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# Digital Technologies and Self-Regulated Language Learning: A Systematic Review

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## Abstract

This study examined the role of digital technologies in facilitating self-regulated language learning (SRL), with a focus on identifying effective strategies and their impact on learner autonomy and language proficiency. Following the PRISMA guidelines, the review synthesized findings from peer-reviewed studies published between 2010 and 2025, drawn from databases, including Web of Science, Scopus, ERIC, ProQuest, and Google Scholar. The analysis uncovered three key themes: (1) technology tools supporting SRL, (2) strategies for promoting learner autonomy, and (3) the impact of technology-enhanced SRL on language proficiency. Tools such as Mobile-Assisted Language Learning (MALL), Computer-Assisted Language Learning (CALL), and Learning Management Systems (LMS) have been found to provide interactive, adaptive, and collaborative environments that enhance Self-Regulated Learning (SRL). The findings revealed that digital technologies support autonomous learning and contribute to increased learner motivation and improved language performance. The study concludes with pedagogical implications, emphasizing the need for strategic integration of technology and learner training to optimize outcomes.

**Keywords**: Technology-Assisted Language Learning, Learner Autonomy, MALL, CALL, LMS

# تکنالوژی‌های دیجیتال و یادگیری زبان به‌صورت خودتنظیم: مروری نظام‌مند

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## چکیده

این مقاله به بررسی نقش فناوری‌های دیجیتال در تسهیل یادگیری زبان به‌صورت خودتنظیم می‌پردازد و تمرکز آن بر شناسایی ابزارها، راهبردها، و تأثیر آن‌ها بر خودمختاری زبان‌آموزان و مهارت‌های زبانی آنان است. این مطالعه مرور نظام‌مند با پیروی از رهنمودهای PRISMA انجام شده و یافته‌های مطالعات انجام‌شده بین سال‌های ۲۰۱۰ تا ۲۰۲۵، از پایگاه‌های مانند Web of Science، Scopus، ERIC، ProQuest و Google Scholar گردآوری و تحلیل گردیده است. تحلیل داده‌ها سه محور اصلی را نمایان ساخت: (۱) ابزارهای تکنالوژیکی در یادگیری خودتنظیم زبان، (۲) راهبردهایی برای تقویت خودمختاری زبان‌آموزان، و (۳) تأثیر یادگیری خودتنظیم با پشتیبانی تکنالوژی بر مهارت‌های زبانی. ابزارهایی چون یادگیری زبان با کمک موبایل (MALL)، یادگیری زبان با کمک کمپیوتر (CALL) ، و سیستم‌های مدیریت یادگیری (LMS) محیط‌های تعاملی، تطبیقی و مشارکتی را فراهم ساخته‌اند که به تقویت رفتارهای یادگیری خودتنظیم منجر می‌شوند. یافته‌ها نشان داد که تکنالوژی‌های دیجیتال از یادگیری خودمختار پشتیبانی می‌کنند، و در افزایش انگیزه زبان‌آموزان و بهبود عملکرد زبانی آنان نقش دارند. این مطالعه در پایان پیامدهای آموزشی را بررسی کرده و بر لزوم ادغام راهبردمند تکنالوژی در آموزش زبان تأکید می‌ورزد.

**واژه‌های کلیدی:** یادگیری زبان با کمک تکنالوژی، خودمختاری زبان‌آموز، یادگیری زبان با کمک موبایل (MALL)، یادگیری زبان با کمک کمپیوتر (CALL)، سیستم‌های مدیریت یادگیری (LMS)

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## Introduction

The blending of technology in language learning has transformed traditional educational practices by offering learners greater opportunities for self-regulation and autonomy (Boekaerts, 2011; Dörnyei, 2020). Technology-assisted self-regulated learning (SRL) has emerged as a prominent concept in the field of education, allowing learners to independently plan, monitor, and evaluate their learning directions through digital tools and platforms (Zimmerman, 2002; Azevedo, 2015). This paradigm shift enables learners to engage with authentic language materials and interactive platforms, providing opportunities for more personalized and autonomous learning experiences that scaffold or, in some contexts, extend beyond traditional classroom instruction (Noori, 2019; Benson, 2013; Lai & Gu, 2011).

Self-regulated learning, as defined by Zimmerman (2000), involves a recurring process of goal setting, strategic action, and self-reflection, where learners actively manage their cognitive, metacognitive, and motivational processes (Oxford, 2017; Andrade & Evans, 2015). In the context of language learning, these self-regulatory strategies are crucial for achieving linguistic competence and fluency. The dawn of technology in education further broadens SRL by granting learners access to asynchronous learning environments, digital repositories, and interactive simulations, which support continuous learning outside traditional classroom boundaries (Lai, 2019; Godwin-Jones, 2018).

The interaction between technology and SRL in language education has been widely studied through platforms such as mobile-assisted language learning (MALL), computer-assisted language learning (CALL), and learning management systems (LMS) (Stockwell, 2016; Reinders & White, 2016). These technological applications enable learners to set individualized learning goals, receive real-time feedback, and adjust their strategies based on performance analytics (Li et al., 2022; Lee & Cho, 2020). Popular digital applications, such as Duolingo, demonstrate how technology can support certain features of SRL by enabling learners to track progress, identify gaps, and engage in self-correction (Vesselinov & Grego, 2019; Godwin-Jones, 2021).

Despite the potential of technology-assisted SRL, a significant lack of empirical studies remains that directly assess how effectively SRL supports the development of learner autonomy (Reinders, 2020; Lai & Zheng, 2018). While various studies have studied specific technologies and their applications, few have systematically analyzed how these tools collectively contribute to greater learner autonomy in language learning.

The growing accessibility of technology in education has catalyzed significant changes in language learning environments, creating opportunities for students to engage in self-directed and autonomous learning. Technology-mediated platforms provide learners with a diverse range of multimedia resources, real-time feedback, and adaptive learning pathways that align with their unique learning preferences (Godwin-Jones, 2019; Kukulska-Hulme & Shield, 2008). Additionally, digital technologies facilitate collaborative learning, enabling learners to connect with peers and instructors across geographical boundaries, thereby enriching the language learning experience through authentic communication and cultural exchange (Blake, 2013; Warschauer & Grimes, 2007).

CALL is a key aspect of technology-assisted SRL, providing global access to learning materials and practice opportunities through smartphones and tablets (Kukulska-Hulme, 2012; Burston, 2014). MALL allows learners to practice language skills in real-world contexts, bridging the gap between classroom instruction and everyday communication (Chen & Li, 2010). Similarly, CALL has evolved to include advanced applications such as virtual reality (VR) and augmented reality (AR), which engage learners in interactive language environments that promote their cognitive engagement and practical language use (Li & Wong, 2020; Godwin-Jones, 2021).

Furthermore, LMSs offer structured digital platforms that enable learners to set goals, track progress, and receive automated feedback on their performance (Li et al., 2022; Lee & Cho, 2020). These systems often integrate analytical tools that help learners identify their strengths and weaknesses. This, in turn, facilitates targeted improvements and strategic learning adjustments (Bannert, Reimann, & Sonnenberg, 2014).

However, despite the significant advancements in technology-assisted SRL, the extent to which these technologies truly develop learner autonomy remains underexplored. Studies have uncovered that while technology provides the infrastructure for self-regulated learning, actual SRL is still subject to learners' ability to set realistic goals, maintain motivation, and apply effective learning strategies (Reinders & White, 2016; Lai & Zheng, 2018).

Therefore, this systematic review has the following objectives:

- Examine the technological tools that support Self-Regulated Learning (SRL).
- Analyze the self-regulatory strategies used by language learners in technology-mediated environments.
- Evaluate the impact of technology-assisted SRL on learner autonomy and language proficiency.

The significance of this study lies in its thorough examination of how technology facilitates SRL in language education. In the twenty-first century, where digital platforms are increasingly integrated into educational practices, understanding the role of technology in fostering learner autonomy is crucial for educators, policymakers, and learners. This study not only synthesizes existing knowledge but also offers a structured analysis of practical technological tools and strategies that promote SRL in language contexts. Moreover, by identifying successful practices and potential research gaps, the study serves as a foundation for future research and practical implementation in technology-enhanced language learning environments.

## Research Methodology

This systematic review was conducted in line with the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, which offer an organized framework for authenticating the review process, minimizing selection bias, and increasing the replicability of the findings (Moher et al., 2009). The review process involved four stages:

- Identification: Relevant studies were retrieved from academic databases, including Web of Science, Scopus, ERIC, ProQuest,

and Google Scholar, using keyword combinations related to technology-assisted learning, SRL, and learner autonomy.

- Screening: Titles and abstracts were screened to exclude duplicates and studies unrelated to SRL or language learning.
- Eligibility: Full texts of potentially relevant articles were assessed against predefined inclusion criteria (e.g., focus on technology-assisted SRL in language learning, empirical basis, English language).
- Inclusion: Studies meeting all criteria were included in the final synthesis and data extraction phase.

***Search Strategy***

A thorough search strategy was used to retrieve studies published between 2010 and 2025 in peer-reviewed journals, peer-reviewed conference proceedings, and academic databases. Keywords and phrases used in the search included *"technology-assisted learning," "self-regulated language learning," "learner autonomy," "digital language learning tools,"* and *"technology in language education."* Boolean operators (AND, OR) (e.g., "SRL" OR "self-regulated learning" AND "language learning") were used to refine search results and confirm the inclusivity of related terms.

The search strategy was intended to retrieve studies across different technologies, including CALL, CALL, and Learning Management Systems (LMS), focusing on tools and strategies that support self-regulation in language learning.

***Inclusion and Exclusion Criteria***

The inclusion criteria required studies to be published between 2010 and 2025, with a specific focus on technology-assisted SRL in language learning contexts. Only studies that reported empirical findings using qualitative and quantitative designs related to learner autonomy, self-regulated learning strategies, or technological tools in language education were considered. Furthermore, all selected studies had to be available in English to ensure their inclusion in the analysis.

The exclusion criteria, on the other hand, ruled out studies that did not focus on language learning or SRL. Additionally, literature reviews,

opinion pieces, and editorials without empirical data were excluded, as the primary focus was on evidence-based findings. Studies published in non-peer-reviewed sources were also omitted. Finally, any duplicates recognized during database searches were removed to evade redundancy in the analysis.

### *Data Extraction and Analysis*

Data extraction was performed via a structured coding sheet developed based on standard practices for systematic reviews and modified to the study's objectives. The coding sheet involved predefined fields such as author(s), year of publication, research design, technology type, SRL strategies, learner autonomy measures, key findings, and reported limitations. The extraction framework was informed by previous systematic reviews in the field (Yalçın, 2022; Abd Halim et al., 2023). The extracted data were then systematically analyzed to identify recurring themes related to technology-assisted self-regulation and its impact on language learning outcomes. A narrative synthesis approach was employed to interpret the findings, supported by a thematic analysis to identify patterns across studies. This process was designed to ensure transparency and replicability in alignment with PRISMA guidelines.

### *Quality Assessment*

To warrant the quality and reliability of the included studies, a quality assessment framework based on the Mixed Methods Appraisal Tool (MMAT) was applied. The evaluation engrossed on core methodological foundations, including the clarity of research questions, appropriateness of the study design, transparency in data collection and analysis procedures, and the logical coherence of conclusions. Rather than employing the complete MMAT scoring system, studies were reviewed qualitatively to identify major methodological weaknesses. This flexible approach accommodated the diverse research designs represented in the dataset while maintaining a consistent standard for inclusion.

### *Synthesis of Results*

The results were synthesized thematically to address the research objectives, focusing on the technological tools, self-regulatory strategies, and impacts on learner autonomy in language learning. Sub-themes were

generated through a coding process applied to the extracted data, using both inductive and deductive approaches. Two independent coders reviewed the data to identify recurring patterns and ensure reliability. Any discrepancies in coding were discussed and resolved through consensus to uphold reliability and alignment with the research objectives.

### *Limitations of the Study*

While this systematic review offers valuable insights, certain limitations should be acknowledged. The inclusion criteria were limited to peer-reviewed studies published in English, which may have led to the exclusion of relevant research published in other languages. The scope of the review was also bounded by the availability and accessibility of published data, which may have influenced the comprehensiveness of the findings. Furthermore, variations in study design, sample characteristics, and methodological rigor among the included studies may have affected the consistency and generalizability of the conclusions.

## Findings

This study examined a diverse body of research that focuses on the intersection of technology and SRL. The findings are organized around three major themes emerging from the literature: (1) Technology Tools for SRL, (2) Strategies for Enhancing Learner Autonomy through Technology, and (3) Impact of Technology-Assisted SRL on Language Proficiency Outcomes. Together, these themes illustrate how digital tools support learners in managing their language learning processes, applying self-regulated strategies, and potentially enhancing linguistic competence through more autonomous learning environments.

### *Technology Tools for SRL*

The proliferation of digital technologies in education has significantly transformed the landscape of language learning. This review identified several categories of technology tools that contribute meaningfully to supporting SRL, including mobile applications (MALL), CALL platforms, learning management systems (LMS), and interactive web-based platforms.

CALL applications, such as Duolingo, are widely regarded for their accessibility and user-friendly interfaces, which promote self-paced, bite-sized learning (Godwin-Jones, 2021; Vesselinov & Grego, 2019). These apps incorporate multiple SRL features such as goal-setting modules, reminders, adaptive learning algorithms, and instant feedback loops, enabling learners to monitor their progress and adjust their learning plans accordingly (Stockwell, 2016). Moreover, the portability of mobile devices enables learners to engage with language materials at any time and from anywhere, thereby enhancing the flexibility and convenience of learning.

In addition to mobile apps, CALL platforms provide more comprehensive language learning environments, often integrating multimedia resources, interactive exercises, and virtual tutors (Li et al., 2022; Lee & Cho, 2020). Platforms such as *Rosetta Stone*, *Busuu*, and *Transparent Language* often feature structured courses that guide learners through progressively complex language concepts while supporting self-regulated learning (SRL) strategies through customizable practice schedules, self-assessment quizzes, and community forums. The integration of social elements fosters collaborative learning, a crucial dimension of SRL, as learners can exchange feedback, share resources, and motivate one another in online communities.

Learning Management Systems (LMSs), such as Moodle, Google Classroom, Blackboard, and Canvas, serve as virtual classrooms that structure language courses and provide learners with resources, assessments, and communication tools. LMS platforms facilitate asynchronous learning, enabling learners to pace themselves independently while accessing synchronous sessions or instructor feedback as needed (Azevedo, 2015; Lai & Zheng, 2018). The ability to track completion rates, grades, and participation fosters self-monitoring, a critical aspect of SRL, while discussion forums and group projects encourage social engagement and peer-supported regulation.

Furthermore, web-based platforms such as *Quizlet*, *Kahoot!*, and *Edmodo* have gained traction due to their interactive and gamified approaches to language practice. These tools often focus on discrete language skills such as vocabulary acquisition and grammar drills but also offer features that

encourage learners to set targets, self-test, and review errors systematically (Noori and Azimi, 2023; Lai, 2019; Godwin-Jones, 2018). For example, *Quizlet*'s spaced repetition flashcards facilitate long-term retention, while *Kahoot!*'s competitive quizzes engage learners' motivation and sustain attention.

**Technological Affordances and SRL Development.** The affordances of these technologies align strongly with SRL theories emphasizing autonomy, strategic planning, and metacognitive control (Zimmerman, 2000). Adaptive learning technologies, which tailor difficulty and content based on ongoing learner performance, provide personalized challenges that prevent frustration or boredom, promoting sustained engagement (Andrade & Evans, 2015; Azevedo, 2015). This customization supports the crucial SRL phase of goal setting by aligning learning tasks with learner readiness.

Gamification elements—such as points, badges, and leaderboards—integrated into many language learning apps foster intrinsic motivation and make the learning process enjoyable (Dörnyei, 2020; Reinders, 2020; Noori, 2025). The motivational benefits of gamified platforms have been linked to increased persistence in language study, longer task completion times, and improved attitudes toward learning (Lai & Zheng, 2018). These motivational supports enable learners to engage in deliberate practice and reflection, two essential SRL processes.

The asynchronous, on-demand nature of technology-enabled learning allows learners to take control of their study schedules, a fundamental condition for self-regulation (Lee & Cho, 2020). This flexibility is essential in contexts where formal instruction may be insufficient or sporadic. Learners can thus maintain regular practice habits, revisiting content as needed and managing their learning environment to fit personal constraints (Godwin-Jones, 2018).

Self-monitoring is facilitated by real-time analytics provided in many apps and platforms. For instance, *Duolingo* tracks streaks, vocabulary mastered, and areas requiring review, providing learners with transparent progress indicators and immediate corrective feedback (Vesselinov & Grego, 2019). This feedback loop enhances learners' metacognitive awareness, enabling them to proactively adapt their learning strategies.

**Collaborative and Social Dimensions of Technology.** Technology also extends SRL beyond individual study by boosting social interaction and collaborative regulation. Tools like *Google Classroom*, *Edmodo*, and *Microsoft Teams* provide virtual spaces where learners can engage in peer discussions, collaborative projects, and peer feedback (Reinders & White, 2016; Lai, 2019). These social learning environments encourage co-regulation, where learners mutually support each other's goal-setting, strategy use, and problem-solving.

Such collaborative tools enable learners to share resources, discuss challenges, and scaffold each other's understanding, thereby blending individual SRL processes with social regulation (Baker & Lund, 2019). For example, asynchronous discussion forums allow reflective dialogue about language challenges and strategy effectiveness, reinforcing metacognitive skills (Zheng et al., 2021).

Moreover, synchronous communication features (chat, video conferencing) embedded in these platforms allow learners to coordinate study schedules, practice speaking skills, and receive immediate peer or instructor feedback, thereby integrating social presence into SRL (Reinders & White, 2016). The sense of community generated through these interactions boosts motivation and accountability, further strengthening self-regulatory behavior.

### *Strategies for Enhancing Learner Autonomy*

Learner autonomy—defined as the capacity to take charge of one's learning—is at the heart of SRL, and technology plays a critical role in facilitating the strategic behaviors that underpin autonomy. The research consistently highlights key SRL strategies enhanced by technology, including goal setting, self-monitoring, time management, and reflective learning (Zimmerman, 2000; Oxford, 2017).

Many mobile apps and online platforms incorporate features that scaffold goal setting. For example, *Duolingo* prompts learners to define daily practice goals and sends reminders to maintain consistency (Godwin-Jones, 2018). These digital platforms encourage learners to develop disciplined study routines. Additionally, learners can set customized

targets based on their proficiency level and learning needs, promoting personalized goal orientation and self-efficacy (Lai, 2019).

Self-monitoring, a fundamental skill-related learning (SRL) process, is supported by interactive quizzes, immediate feedback, and performance dashboards. Digital flashcard systems such as *Quizlet* enable learners to test themselves repeatedly, identify areas of difficulty, and revise accordingly (Benson, 2013; Lai & Gu, 2011). The transparency of performance data helps learners develop accurate self-assessment skills, which are crucial for adapting study methods and resource use.

The promotion of reflective learning through digital means is a growing trend. Technologies such as e-portfolios, blogs, and online learning journals provide platforms where learners can record their experiences, analyze errors, and plan future learning strategies (Reinders & White, 2016). Such reflective practices enhance metacognitive awareness by making learners conscious of their cognitive processes, emotional responses, and strategic choices (Tseng et al., 2020).

**Enhancing Motivation and Learner Control.** Technological environments have a profound impact on learner motivation, which is a key driver of sustained SRL. According to Dörnyei (2020), gamified apps not only reward achievement but also foster intrinsic motivation by making learning enjoyable and meaningful. Research has shown that learners in gamified environments exhibit increased persistence, lower anxiety, and greater willingness to tackle challenging tasks (Lai & Zheng, 2018).

Technology also enhances the learner's sense of control by enabling customization. Learners can select topics, adjust the difficulty level, and choose learning modalities that suit their preferences and goals (Andrade & Evans, 2015). This autonomy-supportive environment aligns with Self-Determination Theory, which posits that perceived autonomy enhances motivation and engagement (Deci & Ryan, 2000).

Time management is another SRL skill supported by digital tools. Calendar integrations, reminders, and progress trackers embedded within learning apps help learners allocate study time efficiently, balance language learning with other responsibilities, and meet deadlines (Lai,

2019). Such features encourage disciplined, planned learning, which is vital for long-term progress.

***Collaborative and Social Strategies in SRL.*** While autonomy emphasizes individual agency, SRL also benefits from social interactions mediated through technology. Group-based learning activities facilitated by digital platforms enable learners to co-regulate learning by setting shared goals, monitoring group progress, and negotiating strategies (Baker & Lund, 2019; Zheng et al., 2021).

Social presence, created through the use of synchronous and asynchronous communication tools, fosters emotional and cognitive engagement that is critical to SRL. Real-time chats, video calls, and discussion forums provide venues for exchanging feedback, clarifying doubts, and offering encouragement (Reinders & White, 2016). These interactions support motivation and accountability, helping learners maintain consistent study habits.

### *Impact of Technology-Assisted SRL on Language Proficiency*

A substantial body of evidence indicates that technology-assisted SRL contributes positively to various dimensions of language proficiency. Studies consistently report that learners using MALL and CALL applications achieve notable gains in vocabulary acquisition, grammar mastery, listening comprehension, and communicative competence compared to traditional instruction alone (Vesselinov & Grego, 2019; Li et al., 2022).

For example, learners using vocabulary apps with spaced repetition algorithms demonstrate significantly improved retention and recall compared to rote memorization methods (Lai & Gu, 2011; Godwin-Jones, 2018). The immediate feedback and adaptive difficulty adjustments allow learners to practice at an optimal challenge level, thereby maximizing learning efficiency.

Moreover, listening and speaking skills have benefited from technology-mediated SRL through access to authentic audio-visual materials and speech recognition tools (Tseng et al., 2020). Platforms like *Speechling* and *Rosetta Stone* provide pronunciation feedback and opportunities for

repeated speaking practice, encouraging learners to self-correct and refine oral skills independently.

**Reading and writing proficiency** have also been enhanced by technology-facilitated self-regulation. Tools that provide grammar and style checking, such as *Grammarly* and *ProWritingAid*, empower learners to identify and correct errors autonomously, reinforcing learning through error analysis and revision (Andrade & Evans, 2015). Online discussion forums and collaborative writing platforms further motivate learners to produce meaningful written work while receiving feedback from peers and instructors.

***Longitudinal and Contextual Factors.*** Longitudinal studies emphasize that sustained engagement with technology-supported SRL is critical for enduring language development (Li et al., 2022). Learners who maintain regular self-regulated practice over months or years exhibit more robust gains and transfer of language skills to authentic communicative contexts.

Contextual factors such as learner age, motivation, cultural background, and technological literacy influence the effectiveness of technology-assisted SRL (Dörnyei, 2020; Lai, 2019). For example, younger learners tend to benefit more from gamified and interactive platforms, whereas adult learners may prefer structured Learning Management System (LMS) courses with clear learning pathways.

The digital divide and access issues remain challenges, particularly in resource-constrained contexts. However, the increasing availability of mobile technologies and internet connectivity worldwide is gradually mitigating these barriers, making technology-enhanced SRL more feasible and equitable (Godwin-Jones, 2021).

## Discussion

The findings of this systematic review offer significant insights into how technology facilitates SRL, enhances learner autonomy, and positively impacts language proficiency. The analysis demonstrated that technology tools, such as CALL, LMSs, and other platforms, serve as practical tools for promoting SRL strategies, fostering learner autonomy, and supporting communicative competence (Stockwell, 2016; Reinders & White, 2016).

### *Critical Analysis of Technology Tools and SRL*

The review highlights that MALL applications, such as Duolingo, Memrise, and Babbel, offer learners flexible, self-paced learning environments that facilitate regular practice and progress tracking (Vesselinov & Grego, 2019; Godwin-Jones, 2021). These platforms enable learners to set personalized goals, monitor their progress, and adjust their learning strategies as needed, aligning well with Zimmerman's (2000) model of SRL. This technological affordance is particularly relevant for language learners in contexts where traditional classroom instruction is limited or inconsistent (Lai, 2019). The convenience and accessibility of MALL tools also contribute to higher engagement rates, allowing learners to practice language skills in short, manageable sessions throughout the day (Godwin-Jones, 2018).

Furthermore, CALL platforms such as Rosetta Stone, Busuu, and Transparent Language integrate interactive lessons and community-based learning that encourage self-regulation through structured activities and peer collaboration (Li et al., 2022; Lee & Cho, 2020). These tools not only provide access to authentic language resources but also offer adaptive learning paths that cater to individual learner needs, enhancing motivation and persistence in language learning (Azevedo, 2015; Reinders, 2020). The interactive nature of CALL environments promotes deep learning by allowing learners to engage with materials dynamically, reinforcing vocabulary, grammar, and pronunciation through repetition and interactive feedback (Stockwell, 2016).

Learning Management Systems (LMSs), such as Moodle, Blackboard, and Canvas, significantly contribute to SRL by facilitating asynchronous learning opportunities. These systems allow learners to manage their study schedules, access learning materials at their convenience, and engage in reflective practices through discussion forums and digital portfolios (Lai & Zheng, 2018; Azevedo, 2015). LMS platforms also support teacher-learner interactions, enabling instructors to provide feedback and scaffold learning experiences that encourage self-monitoring and goal-setting (Reinders & White, 2016). The ability to access assignments, participate in interactive quizzes, and receive instantaneous feedback further

promotes self-regulatory behaviors essential for language acquisition (Godwin-Jones, 2021).

### *Technological Affordances and SRL Development*

One of the significant technological affordances in SRL is the provision of interactive and adaptive learning environments. For instance, adaptive learning systems, which are often integrated into CALL and LMS platforms, tailor content to the learner's proficiency level, helping them practice at an optimal difficulty (Andrade & Evans, 2015; Azevedo, 2015). This customization allows learners to progress at their own pace, adjusting the complexity of tasks based on real-time performance, which aligns with principles of self-regulated learning (Zimmerman, 2000).

Gamified learning environments are another critical aspect, encouraging motivation through reward systems such as badges, leaderboards, and achievement milestones (Dörnyei, 2020; Reinders, 2020). Research indicates that gamification not only sustains learner engagement but also helps learners set realistic goals and evaluate their progress effectively (Lai & Zheng, 2018). Platforms like Kahoot! and Quizlet leverage gamified elements to reinforce vocabulary and grammar, making repetitive practice more engaging and less monotonous (Godwin-Jones, 2018).

The self-paced learning opportunities afforded by technology are particularly advantageous for learners with varying schedules and learning preferences. Digital platforms enable asynchronous learning, allowing students to revisit challenging concepts, practice language skills, and track their progress independently of classroom constraints (Lee & Cho, 2020). This flexibility is particularly beneficial in contexts where classroom instruction is limited or irregular, as learners can maintain consistent practice without time constraints (Godwin-Jones, 2018).

Another core component facilitated by technology is self-monitoring. Applications like Duolingo and Memrise allow learners to track their achievements and adjust their strategies accordingly (Vesselinov & Grego, 2019). This real-time feedback mechanism enhances learners' ability to effectively regulate their learning paths, reinforcing self-correction and strategy adaptation as integral aspects of autonomous learning (Reinders & White, 2016).

### *Collaborative and Social Dimensions of Technology-Enhanced SRL*

The review also emphasizes the importance of collaborative learning in technology-assisted SRL. Collaborative tools such as Google Classroom, Edmodo, and Microsoft Teams promote a sense of community by enabling peer interaction, discussion forums, and collaborative projects (Reinders & White, 2016; Lai, 2019). These platforms serve as virtual spaces where learners can share resources, engage in peer assessments, and support each other's learning journeys, fostering a sense of accountability and mutual support.

Research indicates that collaborative learning environments not only enhance SRL skills but also contribute to language proficiency through peer feedback and social learning mechanisms (Lee & Cho, 2020). Engaging in real-time discussions and collaborative problem-solving activities helps learners practice communicative skills in a supportive environment, mirroring authentic language use (Stockwell, 2016).

The integration of social media platforms, such as WhatsApp, Telegram, and Facebook Groups, has also been noted to enhance SRL by enabling real-time communication and collaborative study practices outside formal learning environments (Lai, 2019; Godwin-Jones, 2018). These platforms allow learners to share language learning tips, exchange vocabulary lists, and engage in collective problem-solving, thereby extending SRL strategies beyond the classroom.

### Implications for Language Learning and Teaching

The integration of technology in SRL offers transformative possibilities for language education. First, it democratizes access to quality language learning resources, particularly in regions where educational infrastructure is limited (Godwin-Jones, 2018). Moreover, the ability to self-regulate through digital platforms empowers learners to take ownership of their learning, leading to greater autonomy and improved language proficiency (Benson, 2013; Reinders & White, 2016).

For educators, the findings suggest the need to incorporate digital tools into curricula to promote SRL strategically. This involves not only the adoption of MALL and CALL technologies but also the development of

learner training programs that emphasize self-monitoring, goal setting, and reflective learning (Oxford, 2017).

**Suggestions for Future Research**

Future research should investigate the impact of technology-assisted SRL in diverse cultural and linguistic contexts to understand its broader implications. Longitudinal studies are also recommended to examine the sustainability of SRL strategies over time. Furthermore, qualitative research focusing on learner perceptions and contextual barriers could provide deeper insights into the effectiveness of technological interventions in SRL.

**Conclusion**

This systematic review has explored the role of technology in facilitating SRL, focusing on the tools, strategies, and impacts on learner autonomy and language proficiency. The findings highlight that technology-enhanced platforms, such as CALL, LMS, and other similar tools, serve as powerful enablers of self-regulated learning by providing interactive, adaptive, and flexible learning environments.

One of the critical insights from this review is the ability of digital tools to promote autonomous learning behaviors. MALL applications, such as Duolingo, Babbel, and Memrise, have been reported to be effective in supporting self-paced study, providing immediate feedback, and facilitating goal-setting —core components of SRL (Vesselinov & Grego, 2019; Godwin-Jones, 2021). Similarly, CALL platforms and LMS environments promote collaborative learning, reflective practices, and strategic self-monitoring that align with Zimmerman's (2000) model of SRL.

The implications for language learning are substantial. Technology not only democratizes access to quality learning resources but also empowers learners to take ownership of their educational journeys. This shift towards learner autonomy reflects broader changes in educational paradigms, emphasizing self-directed learning and lifelong skills development.

However, the review identified gaps in the literature, particularly in the exploration of technology-assisted SRL across diverse cultural and

linguistic contexts. Future research should address these gaps through longitudinal studies and qualitative research that capture learner experiences and contextual barriers to technology adoption.

In a nutshell, technology-assisted SRL represents a transformative shift in language education. By supporting autonomous learning behaviors, enhancing self-regulatory strategies, and providing flexible access to language learning opportunities, technology holds the potential to redefine traditional boundaries of language acquisition. As digital tools continue to evolve, further investigation into their pedagogical integration and cross-cultural application will be crucial for maximizing their impact on language learning outcomes.

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