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Impact of Digital Resources on ESP Academic Performance

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ABSTRACT

Technology, constantly present in current society and education, needs to make use of the most effective digital resources to optimize the teaching-learning process. Despite the growing body of literature on the pedagogical effectiveness of digital resources in a second language (L2) context, limited research has been conducted when working with English for specific purposes, especially with the tourism sector. To this end, this research aims to determine whether the implementation of digital resources with game mechanics improves students' academic performance in face-to-face university contexts. A study was conducted for 4 months with ESP Tourism students ($n = 145$) using a quasi-experimental design to compare the use of traditional resources and the employment of digital resources with game mechanics (Nearpod and Quizizz) and digital platforms (Prezi and Genially) on their academic performance. The results show that students obtained better results when using digital resources than with traditional resources (textbook). Furthermore, when using digital game-based resources, students performed better than when working with digital platforms. Thus, this study contributes to the scientific community by presenting a practical proposal that demonstrates the effectiveness of digital game-based resources in the ESP face-to-face university classroom.

1 | Introduction

In contemporary society, technology permeates every facet of daily life, from communication and entertainment to healthcare and business operations (Levin and Mamlok 2021). As Gobble (2018) states, digital transformation presupposes an accelerated and strategic impact on society. This pervasive influence of technology and digital transformation necessitates its inclusion in educational contexts to ensure that students are not only consumers of technology but also proficient users and creators. The integration of learning and knowledge technologies, alongside digital resources such as platforms and educational games, has become increasingly significant in higher education (Nikou and Aavakare 2021). Despite many universities developing digital strategies using technological tools, they do not seem to be always effectively implemented (Castro et al. 2020). However, when using suitable pedagogies, the use of digital resources seems to improve students' learning experiences and environments, which also promote students' engagement in the classroom (Santos and Bocheco 2017). Engagement has proven to increase motivation and achievement (Reeve and Lee 2014), retention (Bonet and Walters 2016), and even greater course satisfaction (Culver 2010). Thus, technology must be seen as a tool that promotes students' learning (Wekerle and Kollar 2022) in both online and face-to-face educational environments. This innovative teaching approach aims to promote learning in which students are active participants in their learning while enhancing their problem-solving, critical thinking (Chang and Yeh 2021), and digital skills (Van Laar et al. 2020).

The employment of digital resources implies the implementation of active methodologies that host these resources in the most optimal way. New learning scenarios need to take place in order to guarantee the most profitable teaching–learning outcomes. The employment of game-play mechanics (e.g., leader boards, achievements, points, badges, feedback, rewards, and

levels) can have an impact on users' behavior (Anagnostopoulou et al. 2018), psychological, and behavioral outcomes (Koivisto and Hamari 2019), intrinsic motivation, autonomy, and competence (Sailer et al. 2017). On the one hand, it provides a suitable framework for utilizing digital resources in a stress-free environment, inside and outside of the classroom. On the other hand, it enables students to develop their digital skills, one of the cornerstones of today's education and professional development (Molnár et al. 2022).

The question that arises is whether the utilization of technological resources in the university classroom enhances students' academic performance and whether there is a difference between digital platforms and games regarding academic outcomes. The findings from this study provide empirical evidence to the theoretical framework and offer educational implications that can optimize student learning and instructional practices.

2 | Digital Competencies in Education

Digital learning ecosystems, increasingly entrenched in education, aim to meet the demands of contemporary societies immersed in a digitalization process that seeks, among other goals, to establish interdisciplinary knowledge networks (Nguyen and Tuamsuk 2022). Consequently, students must develop the appropriate competencies to ensure their integration into a technologically demanding society, given the quantity and quality of digital resources it handles, and be prepared citizens whose social and professional activities result from meticulous reflection in a continuous process of learning. According to the Council of the European Union (European Union 2018), digital competence is one of the essential skills for lifelong learning that must be promoted in higher education for both students (DigComp) and teachers (DigCompEdu. Redecler. 2017). If one of the main objectives of universities is to equip students with the appropriate competencies that guarantee their professional success, the instruction they receive during their education process requires a mandatory change in the roles of teacher and learner. Thus, the teacher's role in the classroom is transforming from a mere transmitter of information and knowledge, as traditionally conceived, to a guide who assists the learner in making decisions on how to enhance their learning process (Strelan et al. 2020). Within this educational landscape, self-regulated learning becomes a fundamental strategy since it can improve learning outcomes and behavior, motivation, strategies, and metacognitive learning (Ma and Chiu 2024).

The effectiveness of self-regulated learning depends on practicing self-regulation strategies, which should be guided by the teacher until the student has acquired sufficient skill to become autonomous (Costa and García 2017; Teng 2022). In this regard, techniques such as feedback are crucial for promoting self-control and responsibility in the student's cognitive maturation process, aiming to enable them to control, develop, or evaluate the strategies they acquire. The primary objectives to achieve would be: (i) effectiveness in developing dynamic learning processes (acquisition of metacognitive, cognitive, and behavioral skills); (ii) the increase of conditional knowledge (selection of strategies that ensure task success based on when, how, and for what purpose); and (iii) the motivation to use strategies that facilitate achieving the desired goals. To this end, the development of information and communication technologies (ICT) and learning and knowledge technologies (LKT) provides teachers and learners with tools that facilitate this form of learning through software that creates learning spaces and activities promoting this teaching model. Additionally, they provide a digital learning environment which consolidates students' knowledge and fosters the development of crucial skills (Samoylenko et al. 2022).

2.1 | Digital Game Mechanics for ESP

Educational digital games employed in university settings have emerged as a transformative approach that aligns with contemporary pedagogical strategies. As Reinhardt and Sykes (2014) stated, games and play dynamics have significantly increased educational domains. It is necessary to distinguish between (i) game-enhanced perspective, which investigates how commercial games can be used in L2 learning in formal pedagogical environments; (ii) game-based perspective, which focuses on the application of digital games exclusively designed for pedagogical purposes; and (iii) game-informed perspective or gamification, which applies games to teach and learn outside of traditional game spaces. As higher education evolves, it is imperative to explore innovative approaches that enhance student engagement, motivation, and learning outcomes. Educational games, especially when provided with game mechanics under the game-based perspective, become a promising solution since they foster an interactive and immersive learning environment. Through educational game-based resources, students feel captivated and maintain their interest (Shohel et al. 2022). Contrary to traditional lectures and conventional methodologies, where interaction is limited, digital game-based resources present learning material in an interactive and dynamic format that can stimulate students' curiosity and sustain their attention (Zeng et al. 2020). According to Gee (2003), games naturally incorporate different elements, such as challenges, feedback, and rewards, which are key features to maintain students' engagement by shifting the students' role from passive recipients of information to active participants in their learning. Through simulations, role-playing, and problem-solving scenarios, digital game-based resources provide a hands-on learning experience that encourages critical thinking and application of knowledge (Gillian and Zarraonandia 2018). They can effectively work to apply theoretical knowledge in practical scenarios, bridging the class experience with real-world practice, facilitating experiential learning (Zhao et al. 2022), and hence, better preparing students for their future professional careers.

According to Gee (2003), games develop high-quality learning. Research has shown that digital game-based resources foster collaboration among students, creativity, and problem-solving (Fergurson et al. 2019). Current research on the subject (Alenezi 2023; Chaidi and Drigas 2022) shows that their use improves meaningful and autonomous learning inside and outside of the classrooms, which promotes students' self-regulation. In addition, the collaborative nature of many of these resources can be classified under the umbrella of constructivist learning theory, which posits that knowledge

is constructed through social interaction (Vygotsky 1978). Multiplayer and cooperative gaming frameworks require students to work together, communicate effectively, and solve problems together, thereby enhancing their collaborative and communication skills (Kwiatkowska and Wiśniewska-Nogaj 2022), critical competencies in the modern workforce (Johnson et al. 2016).

Digital natives like getting immediate feedback, which is a backbone of digital game-based resources and allows students to recognize and correct mistakes in real time, offering instant feedback through in-game responses and performance analytics. Moreover, they also cater to a variety of learning styles since they offer a multimodal approach that makes them accessible to a broad range of students, regardless of their preferred learning style (El-Sabagh 2021). Certain applications can significantly enhance student interaction, with Nearpod being a prominent example. Nearpod is an interactive learning platform that offers features such as polls, quizzes, interactive videos, and collaborative tasks (Sarginson and McPherson 2021). This platform can be utilized both synchronously and asynchronously, providing an appropriate environment to transition from lecture-based instruction to individual or group activities (Pérez 2017). Rios-Zaruma et al. (2019) demonstrated that Nearpod helped to develop an active and collaborative learning environment between the teacher and the students and effectively facilitated student interaction, engagement, and real-time assessment, and Mokhtari et al. (2021) stated that it increased academic performance, attention, and motivation. Albdullah et al. (2022) identified it as an efficient tool to enhance students' motivation and interest, which results in a better academic performance and provides effective assessment since, upon the conclusion of sessions, Nearpod generates a comprehensive report detailing all activities, including student responses and scores, levels of participation, and interactions (Burton 2019).

In addition, Quizizz is a multiplayer quiz game that exemplifies active pedagogy. It facilitates learning evaluations and learning materials, with music and picture features that make the activities more enjoyable and can stimulate students' interest, which may have a positive effect on students' learning outcomes (Handayani et al. 2024). Educators design quizzes, which students then access through a code or PIN on their mobile devices, engaging with questions with game mechanics (providing points, scores and levels according to the correct number of questions and the speed when answering them). The platform includes features such as question prompts displayed on mobile devices, assignment capabilities, integration with Google Classroom, and the incorporation of avatars and motivational memes, all of which enhance the gaming experience and increase student engagement (Carrión 2022), which may lead to higher academic performance. Katemba and Sinuhaji (2021) applied the ESA (engage, study, and activate) approach using Quizizz to teach EFL vocabulary, showing quantitatively significant differences between the control and the experimental group that used Quizizz regarding the acquisition and use of the newly studied vocabulary. According to Aini et al. (2024), Quizizz can create alternative, creative, and innovative lessons that raise students' motivation, which directly impacts on an increasement of students' learning outcomes. Since it provides a wide range of game characteristics like avatars, themes, memes, and music, apart from the competitive component, where students can see a live ranking on the leaderboard, they feel motivated and engaged in the activity, enhancing the study (Zhao 2019).

Interactive platforms also represent a dynamic intersection of technology and pedagogy, offering engaging and effective learning experiences. As universities strive to meet the demands of a diverse and technologically adept student population, the integration of these platforms has become increasingly essential. Educational digital platforms provide unparalleled accessibility and flexibility, allowing students to engage with course materials anytime and anywhere. This flexibility is particularly beneficial for nontraditional students, such as working professionals and those with family commitments, who may struggle to attend traditional in-person classes. According to a study by Allen and Seaman (2017), online learning platforms have significantly increased enrollment in higher education by making education more accessible. Platforms like Genially, Prezi, and Canvas enable students to access lectures, readings, and assignments at their convenience, thus accommodating diverse schedules and learning paces. This personalized approach enhances learning efficiency and outcomes by ensuring that students receive targeted support and resources. Pugliese (2016) demonstrated that adaptive learning platforms significantly improve student performance by customizing learning pathways based on real-time data. Moreover, digital platforms help to materialize cohesive and flexible blended learning, combining face-to-face instruction with online components. For instance, Prezi is a tool that allows users to create, deliver, and store online presentations (Ustun 2019). It provides a large blank workplace in which users can use a wide range of components, being one of its main features the zooming component (Settle et al. 2011), which creates a sense of movement effect (Bean 2012) to present concepts, ideas, and connections by integrating texts, images, audios, animations, and videos in an animated virtual space (Moulton et al. 2017). Strasser (2014) classified the benefits of Prezi into four categories: (i) creativity when designing dynamic and attractive presentations; (ii) relationships: to allow users to make conceptual connections between the different parts of the presentation and the topic itself. Presentations can be designed to show the linear or nonlinear sequences of concepts, which help students understand the physical, logical, and hierarchical relationships of the connected groups; (iii) visualization: users can customize the presentations with different fonts, colors, and visual aids (images, videos, animation, and audio); and (iv) collaboration: users can collaboratively, synchronously, or asynchronously work on their presentations and easily share them with other users. However, inexperienced users might get confused with the overexploitation of Prezi's zooming capabilities (Diamond 2010). Research has been conducted to check the suitability of Prezi in educational settings: Al-Hammouri (2018) found improvements in academic performance when employing Prezi compared to traditional teaching, and Mokhtari et al. (2021) stated that it helped to increase students' academic performance, attention, and motivation.

Another example of an effective digital platform is Genially since it facilitates the creation of visual and interactive content, capturing students' attention through customizable visual designs (Tapia-Machuca et al. 2020) in a memorable educational experience (Tutillo-Piña et al. 2020). By

incorporating creative and dynamic elements, it engages users through exploration and discovery, thereby enhancing content retention (Domínguez-Parrales 2024). Research, such as Cabrera-Solano's (2022), demonstrates improvements in academic performance among university students when employing Genially in class. Cabrera-Solano (2022) argued that students using Genially significantly increased their academic performance in terms of EFL grammar and vocabulary mastery, and Castillo-Cuesta (2022) pinpointed that the employment of Genially fostered the development of EFL reading and writing, reporting significant differences and higher academic scores when this platform was utilized.

Education and classroom practices need to reflect today's society (Aguiar et al. 2019) through the use of active methodologies and resources that adapt to the current societal needs (Rodríguez-Hoyos et al. 2021). The use of digital platforms and digital game-based resources can help students improve, on the one hand, their communicative skills in English for specific purposes, and on the other, their professional skills. While developing their communicative competence, they will learn how to handle future professional endeavors in the digital era. Empirical studies have consistently demonstrated the positive impact of digital resources on learning outcomes. For instance, a study by PISA (2018) found that students who use digital devices for educational purposes tend to perform better in reading, mathematics, and science. Furthermore, the use of digital tools has been shown to support differentiated instruction, allowing educators to tailor learning experiences to individual student needs (Tomlinson 2001). This personalization is crucial in addressing diverse learning styles and fostering inclusive educational environments. In the ESP context, the use of digital resources has substantially increased, such as the use of virtual reality to create an entirely digital environment or augmented reality to enhance reality with digital resources (Bonner and Reinders 2018), serious games (Pappa and Papadima-Sophocleous 2019; Supuran and Sturza 2017), the use of social media (Plutino 2017; Rosell-Aguilar 2018), or gamification (Boeru 2023). Khan (2019) stated that eLearning tools help engineering students learn ESP, which will facilitate their future professional skills. However, no research has been found on the impact of the utilization of digital platforms and digital game-based resources on academic performance in the English for tourism classroom.

Consequently, the main objective of this study was to evaluate whether the use of technological resources improves the academic performance of university tourism ESP students in a face-to-face context. Current research (Alenezi 2023; Alshammary and Alhalafawy 2022; Pugliese 2016; Sahin and Coban 2020) suggests that digitized university instruction leads to improved academic performance, among other benefits. Therefore, the specific objectives of this study are:

1. To examine the differences in academic performance between the use of digital resources and traditional teaching (lecturing) in higher education.
2. To analyze the differences in academic performance between the use of digital platforms and digital game-based resources in higher education.

Based on a review of the literature and the stated objectives, the following hypotheses are proposed:

Hypothesis 1. *Academic performance is significantly better when digital resources are used rather than with traditional teaching (without digital resources) in higher education.*

Hypothesis 2. *The use of digital game-based resources enhances academic performance more than the use of digital platforms in higher education.*

3 | Methodology

3.1 | Design

This research adopts a quantitative approach with a quasi-experimental design, utilizing academic performance in tests as the metric. A group of university students was used as both the control and experimental group. Specifically, these students first received traditional instruction without digital resources for 3 weeks, followed by instruction incorporating digital resources over a 12-week period (3 weeks per each of the four resources). The digital resources included two platforms (Genially and Prezi) and two digital game-based resources (Quizizz and Nearpod). The order of the four digital resources was randomized, and each resource was used for 3 weeks. Consequently, the study spanned 15 weeks, from September 4 to December 15, during the 2023–2024 academic year.

Initially, academic grades were collected over the 3 weeks of traditional teaching without digital resources, with one test administered each week. Subsequently, digital resources were introduced, alternating every 3 weeks (Prezi, Genially, Quizizz, and Nearpod), with weekly tests to measure academic performance.

The independent variable is the teaching methodology: traditional (without digital resources), digital platforms, and digital game-based resources. The dependent variable is academic performance, measured by test scores across the different teaching methods.

3.2 | Participants

The sample was selected incidentally and nonprobabilistically, based on accessibility to all first-year students enrolled in English I, in the bachelor's degree program of Tourism at a public university in Spain. Out of 156 students, 145 completed all tests, constituting the final sample (30% male, 70% female). The majority (89%) were aged 17–22, and 11% were over 23, with all participants being native Spanish speakers.

Selection criteria included consent to participate, completion of all weekly tests, and regular class attendance. Students were informed about the study's purpose beforehand, and the study adhered to the Helsinki Declaration's guidelines. Most students had no prior experience with the digital platforms and games used in the study, despite all of them knowing how to use technological gadgets, especially their cell phones.

3.3 | Data Collection and Materials

Data collection is conducted from September to December to evaluate whether the use of technological resources improves the ESP academic performance of university students in a face-to-face setting. The instruments used include *ad hoc* tests based on the course syllabus, differentiated by the use and type of digital resources. All tests are administered in the same way to all students, maintaining uniformity in the number of questions and multiple-choice format, and difficulty. The grading scale for all tests ranges from 0 to 10 points, with 0–4.99 points indicating a fail, 5–5.99 a pass, 6–6.99 satisfactory, 7–8.99 good, and 9–10 excellent. To validate the assessments measuring the academic performance of the *ad* hoc content, content validity was established through a review by three university professors selected as expert judges for their specialized knowledge in the subject area. These judges assessed each test item, indicating agreement or disagreement with its relevance and clarity. Subsequently, a Kappa coefficient was calculated to determine inter-rater reliability, yielding an adequate value of 0.85.

The tests are as follows:

Traditional Test: Comprising three tests, the average score of which constitutes the final grade (one test per week, weeks 1–3). Each test contains 10 multiple-choice questions with one correct answer; each correct answer is worth one point and incorrect answers are worth zero points. The score range is 0–10 points.

Digital Platform Test: Comprising six tests, the average score of which constitutes the final grade (one test per week). The tests are divided as follows:

- Prezi (Weeks 4–6): 10 multiple-choice questions with one correct answer; each correct answer is worth one point. Score ranges from 0 to 10 points.
- Genially (premium version) (Weeks 7–9): 10 multiple-choice questions with one correct answer; each correct answer is worth one point. Score ranges from 0 to 10 points.

Digital Game-Based Resources Test: Comprising six tests, the average score of which constitutes the final grade (one test per week). The tests are divided as follows:

- Quizizz (Weeks 10–12): 10 multiple-choice questions with one correct answer; each correct answer is worth one point. Scores range from 0 to 10 points.
- Nearpod (premium version) (Weeks 13–15): 10 multiple-choice questions with one correct answer; each correct answer is worth one point. Scores range from 0 to 10 points.

3.4 | Procedure

First, necessary permissions were obtained to conduct the research in the relevant university course. Second, the tests were planned, and the digital resources were randomized. In September, the academic year began, and students were informed about the research, providing their voluntary consent. The course was taught over 15 weeks, divided into 3 weeks each for traditional teaching (exclusively using the textbook), digital platform Prezi, digital platform Genially, digital game-based resource Quizizz, and digital game-based resource Nearpod. The sequence of digital resources was selected for convenience, beginning with digital platforms (randomly assigned, with Prezi being the first) and followed by digital games (also assigned randomly, starting with Quizizz). The contents taught through traditional teaching were vocabulary (accommodation, describing pieces of art) and grammar (relative clauses), and through digital game-based resources were vocabulary (travel collocations, travel agencies, personality adjectives, work vocabulary, describing places) and grammar (verbs following by to infinitive or gerund, verb tenses, conditionals, modal verbs, direct and indirect questions).

The instructor and class schedule remained consistent for all students to eliminate biases, with classrooms meeting proper ventilation and lighting standards. Data confidentiality was ensured, following the criteria of the Declaration of Helsinki. When using the traditional methods, the instructor followed the guidelines provided by the textbook (Clare et al. 2023), following basically the Communicative Language Teaching methodology, whereas when using the digital games, the instructor followed the principles of Game-Based Learning (Gentile et al. 2014).

3.5 | Data Analysis

The descriptive analysis of the data from all tests was conducted using the mean and standard deviation. Subsequently, the normality of the variables was assessed using the Kolmogorov–Smirnov test, which revealed that none of the variables were normally distributed ($p = 0.00$), as all were below $p < 0.05$. This necessitates the use of nonparametric tests such as the Wilcoxon signed-rank test within the same sample to perform inferential analysis of the variables and compare academic performance across traditional teaching, digital platforms, and digital game-based resources.

To control for the effects of confounding variables and avoid biasing the results, the effects of gender and age were controlled using the Mann–Whitney *U* test. Statistical analyses were conducted with SPSS (IBM 2016), and the nonparametric effect size was calculated using the Common Language Effect Size (CLES) (McGraw and Wong 1992). A significance level of $p < 0.05$ was used for all analyses.

4 | Results

The results of the descriptive statistical analysis are presented in Table 1, with means and standard deviations. Grading criteria are on a scale from 0 to 10 points: 0–4.99 fail, 5–5.99 pass, 6–6.99 satisfactory, 7–8.99 good, and 9–10 excellent. The data indicate that the academic performance of university students in the course is not very positive, nearly passing with traditional teaching (4.78 points out of 10) and passing with digital

TABLE 1 | Descriptive results of traditional teaching and digital resources.

Variables	*M*	SD
Traditional teaching (no digital resources)	4.78	2.45
Digital platform	5.11	2.24
Prezi	5.00	2.51
Genially	5.23	2.74
Digital game-based resources	5.65	2.54
Quizizz	5.68	2.76
Nearpod	5.62	2.83
Total digital resources	5.38	2.31

TABLE 2 | Complementary inferential results by gender and age.

	Genre		Age	
Variables	*U*	*p*	*U*	*p*
Traditional teaching (no digital resources)	1.430	0.231	1.215	0.270
Digital platform	0.360	0.548	0.112	0.737
Prezi	0.182	0.668	0.200	0.751
Genially	0.062	0.802	0.467	0.494
Digital game-based resources	0.707	0.400	0.448	0.503
Quizizz	0.474	0.491	1.597	0.206
Nearpod	0.918	0.337	0.222	0.636
Total digital resources	0.203	0.652	0.306	0.580

*$p < 0.05$.

resources (5.38 points out of 10). Additionally, the academic performance of students using both digital platforms (5.11 point out of 10) and digital game-based resources (5.65 points out of 10) can be improved from the pass level. Regardless of the type of platform or digital game-based resource used, the academic grade remains at the pass level. Regarding data variability, academic performance consistency showed slight decimal differences across instruction types, although performance was marginally more consistent when considering digital resources as a whole, which surpassed that of traditional instruction.

When analyzing frequencies, in traditional teaching, 38% of students are at a fail level, 30% at pass, 29% at good, and 3% at excellent. With digital resources, 30% are at fail, 10% at pass, 34% at satisfactory, and 26% at good. Using digital platforms, 34.5% are at fail, 16% at pass, 31.1% at satisfactory, and 18.5% at good. With digital game-based resources, 30% are at fail, 10% at pass, 20% at satisfactory, 36.5% at good, and 3.5% at excellent.

The inferential analysis using the Wilcoxon signed-rank test indicates significant differences in academic performance between traditional teaching and teaching with total digital resources (Prezi, Genially, Quizziz, and Nearpod) ($W = 3.091$, $p = 0.002$, effect size = 0.322) in favor of digital resources, and between traditional teaching and teaching with digital game-based resources (Quizziz, and Nearpod) ($W = 3.949$, $p = 0.000$, effect size = 0.379) in favor of digital game-based resources. The results indicate no significant differences in academic performance between traditional teaching and teaching with digital platforms (Prezi, and Genially) ($W = 1.826$, $p = 0.068$, effect size = −0.184). These findings achieve the first objective and verify Hypothesis 1, indicating that academic performance with the use of digital resources (Prezi, Genially, Quizziz, and Nearpod) is significantly higher than with traditional teaching without digital resources in higher education. Moreover, when comparing digital resources and traditional teaching independently, there are no significant differences between traditional teaching and digital platforms (Prezi and Genially) but there is a significantly greater performance when working with digital game-based resources (Quizziz and Nearpod) than with traditional teaching.

For the second objective and Hypothesis 2, the inferential analysis with the Wilcoxon test indicates significant differences in academic performance between teaching with digital platforms and teaching with digital game-based resources ($W = 4.952$, $p = 0.000$, effect size = 0.478) in favor of digital game-based resources. At the platform level, there are no significant differences between Prezi and Genially ($W = 1.579$, $p = 0.114$, effect size = 0.132). At the level of digital game-based resources, there are no significant differences between Quizizz and Nearpod ($W = 0.144$, $p = 0.885$, effect size = 0.132). These findings verify Hypothesis 2, indicating that academic performance with digital game-based resources is significantly higher than that with digital platforms in higher education.

To complement the analyses and control for the effects of confounding variables such as gender and age, the nonparametric Mann–Whitney *U* test was employed. As observed in Table 2, there are no significant difference* in any analyzed variable according to gender and age. Therefore, men and women aged 17–22 and those older than 23 do not differ in academic performance in either traditional teaching or teaching with digital resources, regardless of whether they are platforms or digital game-based resources. This consistency supports the validity of the results, suggesting that the instructional method did not significantly impact student performance, thereby reducing threats to the study's internal validity.

5 | Discussion

This study evaluates whether the use of technological resources in teaching improves the academic performance of tourism ESP university students in a face-to-face context. For this purpose, 145 students in the same group received an equal number of weeks and hours of instruction using traditional teaching without digital resources and teaching with digital resources, combining digital platforms (Prezi and Genially) and digital game-based resources (Quizizz and Nearpod). Academic performance was compared using tests on course content (ESP tourism vocabulary and English grammar) across different modalities of traditional and digital resource-based teaching, randomized. The findings provide evidence of improved academic

performance and verify Hypotheses 1 and 2, confirming that teaching with digital resources enhances student performance and that using digital game-based resources results in higher academic performance compared with digital platforms. This may optimize the teaching and learning of ESP at the university level in general, and potentially at other educational stages.

The descriptive results highlight the need to optimize university students' academic performance with both traditional teaching and teaching supplemented with digital resources, whether platforms and/or digital game-based resources. These findings are consistent with Shahjahan et al. (2021) regarding the improvement of academic performance in higher education to ensure well-prepared professionals. According to Wu (2019), good academic performance provides students with educational, personal (mental health, social skills), and professional benefits, leading to better productivity, quality of life, and social equity. Policymakers, researchers, and academics have long been concerned with achieving successful academic performance for students, reducing dropout rates, and enhancing the educational quality of universities. In this regard, one of the actions to implement is for educators to improve pedagogical practices to optimize student learning and performance. This renewal of the pedagogical process in higher education can be achieved by introducing innovative methodologies (Van Laar et al. 2020) that can be applied in contexts with and without digital resources. Teachers need to design classes where students feel that they are the protagonists, which may require training in active methodologies and digital resources (Almusharraf 2021). The university classroom must advocate for a functional and motivating teaching–learning model for students (Snezhko et al. 2022). If digital resources are employed, according to Asratie et al. (2023), classes can become more engaging, enhancing student participation and interest. The quality of teaching in higher education must provide the necessary resources for students to successfully complete their education.

The results confirm the first hypothesis: Academic performance with the use of digital resources is significantly better than with traditional teaching without digital resources in higher education. The group of students achieved significantly higher grades when taught with digital platforms and games compared to traditional teaching without digital resources, indicating a greater acquisition of the information presented in class. To verify that gender and age did not bias the data, an inferential analysis was conducted, showing no significant differences. These findings demonstrate that digital resources, specifically platforms and digital game-based resources, can be utilized by instructors in the classroom to enhance academic performance. These findings are consistent with current research (Alshammary and Alhalafawy 2022) which demonstrates improvements in learning and academic performance through the use of digital tools. Jia et al. (2024) demonstrated that students acquired more vocabulary through the use of digital resources. The employment of digital tools fosters creative reflection, participation, and interaction among students with their peers, curricular content, and professors, which positively impacts socialization, learning, and performance (Opre et al. 2022). The use of digitalization in teaching implies an optimization of learning (Stefanovic and Klochkova 2021) and a more active role for students, placing them at the center of the learning process (Strelan et al. 2020). In their study, Di Michele et al. (2023) highlight the benefits of using various digital resources in the classroom. According to Martínez et al. (2023), digital tools transform classroom learning and must complement university teaching (Greipl et al. 2020). This facilitates the personalization of the educational process and presents a pedagogical innovation challenge for instructors (Haleem et al. 2022; Sillat et al. 2021). Therefore, research seems to indicate the relevance of transitioning from traditional to digital classrooms to enhance students' meaningful learning across all educational stages (Mohamed and Lamia 2020). Modifications of traditional teaching methods in higher education are necessary in the current educational context (Anane 2022). The progressive incorporation of digital learning ecosystems represents a change required by policymakers and academics in university institutions (Nguyen and Tuamsuk 2022). In the same line as the research conducted by Boeru (2023) employing gamification and Khan (2019) using digital resources, this work enhances the utilization of digital game-based resources to learn ESP.

Regarding the second hypothesis, the data confirm that using digital game-based resources significantly enhances academic performance more than digital platforms in higher education. The student group achieved significantly higher grades with digital game-based resources compared to digital platforms, demonstrating greater information acquisition. To verify that gender and age did not bias the data, inferential analysis was conducted without significant differences found. These data show that digital game-based resources, in this study, can be used in the classroom by instructors to improve academic performance. Furthermore, there are no significant differences between using Quizizz or Nearpod as digital game-based resources and between Prezi and Genially as digital platforms. These findings are consistent with systematic reviews indicating the positive effect of digital game-based resources in general on student learning (Zeng et al. 2020; Zhou and Bakhir 2024). Their utilization creates a dynamic classroom environment that engages students by sparking their curiosity and interest (Shohel et al. 2022) and providing experiential learning (Zhao et al. 2022). For example, Mokhtari et al. (2021) found that using Nearpod in university classrooms increases academic performance, attention, and motivation; Carrión (2022) found that using Quizizz improves university student participation. Dixon et al. (2022) found that digital games are effective in English as a second language learning and academic performance. On the other hand, Perrotta and Pangrazio (2023) stated that digital platforms are commonly used as infrastructure for delivering content, which generates less appeal and curiosity among university students compared to digital game-based resources. However, the use of these platforms still enhances academic performance compared to traditional teaching, as indicated by the results of Cabrera-Solano (2022) with Genially and Al-Hammouri (2018) with Prezi. Both digital game-based resources and platforms require training for educators to understand the pedagogical possibilities of each and the potential for personalized learning (Tomlinson 2001). DigCompEdu (Redecker and Punie 2017) serves as the reference framework for developing the digital competence of all educators, including those in higher education, with tools and training strategies. For students, in addition to improving learning and academic performance, these tools optimize their digital competence, which is key in 21st-century education (Molnár et al. 2022) and lifelong learning (European Union 2018).

5.1 | Limitations and Future Research

The study presents certain limitations. First, the sample size is small, so generalizations should be avoided, and results should be interpreted cautiously. The sample should include learners from a wider range of ESP programs. Besides, student assignment was done by convenience and accessibility rather than randomly. However, to mitigate this, a preliminary analysis regarding genre and age was conducted to verify that there were no differences in these sociodemographic variables that may influence the results of the intervention. Secondly, the use of a single-group pretest and posttest design is a limitation. We chose this design to ensure that the same instructor taught all students and that all received the same didactic intervention in a real classroom context, and we could avoid biases. It is noteworthy that the same group was used for both instructional methods, resulting in an imbalance in time allocated to traditional (3 weeks) versus digital (12 weeks, or 3 weeks per digital resource) instruction. Efforts were made to maintain a 3-week interval for each instructional phase. Nevertheless, the extended 12-week duration of digital instruction relative to the 3-week traditional period may have influenced these results. Thirdly, regarding research methodology limitations, students' tasks and assignments were done by convenience and not randomly. Nevertheless, these contributions can be applied to other subjects and contexts in order to promote autonomous and meaningful learning that answers to the demands of the current society. By developing student-centered activities, together with game mechanics, undergraduates have controlled their own learning, focusing on their interests, different learning styles and pace and targeting today's professional and societal demands.

As future lines of research, it would be advisable to extend it to the online university context, other languages, bachelor's degrees, or subjects or to conduct a longitudinal study to check if the results are similar for a longer period of time. Other digital platforms (e.g., Canva) or digital games (e.g., Educaplay, Kahoot) could be tested too to explore their impact on academic performance. Furthermore, measuring students' digital competence could be a valuable variable to include in future studies to account for potential differences in baseline digital proficiency. These studies could build on the current findings and address the existing limitations.

6 | Conclusions

The ubiquitous presence of technology in all societal paradigms underscores the necessity of its inclusion in educational settings to prepare students for a technology-driven world. The use of learning and knowledge technologies, alongside digital resources, such as educational platforms and games, offers significant benefits for both online and face-to-face education. These tools not only enhance learning experiences but also prepare students for a world where technological proficiency is paramount. Therefore, embracing digital resources in higher education is not merely an option but a necessity to cultivate a generation of learners equipped for the challenges and opportunities of the 21st century.

The integration of educational digital game-based resources and platforms in university teaching presents a multifaceted approach to enhancing the learning experience. On the one hand, digital game-based resources increase student engagement, promote active and collaborative learning, provide immediate feedback, accommodate diverse learning styles, boost motivation, and bridge the gap between theory and practice. On the other hand, digital platforms enhance accessibility, facilitate personalized learning, support blended learning models, and foster continuous professional development that aligns with modern pedagogical principles and the needs of a diverse student body. As higher education continues to evolve, embracing these innovative tools will be essential in preparing students for the complexities of the contemporary world.

The current educational context compels educators to employ technological tools and active methodologies in the classroom, as well as effective pedagogical strategies, to transform students into active protagonists of their own learning (Conesa 2024), as demonstrated in our research. Thus, our research justifies that the created digital resources can modify and adapt the content to be taught in educational settings. The key to this is the ludic methodology of game-based learning, which seeks to use games to engage students and increase their motivation and interest. This approach can be applied to any subject to capture students' attention and encourage active participation in their learning (Dahalan et al. 2023).

The pedagogical implications aim at the teaching-learning process in face-to-face higher education, particularly in the ESP classes, but they could be applied to other languages and knowledge fields. First, there is evidence that the use of digital resources positively affects the academic performance of undergraduates. They participated more actively in the classes, feeling more engaged and committed to all the proposed tasks and tests, which improved their learning. Particularly, digital game-based resources seem to have a higher impact on students' performance, so college professors should include this kind of intervention in their syllabi bearing in mind students' needs and expectations of the courses. For instance, when working with digital game-based resources, it is advisable to motivate students through the live ranking on the leaderboard. This competitive element intensifies student engagement, prompting greater attention to each question presented, as these resources are perceived as challenges that must be overcome to obtain higher points and achieve a stronger ranking on the leaderboard. Secondly, the use of digital resources has proven to facilitate learning outside of the classroom, fostering autonomous and self-regulated learning. We should encourage students to reflect on their learning process in order to reinforce a sense of fulfillment of goals and belonging to a group, easily achieved through game-based learning. Thirdly, professors should use cognitive, metacognitive, motivational, and management strategies to create a suitable learning scenario in ESP classes (Martín-González and Chaves-Yuste 2024). Finally, the length of the intervention was satisfactory: 15 weeks or 4 months, which can be regarded as a substantial period of time for the results to be regarded as reliable.

Disclosure

The authors assure the publisher that the material contained in the work is not defamatory, unlawful, obscene, invasive of another person's privacy, hateful, racially or ethnically objectionable, abusive, threatening,

harmful, or in contempt of court. The authors assure that the work is based entirely on original material, that it does not infringe on anyone else's copyright. Authors ensure that they have written entirely original work, and if they have used the work and/or words of others, this has been appropriately cited and quoted. They also assure they had informed consent to participate in the study obtained from participants.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available on request from the corresponding author, B.C.Y.

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