



IMPACT OF ADVANCED TECHNOLOGY INTEGRATION ON ENGLISH LANGUAGE LEARNING IN HIGH SCHOOL

IMPACTO DE LA INTEGRACIÓN DE TECNOLOGÍA AVANZADA EN EL APRENDIZAJE DEL INGLÉS EN BACHILLERATO

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ABSTRACT

This study analyzes the impact of integrating advanced technology in English learning for second- and third-year high school students; its focus is on how the digital team uses the possibilities of these technologies simultaneously with technical limitations such as limited connectivity and lack of teacher training. The systematic approach combined qualitative and quantitative methods, including questionnaires, classroom observations, and analysis of student performance on digital platforms. Duolingo has evolved into autonomous grammar and vocabulary practice. Padlet collaborated in writing and discussions, and was interactive and dynamic. The results showed that students improved their language skills compared to the beginning of the study. In addition, although active participation increased, students' intrinsic motivation registered significant growth, which was summarized by surveys and comments. This study was conducted in English education; it shows that the strategic integration of digital tools improves language skills and promotes active participation, motivating students, and is effective and applicable to other educational contexts with similar functions.

Keywords:

Learning English, Technology, Digital Tools

RESUMEN

Este estudio analiza el impacto de la integración de tecnología avanzada en el aprendizaje de inglés para estudiantes de segundo y tercer año de bachillerato, su enfoque principal es cómo el equipo digital utiliza las posibilidades de estas tecnologías simultáneamente con limitaciones técnicas, como la conectividad limitada y la falta de capacitación docente. El enfoque sistemático combinó lo cualitativo y cuantitativo, incluidos cuestionarios, observaciones en el aula y análisis de rendimiento de los estudiantes en plataformas digitales. Los resultados mostraron que los estudiantes mejoraron sus habilidades lingüísticas en comparación con el inicio del estudio; además, aunque la participación activa aumentó, la motivación intrínseca de los estudiantes registró un crecimiento significativo, que se resumió mediante encuestas y comentarios de preguntas, este estudio se realizó en el aprendizaje del inglés, y muestra que la integración estratégica de las herramientas digitales no solo mejora las habilidades lingüísticas, sino que también promueve la participación activa, motivando a los estudiantes y es efectiva y replicable para otros contextos educativos con funciones similares.

Palabras clave:

Aprendizaje del Inglés, Tecnología, Herramientas Digitales



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INTRODUCTION

English is a language that represents universality as it is the global language; it reflects a range of opportunities for those who master it. Therefore, in today's world, the incorporation of technology into its teaching-learning process suggests changes that are considered significant (Rodríguez y Hernández, 2024). In this context, this article seeks to address the effect that these digital technologies have in the educational field when teaching a language, especially in virtual and face-to-face environments, with the systematized study of its impact on the three essential skills of the English language, speaking (linguistic skills), motivation in the use of this type of tools and active participation in the classroom process.

Technology has improved, providing teachers and students access to resources and interactive activities that enhance learning inside and outside the classroom. You can find online materials to help you practice and expand your existing knowledge (Antonio y Carrión, 2023). Every classroom needs technological teaching resources to support and improve language acquisition. In this way, the relationship between technology and English language teaching infers an improvement because it creates interactive opportunities in the process. Technology allows students to learn in dynamic ways and engaging environments that are utterly different from traditional English classes (Belda, 2020).

The problem revolves around applying traditional methodologies that do not encourage practical interaction and hinder the acquisition of important communication skills. However, introducing interactive practices can significantly improve the acquisition and understanding of English language skills. To ensure continuous learning, monitoring students' progress through regular assessments that measure their linguistic progress is important. This approach highlights the need to update instructional methods toward dynamic and relevant strategies that improve academic performance and increase student engagement and motivation.

According to Alvarado et al. (2021), "smartphone use does not affect the grade point average, but it does affect the time spent studying and doing academic activities; that is, they perceive it as useful" (p.21). Mobile devices are presented as a double-edged sword. While this can be a distraction that affects students' study time, it can also be an effective tool, given that there are a variety of learning materials and platforms that can be adapted to individual learning methods according to the required needs.

Therefore, students' perceptions regarding the integration of English language learning and technology are fundamental as it helps students achieve their goals, improve their interaction with teachers, absorb information better,

and learn more effectively; however, everything depends on the mastery of academic skills and competencies that students acquire during their studies. It is essential to understand the practices and expectations that students will face in the classroom, as mentioned above, this study aims to show how, through a comprehensive approach, technological innovations can overcome existing barriers, enrich the educational process, and promote a more inclusive and effective education adapted to the different contexts in which students and teachers work.

Technological improvements in education have caused broad but beneficial reforms in English training. Implementing emerging technologies and digital platforms has significantly transformed pedagogical and methodological methods (Castillo et al., 2022).

Technological integration

The integration of technology into the English language teaching process has been the subject of numerous studies that have measured its effectiveness over the last decade; in the words of Martínez et al., (2020) the use of current tools such as augmented reality (AR) applications and artificial intelligence-based learning has revolutionized the way of acquiring other languages, especially English, by providing a more immersive experience; the authors point out that augmented reality improves listening comprehension and pronunciation by offering students with contextual and situational experiences that are not available through traditional methods.

Meanwhile, Haro y Yépez (2020) studied the effectiveness of a digital learning platform compared to traditional methods of teaching English as a foreign language (EFL). Using quantitative methods, studies have shown that students who use digital platforms such as Duolingo and Memrise significantly improve their ability to acquire vocabulary and grammar. However, the authors emphasize that technology integration does not guarantee success without being accompanied by properly structured instructional strategies, highlighting the importance of teacher training and course design that use technology to complement, not replace, instruction.

Technology is also evaluated for its ability to support personalized learning. Gómez & Hernandez (2023) state that adaptive platforms that adjust content to students' proficiency levels have proven effective in teaching English. These platforms use artificial intelligence to personalize content and activities, continuously assess students' learning progress, and allow them to adjust assignments to match areas for improvement.

The TPACK Model

According to López and González (2021), TPACK offers teachers a reflective structure that allows them to adapt

digital tools to educational objectives and disciplinary content beyond the mere inclusion of technology. The authors emphasize that this essential perspective optimizes the effectiveness of technical use and enriches the academic experience by learning and contextualizing the educational process.

As stated by Rodríguez y Hernández (2024), the analysis of the TPACK model is considered an essential tool for evaluating the integration of ICT in various educational contexts. Through a comprehensive literature review, this framework has become the standard for implementing technology to recognize areas in which teachers need support, such as technical training and the design of technology-based educational strategies. This approach facilitates a more structured transition to a technologically progressive education model characterized by the strategic use of interactive digital platforms, online assessment tools, and the strategic use of adaptive resources.

In summary, the TPACK model represents a robust, multidimensional framework that guides the integration of technology into education, and that is perceived as robust learning; supported by sound educational practices, strategic implementations enable students to meet the requirements of the constantly developing educational environment. Harmonizing the capabilities of TPACK, technology, pedagogy, and content in the modernization of education in the digital age, according to Mora (2021), not only promotes the implementation of innovative technologies but also improves academic performance in key areas, such as the dissolution of complex problems and interdisciplinary cooperation.

English Language Learning

English was formed by combining various dialects, generating an extensive and diverse vocabulary (Munich, 2021). Today, it has become the most relevant language, unifying people globally as the universal language. English has overcome linguistic and cultural obstacles, consolidating itself as a means of communication. Therefore, education should focus on effectively enhancing the four language skills.

Therefore, learning a second language becomes essential for children and young people to help them manage various areas effectively. In this context, knowledge and use of English are no longer seen as an aid but rather as a requirement (Pakula, 2020).

Four skills must be cultivated for students to master English adequately. These skills are used together: reading, writing, communicating, and listening (Pichet, 2022). Reading comprehension involves interpreting the text in the same way as in the native language. Writing is an

extension of the other skills; it is essential in teaching and learning because it helps develop oral communication and listening skills. Active listening means listening and understanding communication from the speaker's point of view. Hearing and listening are different things; hearing is the perception of vibrations by the sender, and listening encompasses much more. It is understanding and giving meaning to the words that the sender transmits. Speaking, or oral expression, is part of communication, which refers to the English language. Communicative skills are those through which students learn to address each other, how to do it, what to say, and what words and phrases to use to understand appropriately, becoming the builders of knowledge (Pichet, 2022).

There is a considerable distinction between learning and acquiring a new language. All learners begin language learning, but not all succeed. Thus, second language learning refers to the last step that enables the learner to learn a second language the same way they did the first (Parupalli, 2021).

Technology in English teaching and learning

Technology has transformed language learning, and English has not been left behind (Royero, 2024). The use of technology in the teaching and learning process has made it easier for students to gain access to diverse and personalized resources that enhance their experience in education. Here, we investigate how technology is revolutionizing English learning and how these advances can be taken advantage of (Rose, 2022). Mobile applications for learning languages are becoming increasingly popular because they are accessible and easy to use. Duolingo, Babbel, and Memrise offer curated lessons that can be followed anytime, anywhere; they use gamification methods to keep users motivated, making them more entertaining and compelling.

Audiovisual resources, such as videos and podcasts, for improving listening and grammar skills, including pronunciation and vocabulary. Personalized resources, most notably Rosetta Stone and Smartick, are tailored to the student's level and needs based on AI-generated algorithms. Technology offers many opportunities to make learning English more efficient and manageable, from mobile apps to digital teaching systems and communication tools. The use of technology in education has facilitated access to high-quality instructional materials that will improve progress in English classes and help achieve language goals.

MATERIALS AND METHODS

A mixed-type approach with a descriptive correlational scope was used, combining quantitative (statistical) and

qualitative (characteristic) data to analyze the influence that digital (technological) tools have on the English language teaching-learning process; with all this, perceptions, ideas, and perspectives are combined with application trends, providing a more complete and detailed vision. The sample consisted of 95 students from a total population of 120 and 4 teachers who are the total number of high school English teachers, who have been selected to reflect a representative sample of the educational context, ensuring diversity in experience, training, and technological adaptation of Colegio Los Ilinizas, Valle de los Chillos, Quito - Ecuador. Non-probabilistic sampling was used to limit participation to those key subjects in the research process.

As an information gathering technique, a structured questionnaire was used on the use of digital technology in the classroom applied to teachers and students, a structured survey to teachers that had as its main category of inquiry the most complex pedagogical dynamics, such as the challenges associated with the implementation of technological tools and the strategies to overcome them.

The scheduled tasks include using tools such as Duolingo and Quizizz for individual exercises, collaborative platforms such as Padlet to support group interaction, and interactive resources such as podcasts and educational videos to improve listening comprehension and verbal fluency. Each task was adjusted to the purposes of the study.

These activities are conducted in a controlled environment, ensuring equality and uniformity in access to technological resources. To achieve this, each task is precisely timed, and teachers directly monitor students' interactions, providing immediate feedback and addressing potential issues. Numerical data was complemented by qualitative observations from teachers, who confirmed that students were using the tools accurately and meeting the educational objectives. This unified approach helps recognize patterns in student behavior and adjust tasks in real time to improve outcomes.

The triangulation of techniques allowed for the observation and comparison of data collected from questionnaires, interviews, and observations, detecting congruences and divergences that strengthened the truth of the findings. Additionally, teachers and monitors were previously trained in using digital tools and data collection protocols, ensuring equality in execution. Finally, advanced indicators linked to language skills and degrees of active help, produced automatically by digital platforms, were examined, which facilitated obtaining results from a quantitative and qualitative framework.

As shown in Table 1, this study seeks to understand how digital technologies transform English learning in virtual and in-person classes. The central idea is to see how these tools impact our students' three crucial areas: developing speaking skills, motivation to use technology, and active class participation.

The research considers both educational environments—virtual and in-person—and offers a comprehensive look at how English learning is experienced today. To this end, a systematic process has been followed, allowing for an orderly analysis of how these technologies truly influence learning beyond what we can observe at first glance.

This approach focuses not only on language skills but also on equally essential aspects: ensuring students feel motivated, actively participate, and view the use of technology as an ally in their learning process. Because learning English today is much more than studying grammar, it is connecting, interacting, and feeling part of an environment that encourages them to grow.

Table 1. Study Design on the Impact of Technologies on English Learning

Element	Description
Context	The study analyses the impact of digital technologies on teaching English in virtual and face-to-face environments.
Aim	To examine the impact of digital technologies on the development of three key aspects of English language learning.
Areas of study	Both virtual and face-to-face environments are considered within the educational field.
Skills assessed	1. Speaking (language skills) 2. Motivation in the use of technological tools 3. Active participation in the classroom process
Methodology	Systematic study that evaluates the influence of these technologies on language learning.

Source: Own elaboration

To truly understand how technology influences English learning, we designed an observation Matrix that allows us to look beyond traditional outcomes and focus on what happens daily in the classroom.

The main objective of this matrix is to assess whether the integration of digital tools is helping to improve students' English skills, both in comprehension and oral and written expression. But in addition to measuring academic progress, we also want to know how students feel about using these technologies and whether they are actively participating in activities that include them. To do this, we use a simple scale (from Poor to Excellent) that gives us a clear idea of where we are and where we can improve.

The matrix in Table 2 also focuses on three areas that are very important for the study—first, fostering students' active and collaborative participation using digital tools.

Here we observe how often they participate in online group activities, how they interact, and whether they use digital platforms correctly. This helps us see if technology creates a space for collaboration and communication in English.

Additionally, develop language skills through interactive applications and platforms.

We assess whether students are improving in specific skills such as listening, speaking, reading, and writing, and whether they are using the tools consistently and effectively. We also provide a space for them to self-assess their progress, as their perception is key to this process.

Moreover, analyze the impact of digital tools on students' motivation and engagement.

We want to know how they feel using these technologies: Are they motivated? Do they participate more? We also consider their feedback in surveys and directly observe their interest in technological activities compared to traditional ones.

In short, this matrix helps us gain a comprehensive and human view of learning with technology, observing academic progress and how students experience and enjoy this process. Learning English is not just a matter of passing exams but also of feeling like an active part of a modern, dynamic, and motivating environment.

Table 2. Observation Matrix to Evaluate the Impact of Technologies in the Teaching of English

OBJECTIVE	INDICATOR	EVALUATION CRITERIA	OBSERVATION SCALE
GENERAL OBJECTIVE			
Evaluate how the integration of technologies in educational practices improves the learning of English as a foreign language	1. Progress in students' language skills (comprehension, oral and written production).	Students show improvement in language skills at the end of the assessment period.	Poor Fair Good Excellent
	2. Participation in activities with technology in the classroom.	Students use technologies frequently and effectively in classroom activities.	Poor Fair Good Excellent
	3. Student satisfaction with the use of digital tools in their learning.	Students value the use of technology in their learning, showing greater motivation and commitment.	Poor Fair Good Excellent
Specific Objective 1			
Encourage active student participation in collaborative learning activities in English using digital tools	1. Frequency of participation in online collaborative activities.	Students actively participate in collaborative activities on digital platforms, completing proposed activities.	Always Almost always Almost never Never
	2. Quality of interaction and collaboration between students.	Students collaborate effectively, demonstrating communication skills and respect for their peers' contributions in English.	Poor Fair Good Excellent
	3. Appropriate use of collaborative digital platforms.	Students master and correctly use digital tools to collaborate on learning activities in English.	Poor Fair Good Excellent
Specific Objective 2			



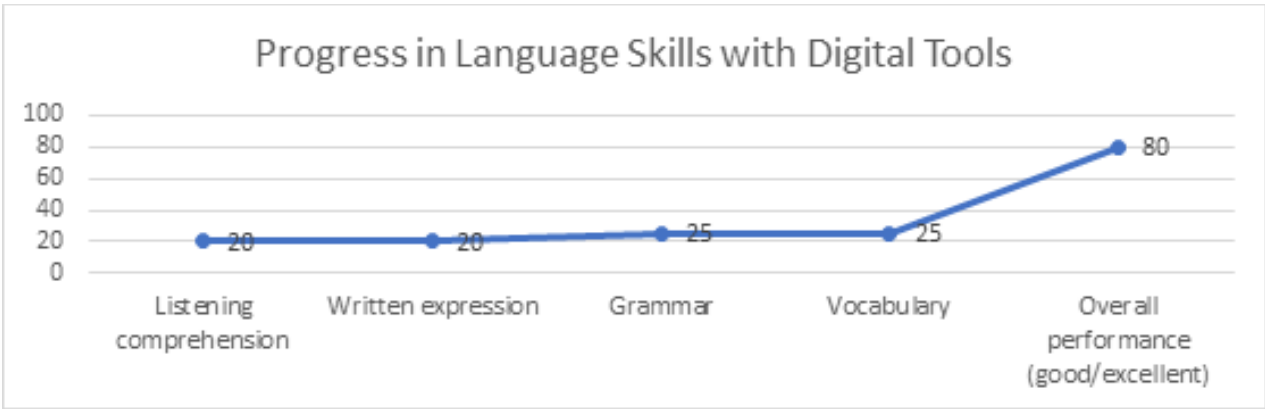
Develop English language skills using interactive technological applications and platforms adapted to the students' level	1. Progress in specific language skills (listening, speaking, reading, writing).	Students demonstrate improvements in specific language skills in periodic assessments and at the end of the application use cycle.	Poor Fair Good Excellent
	2. Constant and effective use of applications and platforms adapted to your level.	Students regularly use technological applications appropriate to their level (at least 2-3 times per week), with observable improvement in their use.	Poor Fair Good Excellent
	3. Satisfaction and self-assessment of progress in skills.	Students positively value their progress in language skills using interactive applications.	Poor Fair Good Excellent
Specific Objective 3			
Analyze the impact of digital tools on students' motivation and engagement during the English learning process	1. Level of motivation and commitment shown by students during activities.	Students show a high level of motivation and engagement when using digital tools in their learning activities.	Poor Fair Good Excellent
	2. Participation in surveys and feedback on the learning experience with technology.	Students complete satisfaction surveys and share positive feedback on how digital tools influence their motivation	Poor Fair Good Excellent
	3. Observation of student interaction and interest in the classroom.	An increase in student participation and interest is observed during technological activities compared to traditional methods.	Poor Fair Good Excellent

Source: Own elaboration

RESULTS-DISCUSSION

The findings obtained using the observation matrix created to assess the effect of incorporating technologies in an English class are described. In this procedure, the students' language skills, active involvement, degree of motivation, and dedication to learning English as a second language were evaluated. The observation was conducted in three English classes with second and third-year high school students from Colegio Los Ilinizas.

Fig. 1: Progress in language skills with digital tools



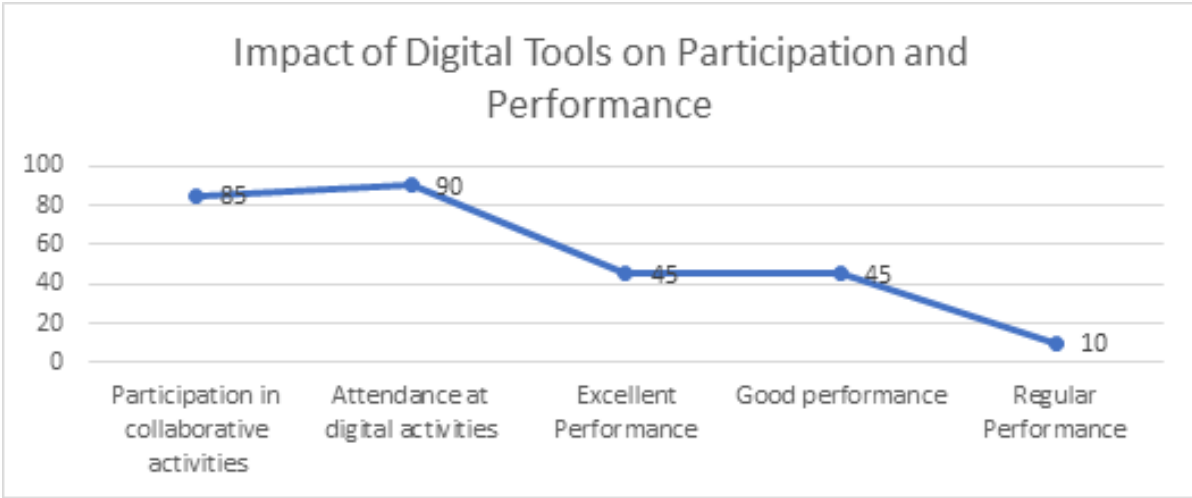
Source: Own elaboration

Figure 1 on the improvement of language skills with digital tools shows an overall positive impact, although there are differences between the different skills assessed; listening and writing comprehension increased by 20%, indicating a moderate improvement, these areas have a limited impact, possibly due to the lack of specific activities that promote more profound and more contextualized interactions. In grammar and vocabulary, the increase was 25%, suggesting that digital tools are more effective in training structural skills. This may be due to continuous practice and immediate feedback, which improves these skills more effectively. Overall performance increased by 80%, demonstrating the

positive cumulative impact of using digital tools in language learning. Although the improvement in some specific skills is only moderate, the combined effect of these tools contributes significantly to the overall results of learning English.

In conclusion, although the non-specific performance is outstanding, digital tools influence language skills. Auditory perception and written production require more concrete tactics to perfect their anticipation and improve results.

Fig. 2: Impact of digital tools on participation and performance

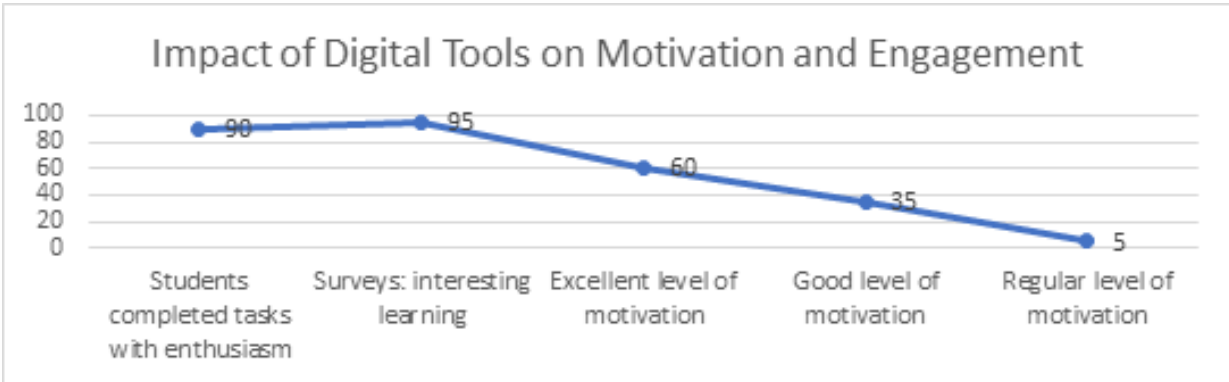


Source: Own elaboration

Figure 2 shows the impact of digital tools on engagement and performance, and the effectiveness of digital tools in increasing student engagement and improving academic performance. Participation in collaborative activities and digital events showed the most significant increases, at 85% and 90%, respectively; this demonstrates that digital tools effectively promote interaction and coherence in educational tasks. Regarding academic performance, 45% of students achieved outstanding results, and another 45% achieved satisfactory results. However, these positive results demonstrate that digital tools do not guarantee a uniform level of excellence. In contrast, only 10% of students demonstrated average performance, indicating that these tools have a minimal impact on low performance levels.

In summary, digital audio tools are particularly efficient for helping and assisting students. However, they have implications for achieving a high academic level. To maximize their advantages, it would be beneficial to assign tactics that enhance comprehensive exploitation and minimize differences between students with different levels of intervention

Fig. 3: Impact of digital tools on motivation and engagement



Source: Own elaboration

Figure 3 shows the impact of digital tools on motivation and engagement. It shows a significant positive effect on students' motivation and engagement. 90% of participants completed the task enthusiastically, confirming the ability

of digital resources to engage students actively. In addition, 95% find learning fun—this is a top-notch result and shows the appeal that digital platforms can offer through interactive design.

Regarding motivation, 60% of students claimed to have improved optimally, and 35% said it was acceptable. Although these data are optimistic, they show that the impact of digital tools in this area can still increase. On the contrary, only 5% said it remained constant, indicating that these tools effectively reduce the decline in motivation.

It can be inferred that digital tools promote a high-adjustment and efficient instructional climate for many students. However, to enhance their effect, tactics that increase students' motivation levels who have not achieved an acceptable level would be beneficial; this would guarantee a more realistic result in motivation and academic interest.

The three graphs examined show the beneficial influence of digital tools on language skills, involvement, convenience, motivation, and dedication. Regarding language skills, 25% of the progress in linguistics and vocabulary stands out, while listening and writing skills show more moderate progress, with 20%. However, the overall performance of students reached an outstanding 80%, highlighting the cumulative and beneficial level of digital tools in the language teaching-learning process.

In input and usage, digital tools proved extremely useful in motivating student participation, with 85% actively participating in collaborative activities and 90% consistently engaging in digital activities. However, academic outcomes were more mixed: only 45% of students achieved outstanding performance, while another 45% recorded satisfactory performance, demonstrating the seriousness of adopting extraordinary strategies to increase student scores to excellence levels.

Regarding motivation and commitment, 90% of the students developed their activities effectively, while 95% showed an interest in creating them, which supports the benefits and effectiveness of digital platforms. Likewise, 60% reported good motivation; this suggests that the learning experience can be further integrated into classes, increasing interest and motivation.

In this way, it is evident that digital technologies improve language skills, foster a collaborative environment, and increase student motivation. However, its application may reflect specific challenges for both students and teachers, one of them being always the need for internet access for use, that is, a high state of connectivity, which not all areas can have; another factor is the initial resistance of students to using digital tools and the need for technological training for teachers and students. With the above,

it is worth remembering that flexible tactics were used, such as taking advantage of offline resources, introductory seminars on how to use the tools and mixed activities that combine face-to-face and virtual dynamics; these measures have not only reduced difficulties but have also improved the learning experience and allowed students to make the most of the available technology.

Finally, it is concluded that digital tools have enormous potential as protagonists in teaching English, provided they are used strategically and adapted to the contextual reports of the students. Instruments such as Padlet, Duolingo, and Kahoot have proven their effectiveness. However, their reputation is based on their solid application of solid pedagogical methods that address both technical challenges and the social particularities of the educational environment. The conclusions derived from this research offer a replicable model that confirms the impact of technologies in similar educational contexts, promoting solid progress in teaching English.

CONCLUSIONS

Integrating technology into English language teaching has proven to be a transformative approach that can redefine the educational process, making it more interactive, effective, and responsive to the needs of modern learners. The study found that digital tools such as Duolingo, which allow students to practice vocabulary and grammar in an interactive and personalized way, can bring significant benefits, including improved language skills, higher engagement, and better student motivation. Padlet fostered collaboration through the co-creation of resources, while Kahoot increased motivation through gamified dynamics, making the activity more engaging and competitive.

The results obtained confirm these hallmarks and highlight the positive impact that digital tools have on different aspects of learning; In the language area, there was good progress in grammar and vocabulary, and general performance was good, this progress was measured through diagnostic tests administered at the beginning and end of the study period, as well as online evaluation activities that analyzed the correct application of grammatical rules and the effective use of vocabulary in real life situations. Therefore, some advances have been made in areas such as auditory comprehension and writing, which suggests that there is still room for improvement through more specific approaches.

Regarding performance, students actively participated in collaborative digital activities, showing a notable commitment. They were appropriately involved. However, to achieve total and high academic performance, strategies such as using personalized digital platforms, addressing individual learning, and, above all, giving constant

feedback should be applied to identify areas of intervention. It is also necessary to develop practices that reinforce listening and writing skills.

The findings of this study confirm that digital technologies, when used strategically and contextually, can be essential catalysts in English language teaching. Key challenges must be overcome to achieve maximum impact, including limited connectivity, a lack of specific teacher training, and socioeconomic barriers that hinder access to these tools. Educational institutions can create more effective, equitable, and sustainable environments by improving technological infrastructure, strengthening teacher training, and adopting inclusive teaching approaches.

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