



Self-Regulated Learning in Technology-Mediated EFL Education: An Empirical Investigation

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Abstract

Background: The growing integration of digital technologies, particularly generative AI tools such as ChatGPT, into English as a Foreign Language (EFL) instruction has shifted greater responsibility onto learners to independently plan, monitor, and manage their own learning process. Within this shift, self-regulated learning (SRL) has emerged as a critical factor determining how effectively EFL learners benefit from technology-mediated environments. However, empirical evidence quantifying the strength of the relationship between students' technology-mediated learning engagement and their self-regulated learning remains limited, particularly at the university level.

Aim: This study aimed to examine the relationship between technology-mediated learning (specifically, university EFL students' use of ChatGPT and related digital tools) and self-regulated learning, and to determine whether technology-mediated learning significantly predicts students' self-regulated learning.

Method: A quantitative correlational design was employed. Participants consisted of 200 university students enrolled in EFL-related courses, selected through convenience sampling. Data were collected using a self-report questionnaire comprising a Technology-Mediated Learning scale (10 items) and a Self-Regulated Learning scale (20 items), both rated on a five-point Likert scale. Data analysis included descriptive statistics, reliability testing using Cronbach's alpha, Pearson product-moment correlation, and simple linear regression.

Results: Both instruments demonstrated excellent internal consistency ($\alpha = .921$ and $\alpha = .934$, respectively). Participants reported relatively high levels of technology-mediated learning ($M = 3.84$, $SD = 0.61$) and self-regulated learning ($M = 3.76$, $SD = 0.58$). A statistically significant, moderate-to-strong positive correlation was found between the two variables ($r = .642$, $p < .001$). Simple linear regression further revealed that technology-mediated learning significantly predicted self-regulated learning, accounting for 41.2% of its variance ($R^2 = .412$, $F(1, 198) = 165.05$, $p < .001$).

Conclusion: Technology-mediated learning engagement is significantly and positively associated with, and predictive of, self-regulated learning among university EFL students. These findings suggest that deliberately integrating and scaffolding technology-mediated tools, including AI-assisted platforms, may support the development of learners' self-regulatory capacity in EFL education. Given the correlational nature of the design, further longitudinal and experimental research is recommended to clarify the causal direction of this relationship.

Introduction

The rapid integration of digital technologies into language classrooms has fundamentally reshaped how learners of English as a Foreign Language (EFL) engage with instructional content, practice materials, and feedback. Learning management systems, mobile applications, and AI-assisted tools now allow EFL learners to study beyond the boundaries of the physical classroom, extending opportunities for practice, exposure, and personalized pacing (An et al., 2020). At the same time, this expanded access places greater responsibility on

learners themselves to plan, monitor, and evaluate their own learning process, since technology-mediated environments typically offer less direct teacher oversight than conventional face-to-face instruction (Lai & Gu, 2011). This shift has drawn growing scholarly attention to the construct of self-regulated learning (SRL) as a critical determinant of success in digitally mediated language education.

Self-regulated learning refers to the self-generated thoughts, feelings, and actions that learners plan and adapt cyclically in pursuit of their own learning goals (Zimmerman, 1990). Rather than treating learning as something that happens to students, the SRL framework positions learners as active agents who set goals, select strategies, monitor progress, and reflect on outcomes across the phases of forethought, performance, and self-reflection (Zimmerman, 2002). Within language education specifically, this agentic view of learning aligns closely with long-standing pedagogical interest in learner autonomy, yet SRL offers a more fine-grained, process-oriented lens for understanding how learners regulate cognition, motivation, and behavior while acquiring a second or foreign language.

The proliferation of technology-mediated instruction has made SRL an especially salient concern for EFL research. Because online and blended environments remove many of the structural supports that regulate behavior in traditional classrooms, learners must exercise stronger independent regulation of their environment, time, and study strategies to succeed (Barnard et al., 2009). Empirical work has responded to this need by developing and validating instruments to capture SRL in digital contexts and by documenting the specific strategies EFL learners deploy when using technology outside class, including goal commitment, resource regulation, and metacognitive monitoring (Lai & Gu, 2011; An et al., 2020). Subsequent studies have extended this line of inquiry by examining how teachers can shape learners' self-directed technology use (Lai, 2015) and by building conceptual frameworks for cultivating such self-direction across diverse technological tools (Lai, 2013).

A growing body of empirical evidence links SRL to meaningful language-learning outcomes in technology-mediated settings. Studies have shown that EFL learners' online self-regulation is closely associated with their self-efficacy beliefs, which in turn shape learning engagement and achievement (Su et al., 2018; Xu et al., 2022). Structural equation modeling research further indicates that learner characteristics interact with online self-regulation to predict performance and satisfaction in digitally delivered language courses (Wang & Zhan, 2020; Zheng & Xiao, 2024). Complementing these findings, experimental research on mobile-assisted language learning demonstrates that sustained technology use can itself strengthen learners' self-regulatory capacity over time, creating a reciprocal relationship between tool use and regulatory skill (Lei et al., 2022).

Despite this expanding literature, systematic reviews suggest that research on SRL in technology-mediated EFL contexts remains fragmented, with considerable variation in the instruments used, the strategies examined, and the technological environments studied (Hunutlu, 2023). Many existing studies also rely on cross-sectional, single-context designs, leaving open questions about how SRL functions across different platforms, proficiency levels, and cultural settings, and about which specific regulatory strategies most reliably predict language achievement (Kurt & Tomak, 2022; Yu, 2023). These gaps point to the need for further empirical investigation that examines SRL not only as a general disposition but as a set of measurable, context-sensitive behaviors within technology-mediated EFL learning.

The present study addresses this need by empirically investigating self-regulated learning among EFL learners in a technology-mediated instructional context. Specifically, it examines the strategies learners employ to regulate their learning, the relationship between these strategies and language learning outcomes, and the factors that predict variation in learners' capacity for self-regulation. By grounding the investigation in established SRL theory while attending to the distinctive demands of digital language learning environments, this study

aims to contribute both theoretical clarity and practical guidance for designing technology-mediated EFL instruction that more effectively supports learner self-regulation.

Literature Review

Theoretical Foundations of Self-Regulated Learning

Beyond Zimmerman's social-cognitive account, several other influential models have shaped the field's understanding of SRL. Pintrich's framework conceptualizes self-regulation as unfolding across four cyclical phases—planning, monitoring, control, and reflection—each operating over the domains of cognition, motivation, behavior, and context, offering one of the few models that explicitly incorporates the learning environment as a regulated component (Pintrich, 2000). Around the same period, Winne and Hadwin proposed an information-processing model in which studying is treated as a recursive sequence of task perception, goal-setting, strategy enactment, and metacognitive monitoring, emphasizing how learners' evolving cognitive conditions shape subsequent regulatory decisions (Winne & Hadwin, 1998).

Comparative reviews of these and other SRL models converge on the conclusion that, despite differing theoretical emphases, all treat self-regulation as an active, goal-directed, and adaptable process that can, in principle, be taught and strengthened through instructional support (Panadero, 2017). This theoretical plurality has proven useful for language education researchers, who have drawn selectively on different models depending on whether their focus is cognitive strategy use, motivational regulation, or environmental structuring.

Measuring Self-Regulation in Language Learning Contexts

Because SRL is a multidimensional construct, much foundational work in this area has focused on developing valid instruments for its measurement. In the specific domain of foreign language learning, an English/Persian questionnaire was developed and validated through exploratory and confirmatory factor analysis, yielding thirteen sub-scales spanning motivation, memory strategies, self-monitoring, and help-seeking, thereby providing language education researchers with a psychometrically grounded, domain-specific alternative to generic SRL scales (Salehi & Jafari, 2016). Complementary bibliometric work mapping nearly 650 EFL-related SRL studies indicates a marked acceleration of research output over the past decade, with instrument development and validation constituting one of the field's most active thematic clusters (Zhong, 2025).

A related bibliometric and content analysis of strategy-based instruction and SRL in second- and foreign-language teaching similarly finds that measurement and technology-assisted learning have emerged as dominant research foci, while calling for more longitudinal and mixed-methods designs to complement the field's predominantly cross-sectional, self-report base (Chen et al., 2025).

Self-Regulation in Online and Distance Language Learning

A substantial body of research has examined how SRL functions specifically within online and distance-delivered language courses. A systematic review of studies conducted in online higher education environments found that several SRL strategies, most notably time management, metacognitive monitoring, and effort regulation, correlate positively, if modestly, with academic achievement, underscoring that not all regulatory behaviors matter equally for outcomes (Broadbent & Poon, 2015). Within EFL-specific distance education, Turkish university students enrolled in distance courses reported moderate to high levels of self-regulated online learning, with variation linked to learners' study habits and prior exposure to online formats (Kulusaklı, 2022).

Complementing this survey-based evidence, an analysis of learners' actual digital-resource use within an online language course found that greater self-regulation of resource use was directly associated with improved learning outcomes, providing behavioral

corroboration for findings based on self-report instruments alone ([Hromalik & Koszalka, 2018](#)).

Mobile-Assisted Language Learning and Self-Regulatory Capacity

Mobile technologies occupy a prominent place in the technology-mediated SRL literature because they extend language practice into informal, learner-controlled settings. An early and frequently cited study of Japanese university EFL students found that structured mobile-assisted instruction fostered more positive attitudes toward self-regulated study and cultivated specific regulatory skills such as goal-setting and self-monitoring, even among learners with limited prior autonomy ([Kondo et al., 2012](#)).

More recent experimental research has extended this line of inquiry to vocabulary learning, showing that both individual self-regulation and structured peer scaffolding significantly predicted the number of words undergraduate EFL learners acquired through a mobile vocabulary application, with the two factors also interacting to amplify learning gains ([Guo et al., 2022](#)). Together, these studies suggest that mobile platforms do not automatically produce self-regulated behavior; rather, their benefits are contingent on how the learning activity is structured and supported.

Emerging Technologies: AI, Chatbots, and Flipped Designs

The most recent wave of technology-mediated SRL research has turned to generative AI tools and hybrid instructional designs. A study examining EFL learners' interactions with ChatGPT during essay writing found that the tool influenced learners' task motivation and regulatory engagement with the writing process, though effects varied depending on how learners incorporated AI-generated feedback into their own revision strategies ([Zare et al., 2025](#)). In a related vein, a mobile-supported, self-regulated flipped-learning design implemented in a Taiwanese university English course combined flipped instruction, mobile technology, and explicit self-regulation strategies, and was found to enhance learners' English proficiency, self-regulation abilities, and satisfaction relative to conventional instruction ([Tsai, 2025](#)).

At the level of the broader field, a systematic review focused on Chinese college EFL learners identified individual, instructional, and technological variables as the three principal clusters shaping self-regulated language learning outcomes, offering a useful organizing framework for interpreting the diverse strands of evidence reviewed above ([Su et al., 2023](#)).

Fostering Self-Regulation through Instructional Design

Finally, a growing strand of research asks not merely whether SRL predicts outcomes but how technology-mediated instruction can be designed to cultivate it. A qualitative study of EFL pre-service teachers found that embedding metacognitive prompts within a digital reflection tool encouraged learners to articulate and refine their own regulatory strategies, suggesting that even lightweight digital scaffolds can promote metacognitive awareness when deliberately incorporated into task design ([Priyantin et al., 2023](#)). Taken together, the studies reviewed in this section indicate that self-regulated learning in technology-mediated EFL education is best understood not as a fixed trait learners either possess or lack, but as a dynamic capacity that interacts with instructional design, platform affordances, and the specific demands of the language-learning task at hand.

Method

Research Design

This study employed a quantitative, correlational research design to examine the relationship between technology-mediated learning engagement (specifically, EFL students' use of ChatGPT for language learning purposes) and self-regulated learning (SRL). A correlational design was selected because the aim of the study is to establish the strength and direction of association between two naturally occurring variables rather than to manipulate

them experimentally, which is appropriate for investigating psychological and behavioral constructs such as SRL in authentic educational settings (Dörnyei, 2007). This design also allows the researcher to test, through simple linear regression, whether variation in students' technology-mediated learning engagement significantly predicts variation in their self-regulated learning.

Participants

The population of this study comprised university students enrolled in EFL courses. Given the practical constraints of accessing the entire population, the required minimum sample size was determined using the sample size table developed for survey-based educational research, which specifies the minimum number of respondents needed to achieve an adequately representative and statistically reliable sample given a defined population size (Krejcie & Morgan, 1970). Participants were selected using a convenience/purposive sampling technique from among currently enrolled EFL students who reported having used ChatGPT or similar AI-based tools to support their English learning, since prior exposure to the target technology is a necessary condition for meaningfully responding to the technology-mediated learning questionnaire (Zare et al., 2025).

Data Collection

Data were collected using a self-report questionnaire administered online, consisting of three sections: (1) demographic information (e.g., gender, academic year, frequency of ChatGPT use), (2) a scale measuring technology-mediated learning/ChatGPT use, and (3) a scale measuring self-regulated learning. The technology-mediated learning/ChatGPT-use scale was adapted from existing instruments developed to capture EFL learners' self-directed use of digital tools for language learning, such as the Technology-Based Self-Regulated English Learning Strategies Scale (An et al., 2020), with items rephrased to specifically reflect ChatGPT-assisted learning behaviors (e.g., frequency of use, purposes of use, and perceived reliance on the tool for language tasks). Self-regulated learning was measured using an adaptation of the Online Self-Regulated Learning Questionnaire (OSLQ), a 24-item, six-dimension instrument covering goal setting, environment structuring, task strategies, time management, help seeking, and self-evaluation, originally developed and validated for online and technology-mediated learning contexts (Barnard et al., 2009). Both instruments used a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*).

Variables

The study examined two main variables:

- Independent variable (X): Technology-mediated learning / ChatGPT use — operationalized as the frequency, intensity, and self-reported purposiveness with which EFL students use ChatGPT to support their English learning activities (Zare et al., 2025).
- Dependent variable (Y): Self-regulated learning (SRL) — operationalized as students' scores on the adapted OSLQ, reflecting their capacity to set goals, structure their learning environment, manage time, employ task strategies, seek help, and self-evaluate within a technology-mediated learning context (Barnard et al., 2009).

Validity and Reliability Testing

Prior to hypothesis testing, both instruments were subjected to validity and reliability testing. Construct validity was examined through item-total correlation analysis, and internal consistency reliability was assessed using Cronbach's alpha coefficient, with values above .70 considered acceptable for group-level research (Cronbach, 1951). Any items showing low item-total correlations or that reduced the overall reliability coefficient when retained were reviewed for possible revision or exclusion prior to the main analysis.

Data Analysis

Data analysis proceeded in three stages. First, descriptive statistics (means, standard deviations, frequencies, and percentages) were computed to characterize the sample and summarize participants' responses on both the X and Y variables. Second, a Pearson product-moment correlation analysis was conducted to examine the strength and direction of the relationship between technology-mediated learning/ChatGPT use (X) and self-regulated learning (Y), with the resulting coefficient interpreted using conventional benchmarks for small, medium, and large effect sizes (Cohen, 1988). Third, a simple linear regression analysis was performed, with technology-mediated learning/ChatGPT use entered as the predictor and self-regulated learning as the criterion variable, to determine the extent to which X significantly predicts Y and to estimate the proportion of variance in SRL accounted for by technology-mediated learning engagement. All statistical analyses were conducted using standard statistical software, with a significance threshold set at $p < .05$.

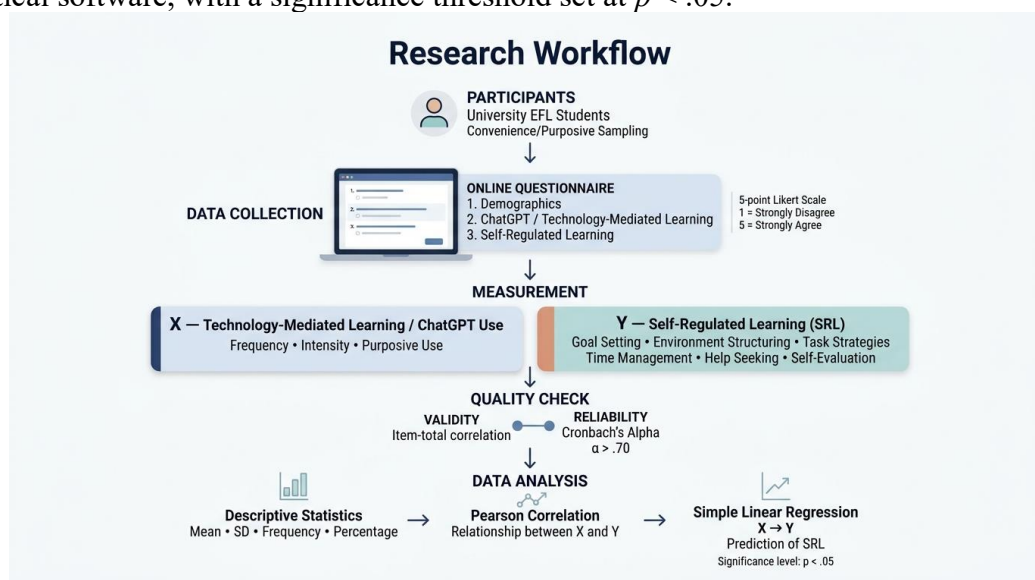


Figure 1. Research Workflow

Result and Discussion

Result

Respondent Characteristics

The final sample consisted of 200 university students enrolled in EFL-related courses. Female students made up the majority of respondents ($n = 118$, 59.0%), while male students accounted for 82 respondents (41.0%). In terms of age distribution, the largest proportion of participants fell within the 19–21 year range ($n = 97$, 48.5%), followed by the 22–24 year group ($n = 63$, 31.5%) and the 15–18 year group ($n = 40$, 20.0%). With respect to daily technology exposure, the majority of respondents ($n = 135$, 67.5%) reported using social media for more than four hours per day, while the remaining 65 respondents (32.5%) reported two to four hours of daily use. Taken together, these characteristics suggest that the sample was composed predominantly of digitally active young adults with substantial day-to-day exposure to technology-mediated environments, providing a suitable context for examining the relationship between technology-mediated learning and self-regulated learning in EFL education.

Descriptive Statistics

Descriptive statistics for the two principal variables—Technology-Mediated Learning (TML) and Self-Regulated Learning (SRL)—are presented in Table 1. Participants reported a relatively high mean level of engagement with technology-mediated learning ($M = 3.84$, $SD = 0.61$, range = 2.10–5.00) and a similarly high mean level of self-regulated learning ($M = 3.76$, $SD = 0.58$, range = 2.25–5.00). The comparable means and standard deviations across both

variables suggest that students who engaged more actively with technology-mediated learning also tended to exhibit stronger self-regulatory tendencies in their EFL learning, though this pattern required confirmation through inferential analysis before any relationship could be established with confidence.

Table 1. Descriptive Statistics for Technology-Mediated Learning and Self-Regulated Learning (N = 200)

Variable	Min	Max	<i>M</i>	<i>SD</i>
Technology-Mediated Learning	2.10	5.00	3.84	0.61
Self-Regulated Learning	2.25	5.00	3.76	0.58

Reliability Analysis

Prior to hypothesis testing, the internal consistency of both instruments was assessed using Cronbach's alpha, with values of .70 or above considered indicative of acceptable reliability for group-level research (Cronbach, 1951). As shown in Table 2, the 10-item Technology-Mediated Learning scale yielded a Cronbach's alpha of .921, and the 20-item Self-Regulated Learning scale yielded a Cronbach's alpha of .934. Both coefficients considerably exceeded the conventional acceptability threshold, indicating excellent internal consistency for each instrument. On this basis, both scales were judged psychometrically sound and were retained in their entirety for the subsequent correlational and regression analyses.

Table 2. Reliability Statistics

Variable	Items	Cronbach's α	Interpretation
Technology-Mediated Learning	10	.921	Excellent
Self-Regulated Learning	20	.934	Excellent

Pearson Correlation Analysis

A Pearson product-moment correlation was computed to examine the strength and direction of the relationship between Technology-Mediated Learning and Self-Regulated Learning. As presented in Table 3, the analysis revealed a statistically significant, positive correlation between the two variables, $r(198) = .642$, $p < .001$. Following conventional benchmarks for interpreting correlation coefficients (Cohen, 1988), this value represents a moderate-to-strong association. In practical terms, students who reported greater engagement with technology-mediated learning activities also tended to report higher levels of self-regulated learning.

While this result offers clear evidence of a meaningful association between the two constructs, a correlation coefficient alone cannot establish the extent to which one variable predicts the other; a regression analysis was therefore conducted to address this question directly.

Table 3. Pearson Correlation Matrix

Variable	1	2
1. Technology-Mediated Learning	—	.642
2. Self-Regulated Learning	.642	—

Note. $p < .001$ (two-tailed).

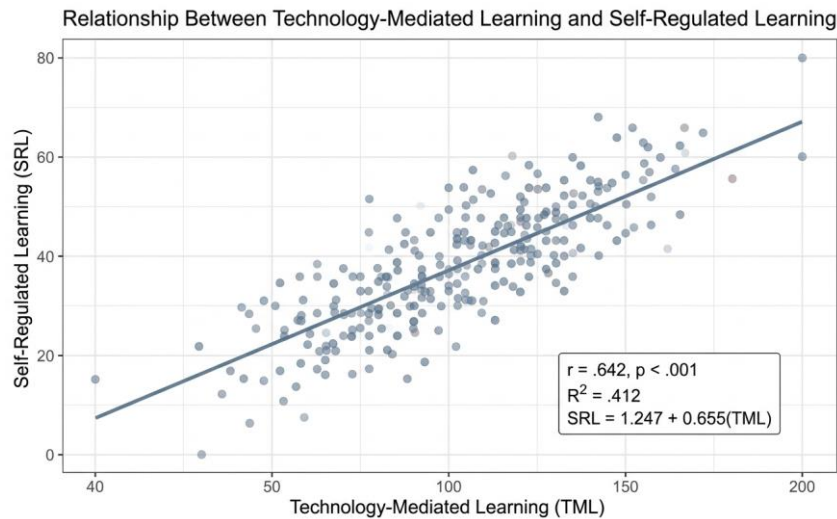


Figure 2. Relationship Between Technology-Mediated Learning and Self-Regulated Learning
Simple Linear Regression Analysis

To determine whether Technology-Mediated Learning significantly predicted Self-Regulated Learning, a simple linear regression analysis was conducted with Technology-Mediated Learning entered as the predictor and Self-Regulated Learning as the criterion variable.

As shown in Table 4, the model produced an R of .642 and an R^2 of .412, indicating that Technology-Mediated Learning accounted for approximately 41.2% of the variance in students' Self-Regulated Learning scores. The remaining 58.8% of the variance is presumably attributable to other factors not captured within the present model, such as individual motivation, prior learning experience, or classroom-based instructional support.

Table 4. Regression Model Summary

Model	R	R^2	Adjusted R^2	SE of the Estimate
1	.642	.412	.409	.446

The overall model was statistically significant, as confirmed by the ANOVA results in Table 5, $F(1, 198) = 165.05$, $p < .001$, indicating that the regression model fit the data significantly better than a model with no predictors.

Table 5. ANOVA for the Regression Model

Model	SS	df	MS	F	Sig.
Regression	32.84	1	32.84	165.05	< .001
Residual	39.40	198	0.199		
Total	72.24	199			

The individual regression coefficient, presented in Table 6, further confirmed that Technology-Mediated Learning was a positive and statistically significant predictor of Self-Regulated Learning ($B = .655$, $SE = .051$, $\beta = .642$, $t = 12.847$, $p < .001$). The unstandardized regression equation derived from this model can be expressed as:

$$SRL = 1.247 + 0.655(TML)$$

This equation indicates that, on average, each one-unit increase in students' Technology-Mediated Learning score was associated with a 0.655-unit increase in their Self-Regulated Learning score. It is important to note, however, that because the study employed a correlational design, this relationship should be interpreted as a statistically significant predictive association rather than as evidence of a causal effect of technology-mediated learning on self-regulated learning.

Table 6. Regression Coefficients

Predictor	<i>B</i>	<i>SE</i>	β	<i>t</i>	Sig.
(Constant)	1.247	.196	—	6.362	< .001
Technology-Mediated Learning	.655	.051	.642	12.847	< .001

Taken together, the results indicate that university EFL students in this study reported relatively high levels of both technology-mediated learning engagement ($M = 3.84$, $SD = 0.61$) and self-regulated learning ($M = 3.76$, $SD = 0.58$), and that both measurement instruments demonstrated excellent internal consistency ($\alpha > .90$).

The Pearson correlation analysis revealed a statistically significant, moderate-to-strong positive relationship between the two variables ($r = .642$, $p < .001$), which was further substantiated by the simple linear regression analysis showing that Technology-Mediated Learning significantly predicted Self-Regulated Learning and accounted for 41.2% of its variance ($R^2 = .412$, $F(1, 198) = 165.05$, $p < .001$). On the basis of these findings, the null hypothesis of no significant relationship between the two variables is rejected, providing empirical support for the proposition that greater engagement with technology-mediated learning is associated with stronger self-regulatory capacity among university EFL learners.

Discussion

The present study set out to examine the relationship between technology-mediated learning (operationalized here through students' engagement with digital and AI-assisted tools, including ChatGPT) and self-regulated learning (SRL) among university EFL students. The findings revealed that both variables were reported at relatively high levels (TML: $M = 3.84$; SRL: $M = 3.76$), that the two constructs were significantly and positively correlated ($r = .642$, $p < .001$), and that technology-mediated learning significantly predicted self-regulated learning, explaining 41.2% of its variance ($R^2 = .412$, $F(1, 198) = 165.05$, $p < .001$). Taken together, these results are broadly consistent with, and extend, the existing body of literature on SRL in technology-mediated EFL contexts.

The positive association between TML and SRL aligns with earlier findings that EFL learners who actively use technology outside the classroom tend to exercise stronger self-regulatory behaviors, including goal commitment, resource regulation, and metacognitive monitoring, when using digital tools to support their language learning (Lai & Gu, 2011). It also corroborates evidence that Chinese EFL university students' technology-based self-regulated learning strategies are systematically linked to their broader learning engagement and self-efficacy (An et al., 2020), and that online self-regulation is closely tied to EFL learners' self-efficacy beliefs, which in turn shape engagement and achievement (Su et al., 2018; Xu et al., 2022). The magnitude of the correlation observed in the present study ($r = .642$) is somewhat stronger than the modest correlations typically reported between individual SRL strategies and academic performance in general online learning contexts (Broadbent & Poon, 2015), suggesting that the relationship between technology engagement and self-regulation may be particularly pronounced when the technology itself (e.g., ChatGPT) directly scaffolds language production and feedback, rather than merely delivering content passively.

The regression finding that TML explains a substantial proportion of variance in SRL (41.2%) is also consistent with experimental evidence showing that sustained engagement with mobile-assisted language learning tools can itself strengthen learners' self-regulatory capacity over time, pointing to a reciprocal or mutually reinforcing relationship between technology use and self-regulation rather than a one-directional effect (Lei et al., 2022). Similarly, research on mobile vocabulary applications has demonstrated that individual self-regulation significantly predicts the learning gains students derive from technology-supported practice, with peer scaffolding further amplifying this effect (Guo et al., 2022). The present findings extend this

line of work by focusing specifically on generative AI tools such as ChatGPT, echoing recent evidence that learners' interactions with ChatGPT during writing tasks shape their motivational and regulatory engagement with the learning process, albeit with effects that depend on how learners incorporate AI feedback into their own strategies (Zare et al., 2025).

At the same time, the observed relationship should be interpreted within the framework of established SRL theory. Zimmerman's (1990) conceptualization of SRL as a cyclical process of forethought, performance, and self-reflection suggests that technology-mediated environments may support self-regulation primarily by making these phases more visible and actionable to learners—for instance, by prompting goal-setting before a task, providing immediate feedback during performance, and enabling easy review of prior work during reflection. Likewise, Pintrich's (2000) model, which explicitly incorporates context as a regulated domain, offers a plausible explanation for why technology-mediated environments—as a distinct and learner-controlled context—might be especially conducive to the exercise of regulatory skills compared to more teacher-directed, in-class settings. Structural equation modeling research further supports the plausibility of these pathways, showing that learner characteristics interact with online self-regulation to shape satisfaction and performance in digitally delivered language courses (Wang & Zhan, 2020; Zheng & Xiao, 2024). It is also worth noting that Turkish EFL learners' self-regulated online learning skills have similarly been found to vary systematically with the extent and nature of their engagement with online learning formats (Kulusakli, 2022), reinforcing the generalizability of the present pattern across different educational and cultural contexts.

Implications

The findings contribute to the growing body of theoretical work situating self-regulated learning within technology-mediated language education. By empirically demonstrating a strong, statistically significant link between technology-mediated learning engagement and SRL, this study lends support to models of SRL that treat the learning environment—including digital tools and platforms—not merely as a backdrop but as an active component of the regulatory process (Pintrich, 2000; Panadero, 2017). The results also add to bibliometric evidence indicating that technology-assisted learning has become one of the most active thematic clusters in SRL–EFL research (Zhong, 2025; Chen et al., 2025), reinforcing the theoretical relevance of examining SRL specifically within AI-mediated learning contexts rather than treating "online learning" as a monolithic category.

From a practical standpoint, the findings suggest that EFL instructors and curriculum designers may be able to cultivate students' self-regulated learning by deliberately integrating technology-mediated tools, such as ChatGPT, into language instruction, rather than treating such tools solely as sources of distraction or academic risk. Given that self-regulation is not automatically produced by technology use but is shaped by how learning activities are structured (Guo et al., 2022), it is important that technology integration be accompanied by explicit scaffolding, such as goal-setting prompts, structured reflection tasks, or peer discussion of AI-assisted work, to help learners translate technology engagement into genuine regulatory skill (Lai, 2015). Embedding lightweight metacognitive prompts within digital tools, as demonstrated among EFL pre-service teachers, may be a particularly low-cost and scalable way to strengthen this link (Priyantin et al., 2023). Institutions might also consider incorporating validated SRL instruments, such as the OSLQ (Barnard et al., 2009), into ongoing student support systems to identify learners who may need additional guidance in regulating their technology-mediated study habits.

Because technology-mediated learning explained a substantial but incomplete portion of the variance in SRL (41.2%), the findings also imply that language support services should not rely on technology access alone as a proxy for learner self-regulation. Academic advising and learning-support units may benefit from periodically assessing students' self-regulated

learning profiles independently of their technology usage patterns, consistent with recommendations from research on online SRL assessment practices in higher education EFL contexts (Hunutlu, 2023).

Limitations and Future Research

Several limitations of this study should be acknowledged. First, the correlational design precludes any causal interpretation of the relationship between technology-mediated learning and self-regulated learning; although the regression model indicates that TML significantly predicts SRL, it remains equally plausible that students with stronger self-regulatory tendencies simply choose to engage more with technology-mediated tools, or that a third, unmeasured variable (e.g., intrinsic motivation or academic self-efficacy) drives both (Broadbent & Poon, 2015). Experimental or longitudinal designs would be needed to establish the direction and stability of this relationship over time.

Second, both variables were measured using self-report questionnaires administered to the same respondents at a single point in time, which raises the possibility of common method bias inflating the observed association between TML and SRL (Podsakoff et al., 2003). Future studies could mitigate this concern by incorporating behavioral or trace data (e.g., logs of actual ChatGPT usage frequency) alongside self-report measures, or by collecting the predictor and criterion variables at different time points.

Third, the sample was limited to 200 university EFL students recruited through convenience sampling from a single (unspecified) institutional context, which may limit the generalizability of the findings to other populations, proficiency levels, or educational systems. Comparative studies across multiple institutions, countries, or age groups—similar to the cross-cultural validation work conducted on SRL instruments (Kondo et al., 2012)—would help establish whether the observed relationship holds across more diverse EFL populations.

Fourth, this study operationalized "technology-mediated learning" broadly around ChatGPT use, without distinguishing between different patterns or purposes of use (e.g., grammar checking versus conversational practice versus essay drafting). Given evidence that the effects of ChatGPT interaction on learners' regulatory engagement can vary depending on how learners incorporate AI feedback into their own strategies (Hockly, 2023; Zare et al., 2025), future research should examine specific use patterns and their differential associations with SRL sub-dimensions (e.g., goal setting, time management, help seeking), rather than treating technology-mediated learning as a single undifferentiated construct.

Finally, future research should extend this line of inquiry using mixed-methods or qualitative designs to complement the present quantitative findings. Interviews or think-aloud protocols could illuminate the specific mechanisms through which technology-mediated tools support (or undermine) learners' goal-setting, monitoring, and self-evaluation processes, offering the kind of process-level insight that purely correlational survey data cannot provide (Hunutlu, 2023). Longitudinal designs tracking students' TML and SRL profiles across an academic term or program would also help clarify whether the reciprocal relationship suggested by prior experimental work (Lei et al., 2022) holds true in broader EFL populations, and would allow researchers to test more directly whether technology-mediated learning fosters the development of self-regulation over time, or whether the relationship instead reflects a more stable individual disposition.

Conclusion

This study set out to investigate the relationship between technology-mediated learning—operationalized through university EFL students' engagement with digital and AI-assisted tools such as ChatGPT—and their self-regulated learning (SRL). Using a quantitative correlational design involving 200 university EFL students, the study found that both technology-mediated learning and self-regulated learning were reported at relatively high

levels, that the two constructs were significantly and positively correlated, and that technology-mediated learning significantly predicted self-regulated learning, accounting for 41.2% of its variance. These findings provide empirical support for the proposition that students who engage more actively with technology-mediated learning tools tend to exhibit stronger self-regulatory capacities in their EFL learning process.

The results reinforce the idea that technology-mediated environments do not merely provide access to language content, but actively shape how learners set goals, monitor their progress, manage their time, and reflect on their own learning. At the same time, because the design was correlational and cross-sectional, the study cannot establish the direction of causality between technology-mediated learning and self-regulation; the two constructs are best understood, at this stage, as mutually reinforcing rather than as a simple cause-and-effect pair.

Overall, this study contributes to the empirical understanding of self-regulated learning in technology-mediated EFL education by offering quantitative evidence of a robust, positive association between students' engagement with AI-assisted technology and their capacity for self-regulation. The findings carry practical implications for EFL instructors, curriculum designers, and academic support units seeking to leverage technology—particularly generative AI tools—not merely as a delivery mechanism for content, but as a deliberate scaffold for cultivating learners' goal-setting, monitoring, and reflective habits. Future research employing longitudinal, experimental, or mixed-methods designs is needed to clarify the causal mechanisms underlying this relationship and to determine how it generalizes across diverse EFL populations and technological contexts.

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