The Interplay Between Technology and Motivation in EFL L2 Classrooms: A Systematic Review of 2019–2024 Research

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Abstract

Motivation is a key determinant of success in second language (L2) learning, and technology has emerged as a crucial factor in fostering motivation for English as a Foreign Language (EFL) students. A systematic synthesis of recent evidence remains scarce despite extensive research, particularly in light of technological advancements between 2019 and 2024. This study employed a systematic literature review (SLR) following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol to ensure methodological transparency and replicability. Six major databases (Google Scholar, Taylor & Francis, ProQuest, Wiley, Sage Pub, and Cambridge Core) were systematically searched using predefined keywords. The initial search yielded 50 peer-reviewed empirical studies published between 2019 and 2024; after applying stringent inclusion, exclusion, and quality assessment criteria, 26 eligible studies were analyzed. Data extraction and synthesis focused on four research questions: (1) research methods employed, (2) motivational frameworks used, (3) impacts of technology on motivation, and (4) technology tools that enhance motivation. Findings indicate a dominance of experimental (38.5%) and mixed-methods (26.9%) designs, with the socio-educational framework most frequently adopted, followed by self-determination theory, ARCS, and cognitive models. Technology shows a predominantly positive impact on motivation, with visual-based tools (AR/VR), social media-based platforms, and game-based applications demonstrating strong motivational benefits. However, effects vary by context and learner proficiency. A few studies report neutral or negative impacts, particularly with online platforms. This review highlights methodological gaps, calling for more longitudinal and mixed-methods research to explore contextual and long-term motivational effects, and provides evidence-based recommendations for selecting effective technology tools in EFL classrooms.

Keywords: Systematic review, PRISMA, EFL motivation, L2 acquisition, technology in language learning.

INTRODUCTION

Motivation is widely regarded as a central factor determining success in second language (L2) learning, as it influences the effort learners invest and their persistence in overcoming challenges (Wentzel, 2020; Feng & Papi, 2020). Crookes and Schmidt (1991) argue that motivation in L2 learning is strongly shaped by classroom-based factors,

particularly the design of learning tasks. Learners are more motivated when tasks are interesting, challenging, authentic, and relevant to their personal goals, making task design a crucial component in sustaining engagement over time (Lee & Lee, 2021; Carless et al., 2010; Tan & Nie, 2015). As Mubarok et al. (2022) emphasized, meaningful learning experiences stimulate curiosity and provide learners with a clear sense of purpose in their language learning journey. Similarly, Williams and Burden's (1997) social constructivist model of L2 motivation highlights that motivation emerges from the dynamic interaction between individual learner factors such as self-concept, attitudes, and perceived competence, and social-contextual variables, including classroom climate, peer collaboration, teacher support, and cultural context. Well-designed traditional classroom practices have long been effective in fostering such motivation, particularly through teacher-mediated interaction that provides emotional and instructional support (Wlodkowski & Ginsberg, 2017), collaborative group work that encourages shared responsibility and peer scaffolding (Järvenoja et al., 2017), and carefully sequenced tasks that build learners' confidence (Wilson & Devereux, 2014), offer constructive feedback, and enhance their sense of achievement (Aslam, 2021; Sallang & Ling, 2019).

However, increasing technology integration offers significant opportunities to enrich and extend these established classroom practices, making them more interactive, personalized, and accessible beyond the physical classroom. Computer-Assisted Language Learning (CALL) and its mobile counterpart, Mobile-Assisted Language Learning (MALL), have broadened opportunities for authentic communication, immediate feedback, and individualized learning pathways (Buddha et al., 2024; Sürüç Şen, 2021; Lei et al., 2022). More recent technological innovations, such as gamification, augmented reality (AR), virtual reality (VR), and artificial intelligence (AI)-powered tools, have further enhanced motivational dynamics in L2 classrooms (Urbaite, 2024; Mirzapour Kouhdasht, 2023; Alshumaimeri & Alshemery, 2023). Gamified applications, for example, use reward systems and competitive elements to increase task engagement (Huseinović, 2023; Smirani & Yamani, 2024), while AR and VR provide immersive environments that stimulate curiosity and enjoyment, both strongly associated with intrinsic motivation (Chen, 2020; Hung et al., 2023; Khan et al., 2023). Additionally, AI-driven chatbots and adaptive learning systems facilitate individualized instruction, enabling learners to practice language skills at their own pace, thereby fostering greater autonomy and self-efficacy (Hidayat-Ur-Rehman, 2024; Wei, 2023; Tajik, 2025; Huang et al., 2024; Ray & Sikdar, 2024). Collectively, these technological affordances complement and strengthen the motivational foundations of traditional classrooms, aligning with Crookes and Schmidt's (1991) emphasis on meaningful, engaging tasks and Williams and Burden's (1997) focus on socially and contextually supportive learning environments.

Empirical studies have demonstrated the potential of technology to enhance motivation in EFL learning by making learning more interactive, personalized, and engaging. MALL has been shown to improve learners' self-regulation and attitudes, both key components of motivation; for instance, Lei et al. (2022) reported that MALL significantly enhanced vocabulary learning by fostering positive attitudes and self-regulatory capacity. Similarly, Huseinović (2023) showed that gamification, through reward systems and competitive elements, increased task engagement and achievement by encouraging active participation. AR has also been identified as a promising tool for promoting intrinsic

motivation by creating immersive and contextually relevant learning experiences; Chen (2020) found that AR video-enhanced learning improved proactive engagement, while Khan et al. (2023) reported gains in vocabulary acquisition, curiosity, and enjoyment. Recently, AI-based tools have attracted attention for their potential to sustain motivation through adaptive learning and personalized feedback. Wei (2023) found that AI-assisted instruction positively influenced L2 motivation and self-regulated learning via personalized learning paths. Hidayat-Ur-Rehman (2024) reported that AI chatbots increased learners' autonomy and engagement in informal digital learning.

Beyond technology-focused research, motivation has consistently been linked to academic achievement. Ai et al. (2021) found that Turkish students with higher motivation performed better in L2 learning, using Gardner's Attitude/Motivation Test Battery to measure motivation. Liu et al. (2020) further showed that extrinsic motivation could benefit students with low intrinsic motivation, while Vu et al. (2022) highlighted the reciprocal relationship between motivation and achievement. Despite these findings, Mahmoodi and Yousefi (2022) noted that most motivation research has been conducted in first-language contexts, calling for more studies on group dynamics, task motivation, teachers' motivation, and the influence of technology in L2 learning. Addressing this call, Boudadi and Gutiérrez-Colón (2020) reviewed the relationship between gamification and motivation in L2 learning. However, they did not examine other technologies such as online meeting platforms or social media, leaving gaps in understanding how different tools affect motivation.

Other reviews have explored aspects of technology and motivation, but remain limited in scope or time frame. Luthfiyyah et al. (2021), for instance, examined technology use in Indonesian secondary schools and found that technology had a stronger positive impact on motivation (44%) than on achievement (35%). However, their review focused on a single educational level and covered studies up to 2020. Similarly, Bahari (2023) analyzed research on technology-assisted L2 motivation between 2010 and 2021, investigating research design, constructs, and theoretical frameworks, but did not address more recent technological innovations. Furthermore, findings on technology's impact on motivation during this period remain inconsistent; for example, Ozer and Badem (2022) reported that online meeting platforms could negatively affect motivation, whereas Jiang et al. (2024) found that video conferencing enhanced learner motivation. These inconsistencies and the rapid integration of new technologies highlight the need for a systematic synthesis to clarify how technology supports or hinders motivation in EFL learning.

In response to this need, the time frame of 2019–2024 was deliberately selected to capture recent developments in technology-enhanced EFL instruction and their implications for learner motivation. The COVID-19 pandemic accelerated the integration of online platforms, mobile-assisted language learning (MALL), and video conferencing into mainstream classroom practice. During this period, tools such as gamified platforms, augmented reality (AR), virtual reality (VR), and artificial intelligence (AI)-powered applications were increasingly adopted, offering interactive, personalized, and socially engaging learning experiences. As many of these innovations were introduced or significantly expanded after 2019, findings on their motivational impact remain limited and context-specific. Focusing on this period allows the review to synthesize the most current evidence, providing insights relevant for educators and researchers seeking to enhance EFL learners' motivation through technology.

Given the critical role of motivation in L2 acquisition and the growing use of technology to sustain learner engagement, it is necessary to systematically examine how technological tools influence motivational processes in EFL classrooms. This systematic review synthesizes empirical studies published between 2019 and 2024 that explore the relationship between technology and EFL students' motivation. Specifically, it aims to map research trends, identify dominant methodological approaches, analyze the motivational frameworks employed, and evaluate the impacts of different technology tools on learner motivation. Four questions guide this review: (1) What research methods have been used in studies on technology and students' motivation? (2) What motivational frameworks are most frequently applied? (3) What impacts does technology have on students' motivation in L2 classrooms? and (4) What technology tools are used to enhance students' motivation in learning a second language? Answering these questions will provide updated insights into technology-mediated motivation in EFL contexts and highlight areas that require further research, particularly concerning emerging tools such as AR, VR, and AI-based applications.

METHOD

This study employed a systematic literature review (SLR) approach, which involves a structured process of identifying, critically evaluating, synthesizing, and presenting findings from existing research to address specific research questions (Snyder, 2019). The SLR method is particularly valuable in educational research because it allows researchers to map trends, evaluate methodological rigor, and synthesize evidence across diverse contexts (Xiao & Watson, 2019). Accordingly, this review aimed to comprehensively analyze studies on the interplay between technology and EFL students' motivation in L2 classrooms. Following a systematic procedure, relevant studies were identified, selected based on predefined inclusion and exclusion criteria, evaluated for eligibility, and synthesized to answer the research questions.

The dataset was obtained from multiple databases—Google Scholar, Taylor and Francis, ProQuest, Wiley, Sage Pub, and Cambridge Core—chosen for their extensive coverage of education-related research. The review focused on studies published between 2019 and 2024 to capture recent developments in technology-enhanced language learning. Search strategies included the formulation of specific keywords such as "Students AND Motivation AND Technology AND EFL AND SLA," "EFL students' motivation AND technology," and "Impacts of technology on EFL learners' motivation." The document type was limited to peer-reviewed empirical articles published in reputable journals. Initial searches yielded 50 articles, which were then organized using a reference manager. A subsequent screening and data extraction phase was conducted by applying the predefined inclusion and exclusion criteria to determine the final set of eligible studies for analysis.

After collecting relevant sources, 50 articles underwent screening to assess their suitability.

Table 1. Inclusion and exclusion criteria

No.	Criteria	Excluded articles
1.	Journal articles published between 2019 and 2024	-

2.	Peer-reviewed and reputable journals: Scopus-indexed	-
3.	EFL context	-
4.	Articles in English	-
5.	SLA classroom context	-
6.	Empirical research	Six articles were excluded because they were review-based: one was a scoping review, one was a synthetic exploration, one was a systematic literature review (SLR) focusing on motivation in general, one reviewed technology and motivation in both ESL and EFL contexts, one focused solely on motivation, and one was a general review article.
7.	Students' motivation 19	One article explored teachers' motivation, another focused on teachers' motivation in implementing CALL, and one discussed barriers affecting teachers' motivation to integrate ICT.
8.	Grey literature	One article was a book chapter, and one was a dissertation.
9.	Exclusion of one of the variables	One article investigated factors related to technology implementation without addressing motivation, another focused on technology and language proficiency, and one emphasized the impact of technology on students' grammar mastery. Additionally, one article highlighted the role of a group leader in boosting students' motivation, where motivation was influenced by factors other than technology, and another discussed investment in digital tools driven by motivation to enhance communicative skills in both digital and real-world contexts.
10.	Non-alignment with motivation frameworks	One article examined academic passion, which employed a different theoretical framework from motivation.
11.	Twisted role of variables	One article examined the role of motivation in online learning, another investigated how motivation mitigates dropout in online education, and one explored how motivation enhances digital learning enjoyment. Additionally, one article analyzed the influence of socioeconomic status and technology acceptance on motivation, another examined how intrinsic motivation shapes positive perceptions of technology's usefulness and ease of use, and one focused on teachers' technology integration, where students' motivation was treated as an influencing factor rather than an outcome.
12.	Double copied	One article was identified as a duplicate of another that was already included in the review.

After applying the predefined inclusion and exclusion criteria, 26 articles were selected for further analysis. These articles then underwent a quality assessment to ensure their eligibility for inclusion in the review. The assessment was based on three key questions: (a) whether the article was published in Scopus-indexed journals between 2019 and 2024, (b) whether it addressed the relationship between technology and students' motivation specifically within the EFL context, and (c) whether it reported the motivational frameworks used in examining technology and students' motivation. Each article was evaluated against

these criteria and marked in a table with "Y" (yes) if it met the criterion and "N" (no) if it did not. Articles with predominantly "Y" ratings across the three criteria were retained, resulting in a final dataset of 26 eligible articles for systematic analysis.
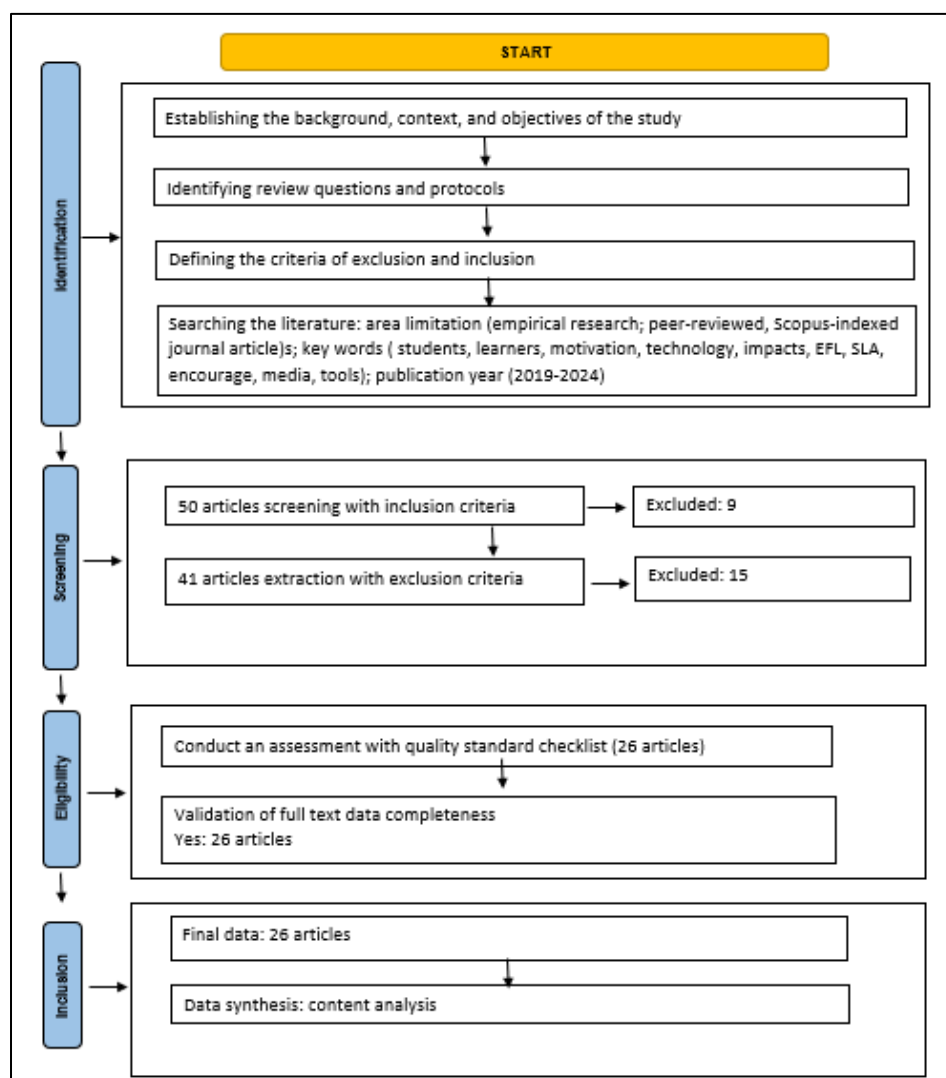

Figure 1: The PRISMA flow diagram of the systematic literature review

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) flow diagram was adopted as the reporting framework to ensure transparency and provide a clear procedural description of the systematic review. PRISMA facilitates a structured presentation of each stage of the review process, making it easier to follow and comprehend (Page et al., 2021; Haddaway et al., 2022). The review began with the identification phase, during which the research background, context, and objectives were established, followed by the formulation of review questions and protocols. Inclusion and exclusion criteria were then developed to define the scope of the study, following recommended practices for systematic reviews (Moher et al., 2009; Page et al., 2021). A literature search was conducted across several reputable databases, focusing on empirical studies published between 2019 and 2024. The initial search yielded 50 articles, after which nine were excluded during the screening stage, leaving 41 articles for detailed appraisal and data extraction. Applying the

exclusion criteria at this stage removed 15 additional articles, producing a final set of 26 eligible articles for analysis. All articles included underwent a quality assessment to ensure they met the established standards and were consistent with systematic review guidelines (Xiao & Watson, 2019). These 26 studies (see Appendix I) formed the primary dataset for the systematic review.

The data were analyzed using content analysis, a systematic research method designed to produce replicable and valid inferences from texts or other meaningful materials within their contexts of use (Krippendorff, 2018). Content analysis is widely applied in systematic reviews as it facilitates the organization, categorization, and interpretation of large volumes of textual data in a structured and objective manner (Elo & Kyngäs, 2008). This study employed quantitative content analysis among the various forms of content analysis, such as ethnographic, qualitative, and quantitative. This approach was selected because it allows for the systematic counting and classification of textual elements, making it particularly suitable for identifying trends, methodological patterns, and the distribution of theoretical frameworks or technology tools across studies (Neuendorf, 2017). Specifically, the selected articles were coded according to several predetermined categories aligned with the research questions, including publication year, research design, theoretical framework, types of technology tools, and reported motivational impacts. Frequencies and percentages were calculated to summarize the data, ensuring that the findings were descriptive and comparable across studies. A standardized coding scheme was applied to maintain objectivity and consistency, and all classifications were cross-checked to minimize potential bias (Stemler, 2001).

FINDING AND DISCUSSION
RQ 1: The methods used in the existing studies regarding technology and students' motivation.

The data extraction revealed that studies investigating the relationship between technology and L2 students' motivation employed diverse methodological approaches, with quantitative methods (n = 19) being the most dominant, followed by mixed-methods approaches (n = 7) (see Figure 2). Notably, no purely qualitative studies were identified in the dataset. The predominance of quantitative research, representing 19 out of 26 studies, indicates that this approach has been the prevailing trend in examining the relationship between technology implementation and students' motivation in EFL contexts.
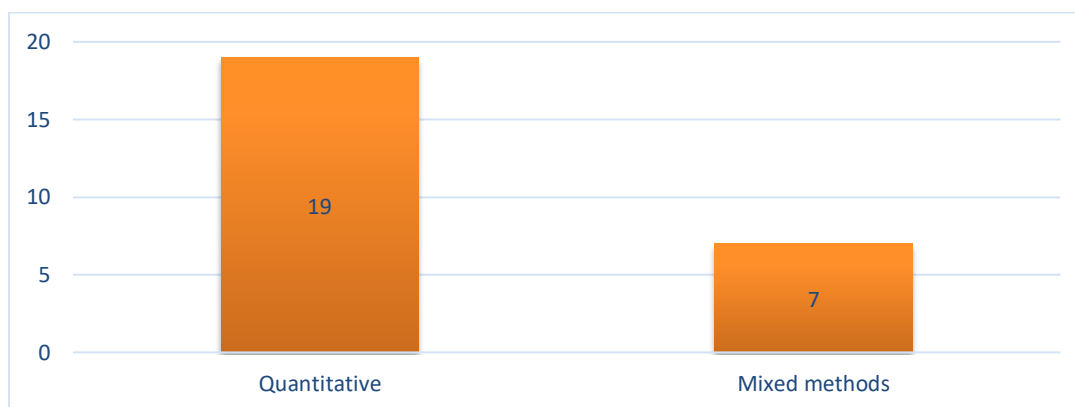
Figure 2. The research approach is found in the data

This finding aligns with previous review studies (Mahmoodi & Yousefi, 2022; Bahari, 2023; Hiromori et al., 2024), which also reported a dominance of quantitative approaches in research on motivation. One possible explanation is that many studies aimed to examine the effects of technology on students' motivation, leading researchers to employ experimental designs to test whether specific technology tools positively influenced motivation and, in some cases, learning outcomes (Creswell, 2015). Experimental studies are particularly suited to measuring cause-and-effect relationships, such as whether a technological intervention affects participants' motivation. However, quantitative approaches are often rigid and primarily describe trends (Creswell, 2015), making them less suitable for exploring the complexity of motivation, which requires deeper contextual and psychological insights. Consequently, there has been a growing trend toward mixed-methods research, which integrates quantitative data with qualitative approaches, such as interviews, to provide a more comprehensive understanding. Mahmoodi and Yousefi (2022) also highlighted this shift in motivational research, noting the increasing adoption of mixed methods to capture motivation's dynamic and context-dependent nature. This current review supports that observation, as mixed-methods studies were more frequently found in articles published from 2021 onward (e.g., Khojah & Thomas, 2021; Ozer & Badem, 2022; Wongsa & Son, 2022; Ebadijalal & Yousofi, 2022; Mirzaei et al., 2022; Ebadi & Amini, 2022; Ebadijalal & Moradkhani, 2023). Dörnyei and Ushioda (2013) similarly emphasized that mixed methods offer an invaluable approach for capturing the multifaceted and socially situated nature of L2 motivation in educational contexts.
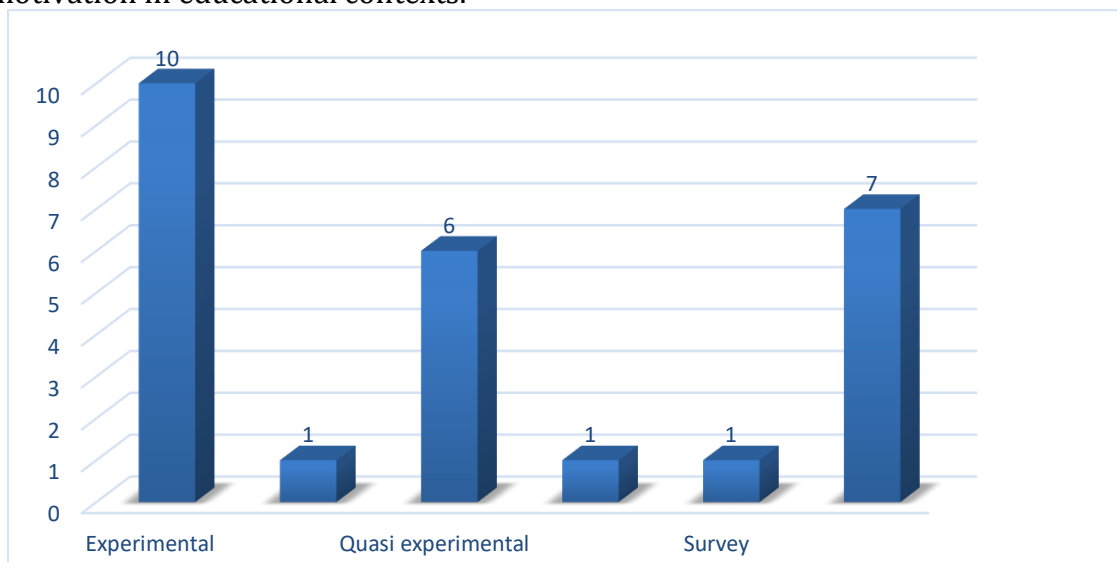

Figure 3. Research design is found in the data

Regarding research design, the studies reviewed employed various approaches, including experimental (38.5%), pre-experimental (3.8%), quasi-experimental (23.1%), survey (3.8%), cross-sectional (3.8%), and sequential explanatory mixed-methods designs (26.9%) (see Figure 1). Experimental research emerged as the most frequently used design, whereas pre-experimental, survey, and cross-sectional studies were the least common. This distribution suggests a strong preference for experimental approaches, reflecting researchers' interest in establishing causal relationships between technology use and students' motivation in EFL contexts.

RQ 2: The current motivation frameworks used by studies regarding technology and students' motivation

Figure 4 shows that various theoretical frameworks have been used in studies on technology and motivation over the past six years. The socio-educational framework was the most frequently adopted in five studies (Tavakoli et al., 2019; Wongsa & Son, 2022; Aysu, 2020; Dong et al., 2022). This preference may be attributed to the availability of Gardner's Attitude/Motivation Test Battery (AMTB), a well-established and reliable instrument commonly used within this framework. Moreover, Kim and Pae (2019) observed that in certain regions, particularly Eastern Asia, the cultural integration component emphasized in the socio-educational model remains highly valued. Interestingly, this finding contrasts with Boo et al. (2015), who reported that the L2 Motivational Self System (L2MSS), belonging to the socio-dynamic phase, was becoming more dominant at that time. This discrepancy may be because Boo et al. (2015) focused on L2 motivation research in general, rather than specifically examining studies on technology-mediated motivation.
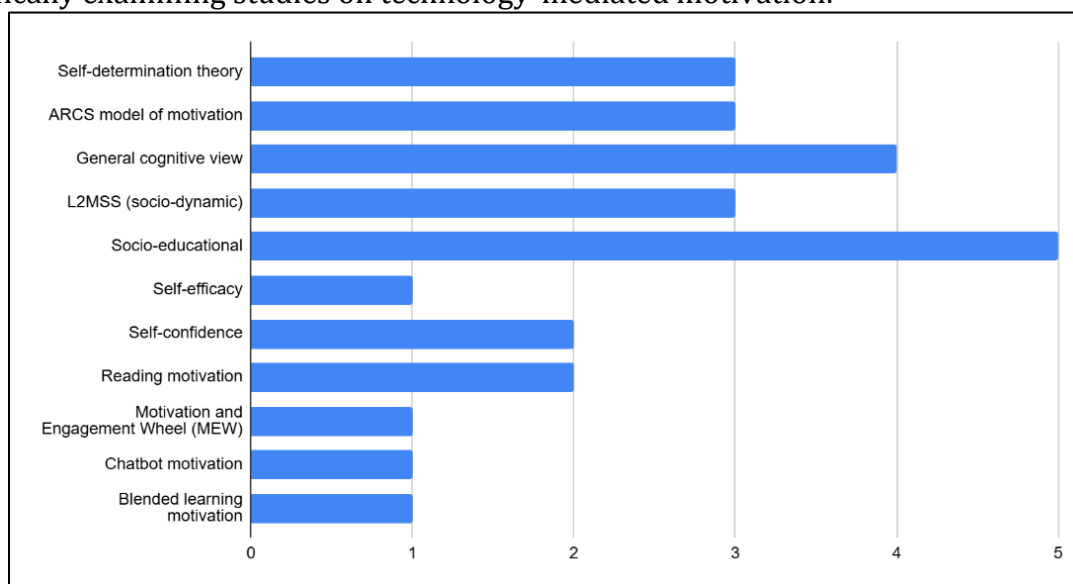

Figure 4. Motivation frameworks found in the data

The general cognitive view was the second most frequently applied framework, used in four studies (Ozer & Badem, 2022; Hung et al., 2023; Chen et al., 2022; Li, 2021). The Self-Determination Theory (SDT) appeared in three studies (Chen, 2020; Alamer et al., 2023; Khojah & Thomas, 2021), while the ARCS model of motivation was also adopted in three studies (Lai & Chang, 2021; Mirzaei et al., 2022; Zhang et al., 2022). The L2 Motivational Self System (L2MSS), representing the socio-dynamic perspective, was used in three studies as well (Lee & Lee, 2021; Ebadijalal & Moradkhani, 2023; Ebadijalal & Yousofi, 2022). Other frameworks appeared less frequently, such as self-confidence (two studies), reading motivation (two studies), and single-use frameworks including self-efficacy (Chen et al., 2021), the Motivation Engagement Wheel (MEW) (Jiang et al., 2024), Chatbot motivation (Ebadi & Amini, 2022), and blended learning motivation (Shang, 2021).

RQ 3: The impacts of technology on students' motivation in learning a second language

The findings indicate that the impacts of technology on students' motivation are varied. Most studies (n = 22) reported a positive relationship between technology use and

students' motivation (see Table 2). In contrast, three studies noted that technology had a small impact on improving motivation, and one study reported that technology did not significantly facilitate increased motivation. Overall, most evidence supports the view that technology tools can enhance students' motivation (Chen, 2020; Lai & Chang, 2021; Chen et al., 2022; Hung et al., 2023; Lee & Lee, 2021; Wongsa & Son, 2022; Zhang et al., 2023; Ebadi & Amini, 2022; Li, 2021; Tavakoli et al., 2019; Aysu, 2020; Jiang et al., 2024; Khojah & Thomas, 2021; Dong et al., 2022). Several studies further demonstrated that motivation enhanced through technology was associated with improved learning outcomes. For instance, Alamer et al. (2023) found that technology use increased both motivation and success in L2 learning, while technology positively influenced motivation and writing performance (Ebadijalal & Yousofi, 2022; Ebadijalal & Moradkhani, 2023; Mirzaei et al., 2022). Reading skills were also found to improve alongside motivation when technology was integrated into learning (Liman Kaban & Karadeniz, 2021; Patra et al., 2022), and similar results were reported for speaking skills (Chen et al., 2021). These findings align with previous reviews on L2 motivation, which noted that technology has been widely adopted as an alternative approach to enhance language learning and teaching (Vonkova et al., 2021). Bahari (2023) also emphasized the multiple affordances of technology in language learning, while Maulida et al. (2020) highlighted that positive attitudes toward technology could foster independent learning, particularly in reading. Moreover, Fauzan et al. (2022) observed that students were highly motivated when using technology such as Data-Driven Learning (DDL) or online corpora, which allowed them to explore word usage in authentic sentence contexts.

Table 2. Technology tools and the relationship between technology and motivation

No.	Authors	Tools	Type	Relation
1.	Chen (2020)	AR video-enhanced learning	Visual-based	Positive
2.	Lai & Chang (2021)	Aurasma AR App	Visual-based	Positive
3.	Chen et al. (2022)	Augmented Reality	Visual-based	Positive
4.	Hung et al (2023)	A visual prompt scaffolding-based VR (VPS-VR)	Visual-based	Positive
5.	Ebadijalal & Yousofi (2022)	Google Expedition	Visual-based	Positive
6.	Aysu (2020)	PowerPoint, videos	Visual-based	Positive
7.	Lee & Lee (2021)	Social media, digital games, youtube	Social media-based	Positive
8.	Chen et al. (2021)	Youtube clips and videos	Social media-based	Positive
9.	Dong et al. (2022)	Skype and Whatsapp	Social media-based	Positive
10.	Wongsa & Son (2022)	Drama-based activities using Facebook	Social media-based	Positive
11.	Alamer et al. (2023)	Whatsapp	Social media-based	Positive

12.	Ali & Bin-Hady, (2019)	Whatsapp	Social media-based	Positive
13.	Patra et al (2022)	Whatsapp	Social media-based	Positive
14.	Mirzaei et al (2022)	Edmodo	Social media-based	Positive
15.	Ebadi and Amini (2022).	CSIEC Chatbots	Chatbot	Positive
16.	Zhang et al (2023)	Chatbot, websites	Chatbot	Positive
17.	Li (2021)	Game-based vocabulary learning app.	Game-based	Positive
18.	Khojah and Thomas (2021).	Socrative app	Game-based	Positive
19.	Tavakoli et al. (2019)	online magazines/newspaper, news podcasts/vodcasts, online glosses/dictionaries, multimedia software, synchronous/asynchronous electronic communication	Website and meeting application	Positive
20.	Jiang et al (2024)	Online language learning with virtual classrooms (OLLVC), VC (Video Conference), Ketangpai, and Tencent	Website and meeting application	Positive
21.	Liman Kaban & Karadeniz (2021)	gamified reading practices, personalized reading practices, and PDF electronic reading practices	Combined tools	Positive
22.	Ebadijalal and Moradkhani (2023)	Google Docs and WhatsApp	Combined tools	Positive
23.	Shang (2021)	Moodle and Facebook	Social media-based	Small impact
24.	Hava (2021)	Edmodo	Social media-based	Small impact
25.	Al Ghaithi (2023)	Digital storytelling (DST)	Visual-based	Small impact
26.	Ozer and Badem (2022)	Online platforms	Meeting application	Negative

Although most studies reported positive relationships, some findings indicated that technology had only a small or even negative impact on students' motivation. Shang (2021) found that blended learning using Moodle and Facebook only slightly affected students' motivation. Similarly, Al Ghaithi (2023) reported that Digital Storytelling (DST) did not significantly enhance motivation. Hava (2021) observed that while Edmodo, a gamification platform, facilitated vocabulary, writing, and speaking development, it did not notably improve students' motivation because learners perceived it as meaningless, time-consuming, and difficult to use, indicating a negative motivational tendency. Moreover, Ozer and Badem (2022) found a negative relationship between technology use and motivation,

attributing it to the lack of social rewards and emotional interactions, such as laughter and eye contact, which are intrinsic motivators in traditional classrooms. These findings are consistent with earlier research. Hanus and Fox (2015) reported that classroom gamification could reduce intrinsic motivation over time. However, students began with similar motivation levels; those in gamified settings experienced a decline as the course progressed.

RQ 4: The technology-based tools used to enhance students' motivation in learning a second language

Six types of technology tools are identified as contributing to enhanced student motivation: visual-based tools, social media-based tools, chatbots, game-based applications, websites, and meeting applications. The first category, visual-based tools, includes Augmented Reality (AR), Virtual Reality (VR), Google Expedition, and PowerPoint. AR has been shown to increase students' intrinsic motivation in L2 learning (Chen, 2020) and to enhance self-efficacy, proactive learning, and learning value among proficient learners (Chen et al., 2022). The AR tool Aurasma also positively affected students' motivation and performance (Lai & Chang, 2021). Similarly, VR integrated with prompt scaffolding improved motivation by providing interactive learning environments (Hung et al., 2023). Google Expedition, another visual-based tool, increased students' confidence, general knowledge, and autonomy while reducing distraction and anxiety (Ebadijalal & Yousofi, 2022). Additionally, Aysu (2020) found that students using PowerPoint were more motivated than those in traditional teaching.

The second social media-based technology category includes YouTube, Skype, Facebook, WhatsApp, and Edmodo. Lee and Lee (2021) observed that students' preferences varied by education level: middle school students were more inclined to actively use English through social media and digital games, while university students preferred consuming English content on social media and YouTube. Supporting this, Chen et al. (2021) reported that YouTube enhanced motivation and speaking skills. Instant messaging apps, particularly WhatsApp, substantially impacted self-motivation and L2 learning success (Alamer et al., 2023), while combining tools like WhatsApp further increased motivation by offering additional learning opportunities beyond classroom settings (Ali & Bin-Hady, 2019). Mirzaei et al. (2022) found that Edmodo significantly improved students' motivation due to its flexibility, learner-centered approach, relaxed environment, borderless interaction, and collaborative features. Similarly, Wongsa and Son (2022) reported that Facebook increased motivation in drama-based activities by reducing stress and increasing enjoyment. These tools are closely linked to Mobile-Assisted Language Learning (MALL), which is highly flexible and conducive to increasing motivation and engagement (Bahari, 2023).

Chatbots represent the third type of technology integrated into L2 classrooms to enhance students' motivation. Ebadi and Amini (2022) reported that the Computer Simulation in Educational Communication (CSIEC) chatbot increased learners' motivation, enthusiasm, and confidence in learning English. Similarly, Zhang et al. (2023) found that chatbots effectively fostered motivation by offering human-like interaction, generating study plans, and providing high accessibility. However, their effectiveness in developing target knowledge was perceived to be slightly lower compared to websites. The fourth category is game-based media. Li (2021) demonstrated that a game-based vocabulary learning app improved students' motivation, while Liman Kaban and Karadeniz (2021) reported that gamified e-book reading significantly enhanced reading motivation. Likewise, Khojah and

Thomas (2021) observed positive changes in motivational behavior and attitudes when students used mobile tasks, particularly through the Socrative app.

The fifth category comprises websites and online meeting applications. In an experimental study, Tavakoli et al. (2019) implemented CALL-mediated Task-Based Language Teaching using online magazines, news podcasts/vodcasts, glossaries, multimedia software, and synchronous/asynchronous electronic communication, resulting in increased motivation among the experimental group. Jiang et al. (2024) similarly found that digital platforms such as Online Language Learning with Virtual Classrooms (OLLVC) and video conferencing tools (Ketangpai and Tecent) enhanced university students' motivation by enabling real-time interaction. Additionally, Dong et al. (2022) reported that CALL-based instruction via Skype fostered supportive learning environments, which increased motivation, reduced anxiety, and enhanced self-efficacy. The last category involves combinations of different tools. Integrating WhatsApp and Google Docs positively influenced students' motivation and collaborative writing (Ebadijalal & Moradkhani, 2023), while combining gamification and e-books also improved reading motivation (Liman Kaban & Karadeniz, 2021).

The findings suggest that the same technology tool can yield different motivational outcomes. For example, Edmodo, a gamified platform, produced contrasting results: Mirzaei et al. (2022) reported that Edmodo enhanced students' motivation and writing performance, whereas Hava (2021) found it had minimal motivational impact in digital storytelling activities. Both studies involved undergraduate students, yet differences in participant age (19–29 years in Mirzaei et al., compared to 18–21 years in Hava) and instructional procedures may explain the discrepancy. Mirzaei et al. conducted face-to-face writing sessions alongside Edmodo, while Hava relied solely on online sessions. Moreover, students in Hava's study perceived digital storytelling via Edmodo as difficult, meaningless, and time-consuming. These contrasting findings highlight the importance of teachers selecting tools that align with learners' needs and contexts to sustain motivation in L2 learning effectively.

CONCLUSION

This systematic review highlights that technology has generally positively impacted students' motivation in EFL classrooms, with most of the reviewed studies reporting enhanced engagement, self-efficacy, and positive attitudes toward language learning. Six categories of technology tools were identified as contributing to motivational gains: visual-based tools, social media-based tools, chatbots, game-based media, websites, online meeting applications, and combinations of multiple tools. Visual-based tools such as AR, VR, and Google Expedition stimulate intrinsic motivation and increase learners' confidence and autonomy. At the same time, social media platforms like WhatsApp, Skype, YouTube, and Facebook supported collaborative, learner-centered environments that reduced anxiety and fostered enjoyment. Chatbots, particularly CSIEC, promoted enthusiasm and confidence through human-like interaction and personalized study plans. In contrast, game-based applications, including gamified vocabulary apps and e-book reading, were associated with increased task engagement and positive attitudes. Websites and meeting applications, especially those integrated into CALL-based instruction, facilitated real-time interaction and supportive learning environments, improving motivation and self-efficacy. Combining multiple tools, such as WhatsApp with Google Docs or gamification with e-books, also positively affected motivation and specific language skills.

However, the findings also demonstrate that technology does not uniformly enhance motivation. Some studies reported minimal or even negative impacts, often due to usability issues, lack of meaningful interaction, or student perceptions of the tools as time-consuming and unengaging. The contrasting results regarding Edmodo illustrate that contextual factors such as learners' age, prior experience, instructional design, and delivery mode, play a critical role in determining motivational outcomes. These findings suggest that while technology offers significant potential to enhance motivation in EFL learning, its effectiveness depends on appropriate pedagogical integration, alignment with learners' needs, and consideration of socio-cultural and affective factors.

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