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Impact of Technology on Language Learning: A Study of Student Engagement

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Abstract

This conceptual paper examines the role of technology in learners' involvement in language learning. It attempts to integrate recent literature and build a model that connects technological tools with behavioral, emotional, and cognitive engagement levels. As documented in Scopus and Web of Science, the peer-reviewed literature was synthesized. This paper categorizes technological interventions, including mobile applications, artificial intelligence (AI) tools, learning management systems (LMS), and immersive technologies, and correlates these with student engagement levels in language learning. Technology advances learner participation through interactivity, enhanced motivation, and greater levels of personalization. Mobile learning and game-like features reinforce behavioral participation, while AI tools and private practice settings foster emotional engagement. Guided learning pathways and real-time feedback support cognitive engagement, fostering a deeper understanding of the material. A conceptual framework is proposed to guide further research and practical application. The theoretical problem suggests a unique digital language engagement tool by analyzing dimensions of interaction with digital frameworks in language acquisition. The study provides comprehensive and practical recommendations for educators, curriculum designers, and decision-makers on language teaching and learning with the aid of technology.

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1. Introduction

The advent of the digital era has revolutionized the teaching and learning processes owing to the incorporation of technology into educational systems. Face-to-face interactions and written references were the pillars of language learning; however, with the advent of digital resources and platforms, these domains have undergone monumental shifts. Students can now acquire skills through social networks, mobile learning applications, and even immersive virtual global classrooms. Hence, the innovations not only transformed how learners acquire skills but also transformed the learners' interaction with the learning process.

Student engagement is one of the most integral components of success in any field of education. It can be defined as the attention, curiosity, interest, and the overall inclination towards the learning process (Fredricks *et al.*, 2004) ^[4]. It has three dimensions: behavioral engagement, which involves taking a participatory role in the learning process; emotional

engagement; and cognitive engagement, which involves investing in learning through detailed, applicable strategies. Learning any language requires actively engaging in speaking, listening, reading, and writing. As educational practices evolve, technology is available to either assist or hinder these forms of engagement in entirely new ways.

Research indicates that students' engagement can be enhanced through collaboration, interactivity, and autonomy in learning, as facilitated by digital platforms such as Web 2.0 tools. Liu, Wang, and Tai (2016) ^[12] examined engagement in language learning through Web 2.0 technologies, noting that blogs, wikis, and social network sites enabled collaboration and active knowledge participation. Engagement in learning, as discussed by Akbari *et al.* (2016) ^[1], motivates and enhances the interactions of foreign language learners, which strengthens their cognitive and emotional participation through online social networks.

The emergence of mobile learning technologies has had a particularly significant impact. Social media and mobile apps significantly boosted student engagement as well as English learning outcomes, as noted by Yu *et al.* (2022) ^[17]. This has also been supported by D'Angelo (2018) ^[3], who noted that the integration of technology into the curriculum, when done purposefully, certainly enhances learner satisfaction, persistence, and achievement. Learners, as suggested by Handayani (2024) ^[8], can independently engage with digital resources, thereby fostering unsupervised learning of English language content beyond the classroom.

Technology's impact is not all beneficial, however. Nakazawa (2009) ^[13] cautioned that online language teaching could lead to effective learner isolation or disengagement. Hannon and D'Netto (2007) have demonstrated that for students from diverse cultural backgrounds, cultural and contextual factors significantly influence their interaction with digital learning technologies. Additionally, the CCT Theory (Campus-Class-Technology), proposed by Güneç and Kuzu (2014) ^[7], focuses on integrating technology within the institutional context, encompassing all pedagogy and the needs and

Given the growing body of literature, the understanding of how different types of technologies impact students' engagement in language learning remains multi-faceted and incomplete. Educators and policymakers need to enhance digital language teaching; therefore, synthesizing separate insights into an integrated strategy is vital.

This paper aims to fill this gap with a conceptual analysis of the technology's impact on students' engagement in language learning. The paper develops an integrative framework that classifies technological tools based on their engagement results, proposing a categorization based on theoretical evidence and practical findings from several studies (Serajuddin, 2023 ^[15]; Inderawati *et al.*, 2019) ^[10]. The aim is to gain a deeper understanding of how technology interacts with learner engagement, both in enhancing and constraining participation, and strive towards a more practical understanding of how to improve educational technology in digital language learning contexts.

2. Literature Review

2.1 Student Engagement

The active involvement of the learner fundamentally shapes the learning journey, particularly in terms of a language that necessitates focused effort, engagement, interaction, and habitual practice. In outlining the scope of involvement, Fredricks, Blumenfeld, and Paris (2004) ^[4] put forth a definition of engagement as a triad of behavioral, emotional, and cognitive components. In language learning contexts, the teaching and learning process is systematic, organized, and focused on measurable outcomes through feedback, listening, and speaking, involving writing and reading activities, which are considered as the level of behavioral engagement. Emotional involvement encompasses a wide range of learners' affective responses, including enjoyment, worry, and interest, which are experienced in connection with the task of language learning. Cognitive engagement manifests through the learner's commitment to grasping intricate linguistic concepts, applying appropriate metacognitive strategies, understanding the need for self-regulation, and overcoming challenges. It is widely accepted that engagement is one of the central factors predicting success in instructions and skill performance of extensively learned and practiced second language (L2). In more recent times, the emergence and development of digital learning technologies have transformed branded approaches

to a learner's engagement with their education. Engagement is no longer restricted to face-to-face interactions. It encompasses online discourse and presentations, interactive equipment, and learning through videos and informal documents, thereby breaking down boundaries between formal and informal language learning (Liu, Wang, & Tai, 2016; Akbari *et al.*, 2016) ^[1].

2.2 Advanced MALL Devices and Their Significance in Learning Foreign Languages

The technological boom in the educational field has given rise to specialized tools designed to foster learner independence and interaction, as well as improve engagement in language learning. Language learning applications, such as Duolingo, Memrise, and Babbel, employ Mobile Assisted Language Learning (MALL) strategies that utilize gamified microlearning. With these programs, users learn languages in a more approachable and enjoyable manner. These applications ensure positive reinforcement through feedback, gradually increasing challenge levels, and achievement-based rewards culminating in habitual participation and progress tracking (Yu *et al.*, 2022 ^[17]; Kukulska-Hulme & Shield, 2008) ^[11]. With an LMS (Learning Management System), teachers can schedule and structure the delivery of content using modern platforms like Moodle and Blackboard. These systems facilitate asynchronous speech communication in forums and chats, allowing learners to participate at their convenience. Moreover, these systems assist with peer assessment and informal evaluative measures (Al-Fraihat *et al.*, 2020) ^[2]. The latest technologies, such as Virtual Reality (VR) and Augmented Reality (AR), offer stimulating contexts in which learners can engage in conversational role-plays of real-life situations using a foreign language, thereby improving their fluency in a low-stakes environment (Godwin-Jones, 2016) ^[5]. Additionally, educational AI chatbots and voice recognition technologies offer users self-paced sessions on relevant grammar, vocabulary, and pronunciation exercises. These systems provide human-like automation, enabling users to receive instant feedback and alleviating the common burden of speaking in real time (Zhao *et al.*, 2022) ^[18]. The majority of researchers also highlight the importance of social networking sites and Web 2.0 applications in developing learners' language skills. Social networking platforms, such as Facebook groups, WhatsApp, and specialized online forums, offer opportunities for informal interactions, language exchange, and peer teaching outside the formal learning environment. Akbari *et al.* (2016) ^[1] demonstrated that learners who participated in conversations in English on social networks became more motivated and confident in their language skills.

2.3 Engagement and Technology

Engagement is demonstrated through observable behaviors, such as attending class, being present, and participating in learning activities. Technology can significantly enhance such behaviors through interactive elements, gamified components, and monitoring and tracking features. Liu, Wang, and Tai (2016) ^[12] reported that students who actively participated in blogs, discussion forums, and wikis were more engaged with language tasks than students in traditional settings. The use of learning games like Kahoot, Quizlet, and Duolingo assigns points, levels, and badges, which foster healthy competition and engagement (Perry *et al.*, 2019) ^[14]. These platforms enhance login frequency, task completion, and score optimization, boosting behavioral engagement.

Moreover, Yu *et al.* (2022) ^[17] note that progress monitoring features, such as dashboards and learning analytics, as well as reminders within MALLs and LMSs, improve performance tracking, which enhances accountability and sustains engagement.

2.4 Technology and Emotional Engagement

Emotional engagement focuses on the student's emotional responses, such as interest, enthusiasm, boredom, and anxiety. Learning a language can be emotionally demanding, particularly during the stages of speaking and pronunciation, which often evoke judgment or risk embarrassment. Such fears can be alleviated using technology that offers self-paced, automated, and non-evaluative settings. According to Godwin-Jones (2018) ^[6], anxiety associated with practice and confidence is heightened by pressure-free repetition provided by AI-powered pronunciation tools or voice recognition systems. Immediate private feedback directly improves the learner's self-understanding, especially during skill introspection. Using videos, podcasts, songs, and games as auxiliary materials for teaching a foreign language amplifies emotional involvement by capturing learners' attention and introducing different elements. Handayani (2024) ^[8] indicated that using digital tools, such as Padlet, Flipgrid, and other storytelling apps, enhanced learners' enthusiasm and emotional connection to the content. In addition, learners' social connectedness through digital exchange apps (such as Tandem and HelloTalk) and class forums cultivate a sense of community, which in turn strengthens emotional investment (Akbari *et al.*, 2016 ^[1]; Serajuddin ^[15], 2023).

2.5 Technology and Cognitive Engagement

Cognitive engagement entails the degree of mental exertion, and the techniques learners employ rationally and systematically, as well as the systems that students invest in to facilitate learning tasks. This aspect is critical for foreign language acquisition because learners must deal with new vocabulary, syntax, and grammatical structures. Technology aids cognitive engagement through personalization, scaffolding, and self-regulation via metacognitive processes. Digital platforms often feature adaptive learning algorithms that adjust the level of content based on the learner's performance. Such calibration ensures learners are not bored or overwhelmed, enabling optimal engagement (Wang & Vásquez, 2012) ^[16]. For instance, some MALL applications motivate deep processing and retention by increasing task levels as learners progress. Tools like Google Docs for collaborative writing and Edmodo or Microsoft Teams for providing peer feedback assist instantaneous feedback, which encourages learners to rethink, refine, and improve hallmarks of cognitive engagement (Inderawati *et al.*, 2019) ^[10]. Moreover, digital portfolios, e-journals, and self-assessment quizzes help learners reflect intently on their understanding, control their learning outcomes, and monitor their development, thus enhancing metacognition. Students demonstrate greater cognitive engagement and mastery of the language when online learning environments foster self-directed learning (Nakazawa, 2009) ^[13].

3. Methodology

This study employs a conceptual approach informed by a systematic literature review. This methodology involves integrating and evaluating the existing empirical and theoretical literature on the use of technology and student engagement in language learning.

Systematic searches in the Scopus and Web of Science databases allowed the retrieval of relevant academic articles. The following terms were used as keywords: "student engagement," "language learning," "educational technology," "digital tools," "mobile-assisted language learning," and "technology-enhanced learning." The inclusion criteria were peer-reviewed journal articles published in English between 2007 and 2024 that addressed the use of technology and engagement in language teaching and learning. The chosen studies were analyzed around core issues regarding (a) the meanings and components of student engagement, (b) the categories of technology used in language learning, and (c) the behavioral, emotional, and cognitive engagement impacts of the technologies. An integrative conceptual framework was developed, incorporating both qualitative and quantitative empirical evidence. Through thematic analysis, a framework was created that aims to classify technological interventions and illustrate their impact on various dimensions of student engagement. It provides a starting point for empirical validation.

4. Conceptual Framework

This literature synthesis reviews the impact of varying technological tools on three dimensions of learner engagement in language learning-behavioral, emotional, and cognitive-within the context of language learning. The framework compiles the work of Liu *et al.* (2016) ^[12], *et al.* (2022), and Handayani (2024) ^[8] to categorize technology into five domains: Mobile Learning, Learning Management Systems (LMSs), Web 2.0 Tools, AI-based tools, and Immersive Technologies (VR/AR). Each category makes a unique contribution to student engagement. Mobile learning facilitates behavioral engagement with gamified apps, while Learning Management Systems (LMSs) foster cognitive engagement through scaffolding. Emotionally engaging activities include anxiety-reducing AI-based pronunciation tools. VR environments provide emotionally engaging simulations of real-life interactions, enhancing behavioral, emotional, and cognitive engagement simultaneously. This framework serves as a point of reference for educators and researchers in evaluating the impact of digital technologies on language teaching and learning. It also highlights the importance of integrating technology purposefully with pedagogy to enhance engagement and learning outcomes. This model illustrates how various tools enhance learners and guide teaching planning and future studies. It also motivates educators to select tools based on the specific engagement results they aim to achieve.

5. Discussion

With the use of laptops and tablets, students interact using new multimedia content with their peers and teachers in the language classroom. The conceptual framework and literature presented in this paper demonstrate how a range of technological tools can engage students across three overarching dimensions: behavioral, emotional, and cognitive. The evidence indicates that any given category of technology appears to be uniquely relevant to these dimensions of engagement. Furthermore, the extent of their impact is mediated by several factors, including the level of the technology's perceived usefulness, reputation, user-friendliness, teacher control, the influence of the surrounding cultural context, and instructional design. Technology has a more positive impact by enhancing participation and engagement on different levels in language tasks.

Through Mobile Assisted Language Learning (MALL) applications or gamification tools like Duolingo, user motivation as well as task completion rates improve through points, streaks, and leaderboards (Perry, Lundie, & Golder, 2019) [14]. They provide tangible signs of success, leading to time on task and decreased attrition.

Marked activity within learning management systems, such as Moodle and Blackboard, also encourages behavioral engagement within defined instructional settings (Al-Fraihat *et al.*, 2020) [2]. From an emotional perspective, the use of digital tools fosters positive responses with emotional support. AI-powered language tutors and pronunciation apps alleviate the learner's spiral of anxiety by providing opportunities for private practice (Godwin-Jones, 2018) [6]. These applications are highly beneficial for anxious learners who tend to opt out of live classroom engagement. The emotional engagement of learners is enhanced by social media and Web 2.0, as they utilize language and build community beyond the classroom (Akbari *et al.*, 2016 [1]; Hannon & D'Netto, 2007). These technologies provide a means for students to go beyond the classroom, thereby deepening their emotional engagement and enhancing their interest in learning the language. The use of reflective and adaptive technologies greatly improves cognitive engagement. Intelligent tutoring systems and teacher apps that give instant feedback and suggest next steps enhance metacognition and self-regulation (Wang & Vásquez, 2012) [16]. Learners develop the ability to evaluate themselves and refine their approaches, which is essential for achieving mastery of complex language structures. Tools for collaboration, such as Google Docs and wikis, also support deeper levels of learning through peer feedback and knowledge co-construction (Inderawati *et al.*, 2019) [10]. VR and AR-based immersive technologies unify the three engagement dimensions by dynamically contextualizing content, thereby enhancing the overall experience. Godwin-Jones (2016) [5] discusses how VR simulations immerse learners within authentic communicative situations, thereby heightening motivation and active involvement as well as facilitating deep thinking and reflection. These technologies are in the early stages of development, but their initial application studies suggest a need for further exploration into their use in language teaching. Nonetheless, the effectiveness of technology in increasing engagement varies from person to person. Many researchers, including Nakazawa (2009) [13], have warned that disengagement or cognitive overload resulting from poorly thought-out tools will undermine your engagement with the material. For example, a lack of social and instructional scaffolding within asynchronous online learning environments can lead to learner isolation.

Additionally, cultural elements and digital skills have a significant impact on engagement levels. Hannon and D'Netto (2007) demonstrated that students from different cultures approach technology in distinct ways, necessitating culture-sensitive design. Additionally, Günüç and Kuzu (2014) [7] emphasized through their Campus-Class-Technology (CCT) theory that institutional resources, curriculum, and student needs shape what is "digital-integration eligible"; hence, the "one-size-fits-all" method for digital integration is flawed. Lastly, while technology provides unparalleled opportunities to engage students in language learning activities, its utility requires strategic alignment anchored on pedagogical frameworks, user experience, contextual flexibility, and integration. Because of this, I propose that further studies focus on the impact of specific pedagogical tools on language skills over a more extended period, examine study engagement

across different population groups, and develop models that effectively blend conventional teaching approaches with digital frameworks.

6. Implications

6.1 Theoretical Implications

The impact of the technological tools employed in teaching language learning is intricately linked to the structured engagement of the students, which can be behavioral, emotional, or cognitive. In this sense, it contributes to the body of research in educational technology and second language acquisition. It also reinforces the notion that technological interventions in education are not merely an addition but rather an integral component that shapes a learner's engagement and motivation. The paper contributes to engagement theory by integrating self-determination theory and constructivist learning principles, thereby providing a multidimensional framework that future researchers can build upon when studying learner-technology relations. The conceptual framework provided can help guide exploratory research focused on testing the connection between technology and engagement. It calls for more research focused on moderators such as learner variables, the design of instruction, or the culture surrounding the technology-engagement relationship. Moreover, the findings of this study further suggest that engagement is a process, not an outcome. This theorization, alongside technological advancements, underscores the need for traditional pedagogical theories to be re-examined.

6.2 Practical Implications

This research can be beneficial to educators, curriculum developers, and policymakers focused on improving the use of technology to enhance engagement in language learning. From an educational standpoint, the use of mobile gamified apps, collaborative Web 2.0 tools, and AI-powered applications is supported by research findings that suggest language instruction can be adaptive and more responsive to students' needs. With this understanding, educators can select and design activities that utilize specific technologies to achieve predetermined engagement objectives. The provided framework may assist curriculum specialists in purposefully integrating diverse digital resources into language programs, as these resources must fulfill pedagogical goals rather than being tangentially incorporated. Developing courses that combine asynchronous and synchronous technologies can cater to a broader range of learner preferences and needs. The study highlights the importance of investing adequately in teacher education, as well as in the school's technology and training infrastructure, as a key concern for institutions and policymakers. Providing educators with adequate technological skill training and support can significantly enhance the student experience and learning. For learners, the insights enhance autonomy, motivation, and engagement with self-directed and adaptive technologies. Purposeful technologies increase ownership among learners. In conclusion, the research aims to stimulate thoughtful action among stakeholders in the educational landscape by integrating theory and practice, emphasizing contextually appropriate decisions regarding the integration of technology in language education.

7. Future Research Directions and Limitations

In the context of this conceptual paper, I propose the framework presented here on technology and learner

engagement in language learning as a starting point for further empirical and theoretical work. Further research is needed that focuses on empirical testing of the proposed technology-engagement matrix using quantitative and qualitative techniques. Experimental or mixed-method designs could capture the impact of particular tools on behavioral, emotional, and cognitive engagement in various learner populations. This area requires longitudinal research focused on the enduring effects of technology use on language skills and rates of engagement over time. Such research can reveal the extent to which the novelty factor associated with specific technologies diminishes and the impact of the length of use on learning outcomes. Considering the scope of culture in education, it is possible to conduct case studies across cultures, regions, or even among different types of learners (for example, adult learners and school students) to understand the impact of cultural elements, language, and technology on participation and engagement patterns. Further research may examine the impact of hybrid teaching—combining face-to-face instructional classes with digital platforms—on learner participation. The question of whether optimal synergy is achieved in teaching through technology, as opposed to traditional methods, remains unanswered. Engagement strategies designed to promote accessible participation must ensure equal educational opportunities for all. Thus, research should focus on the inclusivity and accessibility of technologies designed for users with disabilities, those with low or illiteracy in digital contexts, and those with poor internet connectivity. Research has yet to analyze the engagement factors of emerging technologies, such as AI-based writing tools, adaptive learning technologies, and metaverse education environments, as well as their educational ethics; therefore, further investigation is essential.

The insights presented in this conceptual paper are certainly constructive but must be accompanied by the following limitations. This paper is based on concepts without presenting data to prove the relationships suggested between the types of technology used and the dimensions of engagement. The findings, therefore, are based on literature review interpretations. This primarily involves participation in language learning processes, and the results may be partially applicable to other fields or levels of education. Other disciplines may integrate technology and participation in different ways. The course of development for some of the technologies mentioned is very dynamic; therefore, some of the tools mentioned may be outdated or superseded by newer versions shortly. This temporal scope affects the enduring applicability of the framework. The report attempts to utilize a range of materials; however, the evaluated materials may omit some relevant tools, populations, or contexts related to student participation in technology-enabled language learning. The study and its findings may be highly relevant in the field of educational technology and language pedagogy. Advanced work can be conducted in these areas without being limited by the mentioned limitations, as the published work is foundational.

Conclusion

The integration of technology into language learning has fundamentally transformed students' interactions with content, peers, and their learning environments. Students engage with content through mobile applications, AI-based systems, and even virtual reality (VR), which now allows for more interactive, personalized, and flexible language instruction.

These technologies have fostered active participation and engagement, mitigated learning anxiety, and facilitated deeper levels of thought processing. The conceptual framework developed in this paper demonstrates that various technological tools have distinct effects on behavioral, emotional, and cognitive engagement. Mobile learning applications promote active engagement, while collaborative platforms foster emotional engagement. Intelligent and immersive technologies deepen learners' understanding and mental involvement. Thus, these tools create a more dynamic and responsive experience in language learning. At the same time, technology's impact is not automatic or eternally beneficial. A positive impact still requires intentional design, technology integration, and alignment with learning objectives. Contextual factors, such as a learner's digital skills, available infrastructure, and cultural diversity, must also be considered to facilitate inclusivity and sustained engagement. In conclusion, the intentional use of technology in a language class enhances student participation, dignifies learning achievements, and equips them with skills to communicate in a globalized and digitally interconnected society.

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