Slightly effective; 3. Moderately effective; 4. Effective; 5. Very effective

The interview results

The majority of the participants believed that digital games could be most effectively used for teaching vocabulary, including idioms and collocations. They also perceived that grammar and pronunciation could be taught using digital games.

Digital games can be utilized for teaching vocabulary and lexical items. I have seen several applications linked to digital games on my mobile phone which can teach new vocabulary items to students in a very interactive and entertaining

manner. Other skills can also be considered such as grammar and pronunciation. I am not fully aware of the other language skills which can be promoted through the use of digital games (Pre-service Teacher Trainee 9).

Some participants mentioned that DGBL can be useful for teaching listening and speaking.

My impression is that digital games are applicable for teaching important skills of listening and speaking. Students can play digital games and talk to each other to solve the problems raised by the story of the game. Also, they can listen to each other and the characters who speak in the games. Therefore, these two skills are the ones that can be taken into account when delving into digital game-based learning (Pre-service Teacher Trainee 13).

The majority of the participants asserted that they did not use digital games for language teaching, while few of them mentioned that they used, and at times, encouraged learners to use some mobile-based digital games for fostering their vocabulary knowledge.

Even though I am aware digital games are important learning and teaching options, I usually do not use them for my teaching. I sometimes make my students motivated to use digital games available on their mobile devices in order to teach words (Pre-service Teacher Trainee 14).

Digital games are not included in my teaching practice in general. I have not thought about the reasons yet, but I cannot find a reason why not to use them for language learning (Pre-service Teacher Trainee 20).

Suggestions for integrating digital game-based learning in the language learning curriculum

The survey results

The values indicated in Table 6 show that the pre-service teachers had an agreement on the importance of almost all suggestions presented in the questionnaire. The suggestions include providing access to (new) digital games, engaging language teachers in digital game production/development, developing needs-specific digital games for different groups of students, training students on how to use digital games (for language learning), training teachers on how to use digital games (for language teaching), enhancing the quality of digital facilities in classrooms to enable teachers to use digital games, awareness-raining about the use of digital games for educational purposes, including game-based learning techniques/ principles in teacher training/education programs, and including digital games in mainstream textbooks/teaching materials.

Table 6
TEFL pre-service teachers' suggestions for integrating digital game-based learning in the language learning curriculum

Survey items	Mean	SD
1. Providing access to (new) digital games	4.21	0.712
2. Engaging language teachers in digital game production/development	4.09	0.776
3. Developing needs-specific digital games for different groups of students	4.06	0.661
4. Training students on how to use digital games (for language learning)	3.96	0.747
5. Training teachers on how to use digital games (for language teaching)	4.21	0.725
6. Enhancing the quality of digital facilities in classrooms to enable teachers to use digital games	4.24	0.619
7. Awareness-raining about the use of digital games for educational purposes	4.17	0. 736
8. Including game-based learning techniques/ principles in teacher training/education programs	4.17	0.722
9. Including digital games in mainstream textbooks/teaching materials	3.97	0.727

Likert scales: 1. Not important at all; 2. Slightly important; 3. Moderately important; 4. Important; 5. Very important

The interview results

The pre-service teacher trainees believed that they needed to know more about DGBL. They deemed that training on the principles of DGBL and fostering their digital literacy was an important measure to take.

> *Now, we experience various types of training and education. Digital game-based learning can be an interesting choice for many pre-service teacher trainees in my view. Digital game-based learning can make our future teaching practice exceptional and distinguished from other EFL teachers. I am eager to know more about it and think that without training and reflection, it's not possible to learn how to use digital games for teaching purposes* (Pre-service Teacher Trainee 27).

The participants mentioned that if educational games are to be developed, EFL teachers should cooperate with IT experts to produce such games

I want to add that digital games are produced by IT experts. Why aren't language teachers involved in this process? Well, we do not know much about technologies and IT, but can't we propose ideas on pedagogical and teaching methodological issues? I think this cooperation between teachers and IT experts can be promising and beneficial for the professional development of both parties (Pre-service Teacher Trainee 11).

Some participants argued that implementing DGBL was an institutional and contextual measure that needed the support and positive attitudes of students and educational directors as well.

Teachers are just one piece of the puzzle. More important than teachers might be educational decision-makers and course designers. Even students should be positive and willing for digital game-based learning. If all these stakeholders, including teachers, adopt positive attitudes towards digital game-based learning, its implementation will become possible and facile in my mind (Pre-service Teacher Trainee 28).

Equipping classes with the digital facilities required for digital game-based learning was another suggestion proposed by the participants.

What measure can be more important than equipping universities and institutions with digital tools and facilities? We must do this sooner (Pre-service Teacher Trainee 2).

Factors affecting EFL teachers' adoption of game-based learning

The survey results

Table 7 depicted that the participants regarded most of the factors presented in the survey as important. The perceived factors included the age of the learners, learners' levels of proficiency, learner's attitudes towards digital games, the type of language skill to be taught, institutional support for using digital games in language teaching, availability of suitable digital games, availability of digital facilities in the classroom, and compatibility of teaching objectives/goals with the use of the digital game

Table 7

TEFL pre-service teachers' perspectives on factors affecting EFL teachers' adoption of game-based learning

Survey items	Mean	SD
1. The age of the learners	4.25	0.684
2. Learners' levels of proficiency	4.07	0.765
3. Learner's attitudes towards digital games	3.94	0.822
4. The type of language skill to be taught	4.45	0.624
5. Type of language teaching method/ technique	3.23	1.139
6. Institutional support for using digital games in language teaching	4.31	0.797
7. Availability of suitable digital games	4.25	0.754
8. Availability of digital facilities in the classroom	4.27	0.760
9. Compatibility of teaching objectives/ goals with the use of the digital game	3.98	0.787

Likert scales: 1. Not important at all; 2. Slightly important; 3. Moderately important; 4. Important; 5. Very important

The interview results

The participants discussed that the age of the learner was the most important factor in considering digital game-based learning.

> *One factor that is of a high level of importance for me is age. Previously, we talked about age, but I emphasize that the age of the learner plays a major role in choosing and including digital games in language teaching and learning contexts* (Pre-service Teacher Trainee 26).

The level of proficiency was also perceived as important in choosing the right digital game for language teaching and learning.

Well, the age and proficiency levels of students are somewhat important. Perhaps, digital games are harder to use for some specific proficiency levels. I cannot say what levels are better ones, but I am aware it can be a factor (Pre-service Teacher Trainee 7).

The other perceived factor was the readiness of teachers and students to adopt DGBL.

I perceive that when teachers and students are not cognitively, emotionally, and technically prepared for using digital games in EFL contexts, it cannot be a proper choice. We must make teachers and students prepared. This is not a very hard undertaking though (Pre-service Teacher Trainee 15).

The attitudes of the society, educational directors, and students toward the educational use of games were also perceived to be important from the perspectives of the pre-service teacher trainees.

Many individuals see digital games as tools for having fun or spending free time. This is a matter of attitude. All teachers, students, and directors should have a more open-minded attitude toward digital game-based learning and admit the fact that digital games can be used for many purposes, including educational and language learning ones (Pre-service Teacher Trainee 19).

Discussion

The results of the study showed the favorable responses of Iranian pre-service teacher trainees of TEFL to the implementation of DGBL in language teaching contexts. This is an important finding which is commensurate with previous research on educational stakeholders' attitudes toward DGBL (e.g. An, 2018; Blume, 2020; Noraddin & Neo, 2014; Zohud, 2019). One perceived benefit of implementing DGBL was the opportunity to foster students' critical thinking skills and problem-solving. This finding is in accordance with previous research (e.g. An, 2018). Improving students' critical thinking and discovery learning competence can pave the way for the use of more interactive and innovative language teaching methods and techniques. Thus, DGBL is a beneficial tool to make the language classroom closer to the real lives of students. The other perceived benefit of implementing DGBL is collaborative learning. Many digital games are played in a multiple-player mode and students can easily play the game in small groups or pairs.

Despite the positive responses of pre-service teacher trainees, the implementation of DGBL was perceived to be challenging. The pre-service teacher trainees were aware of these limitations and challenges. This finding is in line with previous research on DGBL which showed the relevant challenges and limitations (e.g. Berg Marklund, 2015; Li, 2017; Taufik et al., 2019). The lack of knowledge about DGBL was an important obstacle pointed out both in the survey and interviews. The lack of knowledge or competence about the use of any technology can reduce pre-service teacher trainees' levels of self-confidence. The other challenge is the lack of access to suitable or needs-

specific digital games. Technologies cannot be successfully used when they are not accessible or the users do not have adequate knowledge or literacy to use them. It is recommended that future research focus on the knowledge types or competencies pre-service teacher trainees need to be equipped with to deal with the complexities of DGBL. The other perceived limitation was related to the issue that the pre-service teacher trainees raised concerns about the lack of educational digital games. Berg Marklund (2015) also argued that the production of educational games is more challenging than producing games for entertainment. Therefore, access to more educational digital games should be facilitated in language teaching contexts. More investigation is required to examine the challenges of developing educational digital games compared to digital games for entertainment purposes. Furthermore, the participants complained about the inadequate digital facilities in EFL classes. It is suggested that more effective measures be taken into account to facilitate the inclusion of digital games for language learning purposes.

Regarding the appropriate age range for implementing DGBL, the participants believed that adolescents are the group of students who can enjoy the benefits of DGBL more considerably than the other age groups. Younger learners might have a higher level of interest in the use of digital games since they have a high level of digital literacy. One impeding factor regarding using digital games for adult learners may be the low digital literacies of adults. Concerning the language learning skills suitable for DGBL, speaking, listening, and sub-skills were the preferred skills. It is important to take the perspectives and preferences of pre-service teacher trainees into account, while more empirical research is required to unpack the actual effect of DGBL on each language learning skill.

The participants also proposed some suggestions for the inclusion of DGBL in the language learning curriculum. Including the principles and techniques of DGBL in teacher training/education programs can be a motivating factor for language teachers. Training can be provided both on technical and technological aspects of digital games as well as pedagogical aspects. As An (2018) suggests, training on the use of digital games for educational purposes can enhance teachers' levels of self-efficacy and attitudes. The other suggestion was to improve the digital facilities in EFL classrooms. This is a crucial measure and prerequisite for implementing DGBL. At times, mobile technologies might be required for playing educational digital games. The most important suggestion may be the cooperation between IT experts and TEFL experts/teachers to develop and produce digital games for educational purposes. Currently, the majority of educational games are produced without taking into account the pedagogical context and knowledge of teachers. Institutions can support teachers to link them to educational game designers and producers. This cooperation can strengthen the pedagogical and technological validity of digital games produced for educational purposes. It is paramount that the suggestions made by the pre-service teacher trainees be taken into account and improvements be made in preparing the context for the successful implementation of DGBL. Contextual factors play a considerable role in the acceptance and successful implementation of DGBL. Further research is needed to be undertaken to unravel these contextual factors which might affect the attitudes of teachers and students in the language teaching context of Iran and other similar contexts.

Implications and limitations

The study was not without limitations. The first limitation was that EFL students could not be included in the study since they did not have adequate knowledge about the pedagogical aspects of DGBL. Educational directors were also invited to participate in the study, but due to the lack of access to most of them, it was not possible to include them in the study. The study explored the attitudes of pre-service teacher trainees; however, for conducting a more in-depth analysis of the actual status of DGBL, more experimental and longitudinal research studies should be conducted. More specifically, the findings of the study can be used for similar contexts, but generalizing the results to other contexts should be done with caution.

The study can have implications for curriculum developers, educational directors, materials developers, teachers, teacher educators, and students. Materials developers can use the findings of the study to focus their projects on the realistic needs and attitudes of teachers. Educational directors can also adopt a supportive approach to funding the development of educational digital games and encouraging language teachers to be involved in collaborative projects of digital game production. Curriculum developers and course designers can use the findings of the study to pave the way for removing contextual and perceptual factors and limitations of DGBL. EFL teachers can also plan pedagogical practices based on the findings of the study.

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