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Digital Game-Based Language Learning (DGBL): An Analysis of Polish and Spanish Teacher Candidates' Knowledge and Attitudes

Abstract

The digital gaming industry is experiencing rapid growth and presents significant potential for implementation in educational contexts. Despite a significant body of literature on Digital Game-Based Language Learning (DGBL), the focus has primarily been on students as game players rather than on teacher candidates as future educators. This study aimed to examine the attitudes and knowledge of 205 teacher candidates from Poland (n = 79) and Spain (n = 126) regarding digital games' potential for foreign language learning. Convenience sampling was used, and a mixed-method approach was taken to collect quantitative and qualitative data via pre-post surveys, digital game presentations, and class discussions. Participants undertook various DGBL activities and were grouped into teams to choose games for language learning, create infographics, and share their insights in a collaborative learning environment. Statistical analysis indicated differences in the first-time technology access and gameplay frequency between the Polish and Spanish cohorts. The Wilcoxon-signed rank test revealed a significant difference ($p \leq 0.05$) in two of the five scale dimensions: usefulness (U) and preference for digital games (PDG). The findings suggest that while teacher candidates hold a positive view of DGBL's potential, they lack practical knowledge of its implementation in the language classroom.

Keywords: digital games, language learning, teacher candidates, attitudes

The number of digital games and game players has been constantly increasing over the past few decades, as evident in recent studies (Baltezarević et al., 2018; Palma-Ruiz et al., 2020). Consequently, digital game-based language learning (DGBL) has been the focus of numerous studies (Reinders, 2012;

Godwin-Jones, 2014; Reinhardt, 2018; Sykes, 2018; Peterson et al., 2022). Some studies have concentrated on the impact of digital games on developing various language skills and components such as listening and speaking (Hwang et al., 2016; Wang & Han, 2021), reading and writing (Lee, 2019; Mazhar, 2019), grammar (Hashim, Rafiq, & Yunus, 2019; Kao, 2020), and vocabulary, particularly incidental vocabulary learning (Zou, Li, & Jin, 2021; Calvo-Ferrer & Belda-Medina, 2021). Other studies have explored the effect of digital games on student motivation, engagement, and interaction (Chen & Yang, 2013; Ebrahimzadeh & Alavi, 2016; Lorenset, 2017).

Research on the attitudes and knowledge of prospective teachers regarding digital games for language learning is limited, with only a few studies conducted on this topic (Chen et al., 2012; Alyaz & Genc, 2016; Belda-Medina & Calvo-Ferrer, 2022). Attitudes in this research refer to the teacher candidates' overall evaluation or opinion towards using digital games as a tool for language learning (An, 2018). It can encompass beliefs, feelings, and behaviors that shape their perception of digital games in education. Attitudes can be positive, negative, or neutral and can be influenced by various factors such as prior experience, cultural background, and personal preferences.

Given that young learners nowadays are frequent game players, it is crucial to investigate teacher candidates' knowledge and attitudes towards digital game-based language learning. This investigation is particularly relevant as teacher candidates need to learn how to incorporate digital games pedagogically into education, given their role as future educators. Therefore, there is a need to bridge the gap in understanding and help teacher candidates transition from young game players to effective educators who can integrate digital games into language learning effectively (Klimova & Kacetl, 2018; Belda-Medina & Calvo-Ferrer, 2022).

The number of studies about DGBL is constantly increasing, particularly those related to the integration of game-based apps (Hung et al., 2018; Chang & Hwang, 2019). Some authors have delved into the advantages, such as their wide availability and positive effect on student motivation (Gamlo, 2019), and their disadvantages, mainly limited functionality and lack of human interaction (Huang, Chang, & Wu, 2017). Although some teacher training programs nowadays include games and gamification in the curriculum, this area has been traditionally neglected, partly because it was deemed as non-fundamental to language learning and because in-service teachers lacked proper knowledge and formation (Emam & Roslin, 2021; Li & Lan, 2022). Today young students, who are often described as digital natives (Prensky, 2001), are constantly exposed to electronic devices and digital games.

Modern technology-oriented methods such as Connectivism (Downes, 2019) or Computer-Supported Collaborative Learning (Muñoz-Carril et al., 2021) propose new approaches and practices to help students and teachers reach

their goals in education. These are three modern methods that emphasize the importance of collaboration and networks in learning. The use of digital games in language learning can connect learners with authentic language use and provide them with opportunities to engage in language practice that is meaningful and relevant to their interests and experiences. Moreover, games can provide a platform for learners to collaborate and interact with each other, as well as with native speakers of the target language, which can create a network of connections that support language learning. Through these interactions, learners can receive feedback and guidance, which can enhance their language skills and knowledge. Therefore, the integration of DGBL in teacher training programs seems to be a necessary step in 21st-century education as pointed out in several works (Chen et al., 2012; Alyaz & Genc, 2016; Newcombe & Brick, 2017; Reinhardt, 2018; Casañ-Pitarch, 2018a).

This study aims to achieve three specific objectives. The first objective is to assess the existing knowledge of digital game-based language learning (DGBL) among language teacher candidates in two different settings, Poland (n = 79) and Spain (n = 126). The second objective is to compare the attitudes of the candidates towards the incorporation of digital games in language learning. The third objective is to measure the impact of a learning module on DGBL, coupled with student presentations, on the candidates' attitudes towards digital games. Teacher candidates play a crucial role in the integration of digital games as they will be responsible for designing and implementing language learning activities that incorporate these games. The comparison of two distinct settings will facilitate the identification of potential cultural differences that may affect the adoption and implementation of DGBL in the classroom. By assessing the existing knowledge on DGBL among language teacher candidates, this study can identify areas of strength and weakness, which can inform future training programs and curricula to better prepare teacher candidates for integrating digital games into language learning.

This research paper consists of four main sections: a literature review on attitudes toward Digital-Game Based Language Learning (DGBL), objectives and research questions, context and methodology, and results and conclusions. The literature review provides an overview of existing research on attitudes toward DGBL in language learning, including its potential benefits and challenges. The objectives and research questions aim to investigate the attitudes and perceptions of language learners and teacher candidates in the context of DGBL. The context and methodology section describes the participants, data collection methods, and data analysis techniques used in this study. The results section presents the findings of the study in terms of teacher candidates' attitudes toward the use of digital games in language learning after the intervention. Finally, the conclusions section summarizes the main findings of the study and advanced future research in the field of DGBL.

Attitudes toward Digital-Game Based Language Learning (DGBL)

One of the technological consequences of the COVID-19 impact worldwide was the unprecedented increase of digital games and gamers around the world (Şener, Yalçın, & Gulseven, 2021; Einav, 2022; Han et al., 2022). There is nowadays an increasing interest in DGBL as evidenced by the number of publications about the use of digital games in the foreign language classroom, particularly concerning vocabulary learning (Hung et al., 2018; Xu et al. 2020; Zou, Huang, & Xie, 2021; He, 2022). Digital games can be used to learn vocabulary in English through various methods such as explicit and implicit vocabulary instruction and they can be designed to promote active vocabulary use through tasks and challenges that require players to apply their vocabulary knowledge.

In our study, digital games are defined as any game on a console, handheld device, smartphone, or computer, including browser games, which enable one or multiple players to engage with the content primarily for entertainment purposes. The current study analyzes three types of games: educational games, commercial games, and game-based apps. Digital educational games or edugames are interactive games designed to achieve a specific learning outcome or educational objective. These games use game design elements to engage learners and provide a fun and immersive learning experience. Commercial Off-The-Shelf (COTS) games are pre-existing games that are commercially available for entertainment purposes, such as popular consoles or computer games. These games are not specifically designed for educational purposes but can be repurposed for language learning through various modifications and adaptations. Digital game-based apps are applications that use game design elements to enhance user engagement and motivate learning or skill development. These apps are specifically designed for mobile devices such as smartphones and tablets and can cover a wide range of topics, including language learning.

Several studies have indicated a positive view of digital games in game-based learning (Janakiraman, Watson, & Watson, 2018; Voulgari et al., 2020). The benefits of digital games were identified as cognitive skill development in areas such as problem-solving, risk-taking, and reasoning, as well as improved motivation and interaction in the learning process (Blumberg et al., 2019; Mayer, 2019). However, some studies also identified negative attitudes towards digital games and their integration in the classroom among in-service teachers, citing pedagogical inadequacies, distraction, and ineffective learning structure as reasons for the skepticism (Burston, 2014; Gilakjani & Leong, 2012; De Grove, Bourgonjon, & Van Looy, 2012). Pre-service foreign-language teachers showed positive attitudes towards digital games, but the main difficulty for them was the lack of practical knowledge and unawareness of effective peda-

gogical methods for integrating digital games into the classroom (Chen et al., 2012; Kruk, 2017; Kuru Gönen, 2019).

Digital games have the potential to facilitate student-centered learning, in which teachers act as facilitators, and students are encouraged to actively participate in their learning, engage in discussions, work collaboratively, and apply their knowledge in real-world situations. While gaming proficiency may involve skills such as strategy, quick decision-making, and problem-solving, effective teaching of English through digital games requires additional knowledge and skills related to pedagogy. Therefore, it is necessary to consider major curricular changes that incorporate gaming pedagogy (Sardone & Devlin-Scherer, 2009, p. 65). According to these authors, the integration of a digital game module in teacher education courses and alternative forms of educational technology can strengthen student motivation, enhance their innovation capability, and increase interaction (Sardone & Devlin-Scherer, 2010).

In regard to pre-service teachers' perceptions, Demirbilek, Yılmaz, and Tamer (2010, p. 720) revealed that the use of computer games during instruction, the features of the game, and the hardware and software infrastructure of the classroom influence instructors' and students' attitudes towards computer games. In a study among pre-service teachers of English as a foreign language, Blume (2020) demonstrated a positive correlation between game-playing and beliefs, and between game-playing frequency and the perceived usage of language learning strategies. The author collected information on students' experience with digital media for language learning, language proficiency, language learning strategies, digital game-playing habits, digital language learning practices, and their attitudes towards digital game-based language learning. The author concluded that no previous learning experience in digital games is better than a negative experience.

Obstacles to the effective integration of digital games in education include negative attitudes among some in-service teachers and a lack of technical and pedagogical support. Kaimara et al. (2021, p. 838) exposed that many current teachers perceive potential barriers such as the lack of financial resources, preference for traditional teaching methods and stereotypes about the value of digital games, lack of ICT training, lack of infrastructure, and lack of educational policy. Attitudes towards incorporating digital games in language learning are generally influenced by three primary factors: prior experience playing games, the opinion of influential people such as teachers and parents, and the perception of one's ability to use digital games effectively (Mertala, 2019; Fokides & Kaimara, 2020).

Regarding pedagogical approaches, Munkundan, Kalajahi, and Naghdipour (2014) analyzed the potential of adopting digital games in education from the scope of distinctive learning theories and game design principles. The authors conclude that teachers play a crucial role in selecting and employing digital

games for language learning. As a source of linguistic input, language teachers should carefully choose games that align with learning goals and cater to learners' needs. It is important for educators to continually challenge their skills and keep up with technological advancements to effectively integrate digital games into the classroom.

Prior research has suggested that pre-service language teachers tend to display a positive attitude towards incorporating digital games in foreign language classrooms. Despite this positive perception, digital games are not commonly included in teacher training programs, leading to a deficiency in experience and preparation among language teacher candidates (Kennedy-Clark, 2011; Hsieh & Wang, 2008). The integration of digital games in education in Spain has been gaining momentum and the educational authorities have recently shown interest in promoting their use in the classroom but the extent of the integration of digital games in education varies across different regions in Spain (Alonso-García et al., 2021). Teachers may distrust the use of digital games in education due to a lack of training, support, and personal biases against video games such as the distraction factor. In Poland, some educational institutions have incorporated gamification and digital games into their curricula, especially in technical studies, because they recognize that games can be effective in promoting student motivation; however, implementing a system that can fully engage and motivate students through games requires significant effort and design considerations but the main challenges arise from educational policymakers who may not be prepared to implement changes (Głowacki et al., 2018).

To address this issue, our study seeks to fill this gap by assessing the prior knowledge and attitudes towards digital games among language teacher candidates and comparing the results across two distinct educational settings, namely Poland and Spain.

Objectives and Questions

This research has three main objectives:

- To analyze technology ownership and interest among Polish and Spanish language teacher candidates;
- To measure their attitudes toward the integration of digital games in language learning from a comparative perspective;
- To evaluate the effect of using a learning module about DGBL on the teacher candidates' attitudes toward digital games as future educators.

The stated objectives align with the following research questions:

1. What is the technology ownership and interest among language teacher candidates from Poland and Spain?
2. How do the attitudes of language teacher candidates from Poland and Spain towards the integration of digital games in language learning compare with each other?
3. How does the use of a learning module about DGBL affect the attitudes of language teacher candidates from Poland and Spain towards digital games as future educators?

Context and Methodology

This two-month research study involved 205 EFL teacher candidates (n = 205) from two different universities, 79 from Poland (Pol. = 79) and 126 from Spain (Sp. = 126), all of whom were enrolled in their third year of college. The study was conducted using convenience sampling. Their English proficiency level ranged from B2 to C1 according to the Common European Framework of Reference (CEFR) (Council of Europe, 2001), with twelve students being native speakers (C2). All participants were taking a similar subject entitled Applied Linguistics at their respective universities, which was taught by the researchers, and the classes met twice a week for two-hour sessions for two months. The gender distribution was similar in both settings, with 75% female and 25% male students among the Polish students (n = 79) and 81% female and 19% male students among Spanish participants (n = 126). Regarding age, 97% of the Polish and 96% of the Spanish students were between the ages of 20 and 30.

During the two-month intervention, all participants were required to complete a learning module on DGBL. This module included reading two articles (Klimova & Kacetl, 2018; Sykes, 2018) and engaging in discussions about the benefits and challenges of incorporating digital games in language classrooms. In addition, participants were provided with videos and web links showcasing different games related to language learning.1 Additionally, there was a test based on Moodle content. The language of instruction was English, and the activities were identical for both Polish and Spanish students. To assess their understanding of the material, participants were asked to give a short collaborative presentation on DGBL, in which they explained the digital games they had selected and how they could be used for language learning.

[1] Three websites: *Real English for Gamer Learners* https://bit.ly/2H7T2pb, *The Best Video Games For Learning Languages* https://bit.ly/43WHUnF and *Edutopia* https://edut.to/3Lm5d3g.

Different instruments were used in this mixed-method research to gather quantitative and qualitative data. Quantitative data were collected through a pre-post survey administered on the first and last day of class. The pre-survey included four sections: the first one contained some socio-demographic information; the second integrated ten questions related to technology ownership and usage, including prior knowledge, frequency of use, and preference for digital games; the third section was related to confidence and interest in technology based on a validated scale by Lei (2009) for pre-service teachers; the fourth section was based on a scale by Bourgonjon et al. (2010) about attitudes toward digital games and contained 20 items specifically related to the use of digital games in education. It was divided into four dimensions: personal experience (EXP), usefulness (U), learning opportunities (LO), and preference for digital games (PDG). The post-survey included two sections: the first section incorporated five questions about the digital games presented in class; the second section replicated the last section of the pre-survey about participants' attitudes toward digital games based on Bourgonjon et al. (2010). Quantitative data were analyzed using the IBM SPSS 22 statistical software to determine whether there is a significant difference between the pre- and post-survey results and for descriptive statistics

Qualitative data were gathered through a semi-structured discussion during the last week of class. After the presentations, participants discussed the potential benefits and limitations of the games demonstrated in each educational setting and shared their insights about the games explained in class. One researcher led the discussion while the other transcribed the most important comments. Then, both researchers coded the student comments using thematic analysis (TA).

The study was conducted in accordance with the Declaration of Helsinki and following the regulations of both institutions for studies involving humans: the University of Alicante (Spain) (https://bit.ly/3yoLb05) and the Silesian University of Technology (Poland) (https://bit.ly/3NTz6Wr). The project adheres to ethical principles set out by both institutions, including specific regulations regarding requirements related to information, consent, anonymity, and the right to withdraw from the project. All participants gave written consent to use the data obtained for scientific purposes, and their names were omitted to ensure anonymity.

Results

The pre-survey results about technology ownership showed similar scores for both groups since all participants had a smartphone, and most of them had a laptop or tablet, and a computer as shown in Table 1. However, some differences between Polish and Spanish students emerged regarding first-time access to technology. Polish students indicated that they started to use electronic devices earlier than their Spanish counterparts (item #2). The results of the frequency of computer use were also similar with slightly higher scores among Spanish teacher candidates.

Table 1

Technology Ownership and Usage

Item	Choices	Polish (*n* = 79)	Spanish (*n* = 126)
1. Technology ownership	Computer (PC/Mac)	72.2%	69.7%
(several options)	Laptop or tablet	93.6%	92.5%
	Smartphone	100%	100%
2. Computer/smartphone first-time access	Early start (pre-school)	16.4%	6.3%
	Elementary school	81.3%	54,5%
	Secondary school	2.3%	39.2%
3. Computer usage per day (inc. class time)	< 1 h	0%	0%
	1–2 h	16.2%	4.7%
	2–3 h	19.7%	32.8%
	3–4 h	42.8%	39.9%
	4+	21.3%	22.6%

In terms of gameplay frequency per week (#1), the results showed that Polish students played games more frequently than the Spanish teacher candidates. Over 32% of the Spanish participants reported that they used to play games at an earlier age but do not play them now. Regarding game platforms (#2), both groups preferred using computers and tablets over other electronic devices. However, Spanish participants seemed to prefer the Nintendo platform over the PlayStation, whereas Polish students showed the opposite preference.

Table 2

Gameplay Frequency and Preferred Platform

Item	Choices	Polish (n = 79)	Spanish (n = 126)
1. Game play per week	Never	22.1%	32.2%
	< 1 h	18.5%	27.6%
	1–3 h	19.3%	18.5%
	3–5 h	12.4%	11.3%
	5+	27.7%	10.4%
2. Game platform	Nintendo	12.4%	44.2%
(several options)	Play Station	40.3%	33.1%
	XBOX	37.5%	6.4%
	PC/Mac	62.7%	53.7%
	Tablet	59.2%	77.2%
	Smartphone	12.3%	28.5%
	Other	11.8%	16.3%

Regarding participants' confidence and interest in technology, the pre-survey results yielded similar scores for most of the items, as shown in Table 3. A Mann-Whitney test for two independent samples revealed statistically significant differences ($p < 0.05$) in only two items: #6 ($p = .021$) and #7 ($p = .007$). As illustrated in Table 3, interest in technology was higher among Spanish participants, in contrast to more moderate scores among Polish students. Both groups indicated that they were self-confident (#4 & 10) and believed in the positive impact of technology on learning (#7 & 8), which is consistent with previous research findings (Lei, 2009; Rahimi & Yadollahi, 2011).

In contrast, participants did not support the idea, claimed by some in-service teachers in previous studies (Zhao & Frank, 2003), that technology could isolate students from one another (#5).

After completing the pre-survey, the teacher candidates were exposed to various materials about DGBL through a learning module in Moodle. During the first week, participants had to read two articles and visit different websites that provided information about the use of digital games in language learning. They then completed a questionnaire about the materials included in the learning module. The questionnaire was likely designed to evaluate the students' knowledge of how games can be used to teach language, including the types of games that can be used, the benefits and challenges of using games, and the strategies that can be employed to ensure effective learning through gaming.

Table 3

Confidence and Interest in Technology

	***N* = 205 α = .828**	**Polish (*N* = 79)**		**Spanish (*N* = 126)**		**Asymp. Sig (2-tailed)**
	Item	Mean	SD	Mean	SD	Z
1	Computers are generally reliable.	3.9	0.62	3.8	0.81	.706
2	The more technology you use, the more respect you will get from your peers.	2.2	0.83	2.4	1.17	.347
3	I feel comfortable using technology.	4.2	0.81	4.1	0.85	.728
4	I do well with computer technologies.	3.5	0.92	3.8	0.97	.128
5	Computers and related technologies will isolate students from one another.	2.5	0.88	2.7	1.05	.175
6	I am interested in computers and related technologies.	2.9	1.21	3.4	1.13	.021
7	I am interested in technologies that will help me learn more in the future.	3.5	1.10	4.0	0.87	.007
8	I believe that technologies can help me learn better.	4.1	0.76	4.1	0.90	.830
9	I can solve most of the problems when my computer doesn't work.	2.8	1.14	2.9	1.17	.574
10	I am confident in using technology in my learning.	3.7	0.87	3.8	1.01	.227

Next, all the participants were randomly arranged into teams of 4–5 members, and each team was required to select three different types of games: a commercial game, also known as commercial-off-the-shelf games (COTS), primarily designed for entertainment but used in this project for educational purposes; a serious game originally designed as a learning tool; and a game-based educational app. The teacher candidates were provided with a rubric designed to evaluate different digital games based on a five-point scale (interface, usability, engagement, and education value), which is presented in the Appendix.

During the 15-minute presentation, each team had to illustrate how the games they selected could be effectively used for language learning while their classmates were given some time to play those games using their laptops, tablets, and smartphones. The presentations contained a wide range of games

illustrating different genres and types. Some of the commercial games (COTS) selected were addressed to younger learners in elementary education, such as the social simulation game *Animal Crossing New Horizon*, the adventure puzzle game *Layton Brothers Mystery Room*, and the popular sandbox video game *Minecraft*. Others were more oriented to secondary education students, for example, the critically acclaimed episodic adventure game *Life is Strange*, the cinematic third-person thriller game *Detroit*, the strategic life simulation video game *The SIMS*, the 3D massively-multiplayer online action role-playing game (MMOARPG) *Lost Ark*, and the free-to-play (F2P) online multiplayer video game *Fortnite*. Some teams selected well-known COTS, such as the first-person shooter video games *Call of Duty* and *Fran Cry* 3, while others opted for action role-playing games (RPG)—*Bloodborne* and *Skyrim*, and action-adventure video games—*Assassins Creed II*.

In *Assassins Creed II*, language learners can focus on learning and memorizing vocabulary related to the historical settings. For example, learners can create a list of historical figures, events, and cultural elements mentioned in the game and practice their pronunciation and spelling of these terms. Additionally, learners can use the game's subtitles and dialogues to improve their listening and comprehension skills and learn new vocabulary in context. Another strategy for using Assassin's Creed is to focus on specialized vocabulary related to the assassin's tools and weapons. The game features a variety of weapons, such as swords, daggers, and crossbows, as well as tools like smoke bombs and grappling hooks.

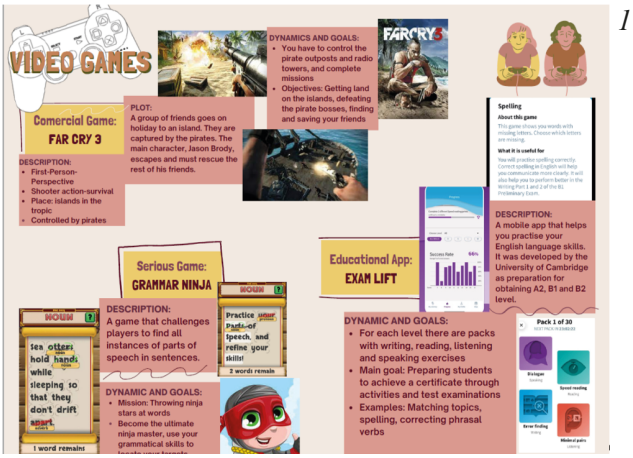
Some of the serious games mentioned, also known as edugames, were mostly addressed to children. For example, *Guess Who*? for basic sounds, *Papua Learn English* for pronunciation, *Little Chatterbox* and *Mingoville* for pronunciation and vocabulary, *Little Mouse's Encyclopedia* and *Guess Up* for vocabulary development, and *Grammar Ninja* for learning grammar. A few games were proposed for more advanced learners, such as *It's a Deal* to learn some English business vocabulary and *Alchemy Lab* for scientific vocabulary. Participants highlighted some of the potential benefits of using edugames, such as increased motivation and enhanced interaction, which are in line with previous works (Westera, 2019; Chen & Hsu, 2020).

Concerning game-based apps, some examples were *Brainpop* for reading and listening, *Wordwall* and *Wordle* for vocabulary building, *Bubbles* for vocabulary and reading comprehension, *Buddy.ai* for listening and speaking, and *Exam Lift* for all four skills. Two teams explained the affordances and limitations of the language learning app *Memrise*, and the language exchange app *Hello Talk*, while others opted for apps with social networking options such as *Madlipz*, which lets its users dub their favorite series or animations and share them online. Consistent with previous research, dictionary and lexical apps

appeared to be the most popular applications among students (Nami, 2020). Figure 1 shows three examples of infographics created by the participants.

Figure 1

Infographics about Digital Games Created by Teacher Candidates. Permission to Reproduce the Images below Granted by: Sandra Abad (1), Kaoutar Smaili (2), Victor Marrahi (3)



The last week after the presentations, all participants completed a post-survey with two sections. The first section included four questions about students' satisfaction with the digital games and class presentations. The second section replicated the same questions included in the third section of the pre-survey, which aimed to measure teacher candidates' attitudes toward digital games before and after the intervention. This section was based on a validated scale by

Bourgonjon et al. (2010) and consisted of 20 items arranged in four dimensions: experience (EXP), usefulness (U), learning opportunities (LO), and preference for digital games (PDG), as shown in Table 4.

The results of the pre-survey indicated some inter-group differences. Polish participants reported (#4) playing games less frequently than people their age, but still more often than their Spanish counterparts (M = 1.7 and M = 2.1, respectively). Additionally, they supported the idea (#16) that digital games provide opportunities for critical thinking (M = 3.6), as demonstrated in previous studies (Hewett, Zeng, & Pletcher, 2020). On the other hand, Spanish students gave stronger support for the effect of using digital games on the self-controlled learning process (#12) (M = 3.5) and the motivating effect of digital games on the learning process (#17) (M = 4.1), both in the Learning Opportunities (LO) section. The three items in the Preference for Digital Games (PDG) section yielded higher scores among Spanish teacher candidates (#18–20), which might be surprising given that they played less frequently than their Polish counterparts. However, the novelty factor may play a critical role in this case, as suggested in previous research (Sánchez-Mena, Martí-Parreño, & Miquel-Romero, 2019).

In the post-survey results, the inter-group differences observed in the pre-survey decreased in all sections, particularly those items previously analyzed (#4, 12, 16–20).

Table 4

Attitudes about the Use of Digital Games for Language Learning

	***n* = 205 α = .955**	**Polish (*n* = 79)**		**Spanish (*n* = 126)**	
		Pre	Post	Pre	Post
EXP	1. I like digital games.	3.5	3.5	3.5	3.6
	2. I like playing digital games.	3.4	3.5	3.5	3.6
	3. I often play digital games.	2.5	2.7	2.5	2.6
	4. Compared to people of my age, I play a lot of digital games.	2.1	2.2	1.7	1.8
	5. I would describe myself as a gamer.	2.0	2.2	1.7	1.9
	6. I play different types of digital games.	2.3	2.4	2.3	2.5
U	7. Using digital games in the classroom would improve my performance.	2.6	3.7	2.7	3.4
	8. Using digital games in the classroom would improve my learning productivity.	2.9	3.9	3.0	3.5
	9. Using digital games in the classroom would improve my effectiveness.	2.6	4.0	3.0	3.6

	n = 205 α = .955	Polish (*n* = 79)		Spanish (*n* = 126)	
	10. Using digital games in the classroom would help me to achieve better grades.	2.5	3.9	2.9	3.6
LO	11. Digital games offer opportunities to experiment with knowledge.	3.5	3.6	3.6	3.7
	12. Digital games offer opportunities to take control over the learning process.	3.0	3.4	3.5	3.6
	13. Digital games offer opportunities to experience things you learn about.	3.6	3.7	3.7	3.7
	14. Video games offer opportunities to stimulate transfer between various subjects.	3.1	3.6	3.6	3.7
	15. Digital games offer opportunities to interact with other students.	3.3	3.9	3.8	3.9
	16. Digital games offer opportunities to think critically.	3.1	3.6	3.3	3.5
	17. Digital games offer opportunities to motivate students.	3.4	4.0	4.1	4.3
PDG	18. If I had the choice, I would choose to follow courses in which digital games are used.	2.7	3.9	3.1	3.7
	19. If I had to vote, I would vote in favor of using digital games in the classroom.	3.0	4.0	3.4	3.8
	20. I would like to use more digital games in my classes.	3.0	3.9	3.4	3.9

The Wilcoxon signed-rank test was used to compare the non-parametric data obtained for both groups and determine the existence of any statistically significant intra-group differences before (pre-) and after (post-) the intervention. Consistent with previous studies (Belda-Medina & Calvo-Ferrer, 2022), the analysis revealed significant differences ($p < 0.05$) in the usefulness (U) and preference for digital games (PDG) sections, indicating that participants' attitudes towards digital games were more positive after the intervention. Moreover, the differences in the LO section results were more pronounced (#14–17) among the Polish participants.

Table 5

Attitudes about Digital Games before and after the Intervention

	***n* = 205**	**Polish (*n* = 79)**		**Spanish (*n* = 126)**	
	Item	**Z**	**Asymp. Sig. (2-tailed)**	**Z**	**Asymp. Sig. (2-tailed)**
EXP	1	-1,433[b]	.163	-1,414[b]	.157
	2	-,816[b]	.414	-1,732[b]	.083
	3	-1,000[b]	.317	-1,523[b]	.136
	4	-1,414[b]	.157	-1,438[b]	.163
	5	-,577[b]	.564	-1,238[b]	.081
	6	-1,633[b]	-102	-2,449[b]	.093
U	7	-6,286[b]	.000	-7,458[b]	.000
	8	-6,141[b]	.002	-6,136[b]	.003
	9	-6,730[b]	.001	-6,954[b]	.002
	10	-6,771[b]	.001	-6,517[b]	.002
LO	11	-,253[c]	.800	-1,414[b]	.128
	12	-,413[c]	.680	-2,104[b]	.157
	13	-,060[c]	.952	-,333[b]	.739
	14	-2,111[b]	.035	-,447[b]	.655
	15	-3,000[b]	.023	-1,414[b]	.153
	16	-2,121[b]	.034	-1,000[b]	.317
	17	-5,391[b]	.001	-4,971[b]	.012
PDG	18	-6,357[b]	.002	-6,094[b]	.002
	19	-6,329[b]	.002	-5,529[b]	.013
	20	-6,216[b]	.002	-5,909[b]	.017

Qualitative data were gathered through class discussions. In the last week, Polish and Spanish participants engaged in a semi-structured discussion. The instructors later summarized the most relevant comments and codified the students' insights into main themes through thematic analysis. Some of the language skills that can be taught through the use of digital games include reading, writing, listening, speaking, and vocabulary acquisition. For reading, video games can offer an immersive and interactive environment where players have to read and comprehend text to progress through the game. Games like

The Elder Scrolls V: Skyrim and *The Witcher 3: Wild Hunt* provide engaging and challenging narratives that require players to read and understand the story to complete quests and advance through the game. For listening and speaking, language learners can benefit from games like *Overwatch* and *Fortnite*, which provide voice chat features that allow players to communicate with each other in real time. By participating in voice chat, language learners can practice their speaking and listening skills in a fun and authentic context. In terms of writing skills, video games allow players to create and design their games, worlds, and narratives. For example, *Minecraft* and *Roblox* are popular games that allow players to design and create their virtual worlds and stories, which require them to practice their writing skills.

Teacher candidates identified various benefits of using digital games in language learning, with "interaction" emerging as a primary theme, as demonstrated in Table 6 (P182, P38, P124). In particular, online multiplayer games have provided students with opportunities to communicate in English with other players worldwide, including native speakers. This finding is consistent with previous research on willingness to communicate (Horowitz, 2019). Additionally, Spanish participants noted the usefulness of digital games for learning vocabulary (P182). Despite these benefits, both groups acknowledged that some in-service teachers often overlook the potential of digital games as a learning tool and suggested introducing such games in the classroom (P96). A few teacher candidates also acknowledged the potential for digital games to serve as a distraction (P124), which is consistent with previous research (Casañ-Pitarch, 2018b). Ultimately, participants concluded that the adoption of digital games in the language classroom could provide three key benefits: enjoyment, enhanced motivation, and autonomous learning. This conclusion is consistent with prior research findings (Belda-Medina & Calvo-Ferrer, 2022).

Table 6

Participants' Comments on Using Digital Games for Language Learning

Participant	Theme	Comment
182 (Sp, f)	Vocabulary learning & interaction	It can be interesting, especially from the point of view of vocabulary learning, since you can learn a lot of specific vocabulary related to the games that you play. Besides, if they are multiplayer games, you may have the opportunity to speak to English native speakers.
61 (Pol, m)	Critical thinking	In my opinion, learning through video games opens up a lot of interesting opportunities. Games allow us to interact with content on different levels, it can help us think critically, think logically. It can teach us problem-solving. I think learning in general could benefit from incorporating more games in it.

Participant	Theme	Comment
96 (Sp, m)	Effectiveness	I've been playing video games since I was five years old. I'm a PC gamer and I've always liked video games, but as I've grown up my gaming time has been decreasing. I think video games are a very interesting and effective way to learn. I have learned and improved my language skills and intuition through video games.
38 (Pol, m)	Usefulness and interaction	For me, using video games in learning English is very useful. I have some personal experience with that and I think there's no better way to learn some phrases or vocabulary specific to a given subject than to immerse in the world of a game. Games require constant focus, unlike other media such as movies or even books. The strongest quality of games in this matter is that they are interactive and this is a great possibility because in this entertainment that they provide the knowledge can be delivered in a pleasant way.
21 (Pol, f)	Listening and vocabulary	I believe that games can teach us new vocabulary from various fields. Games are often available in many languages and we can turn on subtitles, so that we can visualize the spoken words and understand them better. Even though we may not know a certain word, we can understand it from the context depending on what's happening on the screen. We can learn new slang words and collocations.
124 (Sp, f)	Motivation & distraction	I think it is a good idea to encourage learning in class and the concepts are learned faster. However, they can also be distracting.

Conclusions

Three main conclusions can be drawn from this study. First, the results of the study on technology ownership among language learners showed no differences between Polish and Spanish participants. However, it was found that Polish students had their first access to electronic devices earlier and had a higher frequency of gameplay. All participants demonstrated high confidence and a strong interest in technology integration in education. The finding suggests that factors such as unequal access to technology and variation in usage frequency during early developmental stages may not have a significant influence on the level of interest exhibited by adult college students, which is consistent with previous results (Chen et al., 2012; Kruk, 2017; Barr, 2018).

Second, it was observed that both Spanish and Polish teacher candidates had limited knowledge of the pedagogical applications of digital games in language learning. Despite identifying themselves as gamers, they lacked pedagogical knowledge on the fundamental aspects of game-based learning. A teacher

candidate with limited teaching experience may struggle to determine how to align the learning objectives and outcomes of children and young learners with certain games. For example, they may encounter difficulties in aligning game content with curriculum standards, balancing game-based learning with traditional instruction, and ensuring effective use of technology, depending on each student's needs. However, after engaging in a learning module on DGBL and participating in team presentations, they gained valuable insights on the use of diverse digital games, including commercial and educational games, for various purposes such as intentional and incidental vocabulary acquisition. Notably, this was the first experience for all participants to complete a learning module on DGBL. Therefore, it is suggested that teacher training programs should be updated to integrate DGBL into their curricula and provide better preparation for future educators in transitioning from game players during childhood to game implementers in their teaching careers, as highlighted in previous literature (Foster & Shah, 2020; Belda-Medina & Calvo-Ferrer, 2022).

The third finding of this study is that the intervention, which involved a learning module and student presentations, had a significant impact on teacher candidates' attitudes towards DGBL, as evidenced by the pre-post-survey results. Consistent with prior research (Belda-Medina & Calvo-Ferrer, 2022), statistically significant differences were observed in the dimensions of usefulness (U) and preference for digital games (PDG) among both groups. Furthermore, it was found that teacher candidates' perceptions of the usefulness of digital games in language learning were similar across educational settings, despite the lack of formal training in this area. This finding is in line with previous studies (Blume, 2020; Dashtestani, 2022) that highlight the effectiveness of digital games as a learning tool, particularly in collaborative learning environments (Kaimara et al., 2022), due to their interactive features and motivational effects.

The results of the study showed that the digital game-based language learning module was effective in increasing participants' knowledge and changing their attitudes towards digital games for language learning. Specifically, the post-intervention survey results showed a statistically significant increase in participants' positive attitudes towards the use of digital games for language learning, as well as an increase in their perceived knowledge of how to effectively integrate digital games into their teaching practice. Based on these findings, universities looking to implement similar interventions should consider incorporating collaborative learning components, and provide opportunities for participants to explore and choose games that are relevant to their teaching contexts.

The limitations of this research are mainly due to the participants' varying levels of prior knowledge and experience with digital games. The study did not consider differences in the types of digital games that participants had experience with, which could have influenced their preferences and perceptions

of DGBL's effectiveness for language learning. Additionally, the study did not assess the frequency and duration of participants' digital game usage, which may have impacted their perceptions towards the educational value of digital games. Further research should be conducted in diverse educational settings and with different types of games to compare their effectiveness on language proficiency, engagement, and motivation. The study should involve pre-service teachers who not only have familiarity with digital games but also possess the pedagogical knowledge and skills required to implement them effectively. In conclusion, it is essential to revise the curriculum to include digital games in language learning and incorporate them into teacher training programs to ensure that upcoming educators have the necessary knowledge and skills to use digital games in the language learning process.

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Appendix

Attitudes towards Video Games

Rubric used to evaluate digital games for language learning

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Needs Improvement (2)	Poor (1)
Educational Value	The game is educationally valuable and suitable for language learning as it supports the acquisition of language skills and aligns with the learning objectives.	The game has some educational value and is quite appropriate for language learning. It aligns with some learning objectives and supports the acquisition of some language skills.	The game has limited educational value and is somewhat appropriate for language learning. It partially aligns with learning objectives.	The game has marginal educational value and is not appropriate for language learning. It aligns with only a few learning objectives.	The game has no educational value and is completely inappropriate for language learning.
Engagement	The game is highly engaging, incorporating feedback, rewards, and challenges to motivate players to continue playing.	The game is quite engaging and motivates players to continue playing. It incorporates some elements such as feedback, rewards, and challenges.	The game has limited engagement and is somewhat motivating for players. It incorporates few elements.	The game lacks engagement and is not motivating for players to continue playing. It incorporates few elements.	The game is completely disengaging and does not motivate players to continue playing.
Usability	The game is user-friendly with clear controls and instructions, accessible to all skill levels, and accommodates diverse learning style.	The game is quite easy to use and navigate, with adequate instructions and controls. It is accessible to most players of varying skill levels.	The game has limited usability and is somewhat difficult to use and navigate. It has unclear instructions and controls.	The game lacks usability and is difficult to use and navigate. It has unclear instructions and controls that may limit accessibility for most players.	The game is completely unusable and has no instructions. It is inaccessible to most players.
Interface	The game's audiovisuals are high-quality and appropriate for the target audience, enhancing educational value and engagement.	Good audiovisuals that support language learning and are somewhat appropriate for the game's target audience.	The audiovisuals are fair and they partially support language learning.	Poor quality audiovisuals that do not support language learning and are not appropriate for the game's	No audiovisuals or inappropriate audiovisuals that detract from language learning.