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THE ROLE OF DIGITAL TECHNOLOGY IN FOSTERING LEARNER AUTONOMY IN ENGLISH LANGUAGE LEARNING: THE MEDIATING ROLE OF SELF-REGULATION AMONG UZBEK UNIVERSITY STUDENTS

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ANNOTATION

This article examines the role of digital technology in fostering learner autonomy in English language learning, with particular attention to self-regulation as a potential mediating mechanism among university students in Uzbekistan. The study is based on a critical synthesis of recent empirical and theoretical research published primarily during 2024–2026 and develops a context-sensitive conceptual framework for understanding the relationship between digital technology use, self-regulation, and learner autonomy in English as a Foreign Language (EFL) learning. The analysis demonstrates that digital technologies provide learners with expanded access to resources, flexible learning trajectories, immediate feedback, opportunities for personalized practice, and communication beyond the classroom. However, technological access alone does not guarantee learner autonomy. Recent empirical evidence indicates that students' capacity to formulate goals, plan learning activities, monitor progress, regulate effort, select appropriate strategies, and evaluate learning outcomes substantially determines whether digital resources become tools for autonomous learning or merely sources of passive consumption. The article therefore conceptualizes self-regulation as a central mechanism connecting digital technology use with learner autonomy. Particular attention is given to the Uzbek higher-education context, where digitalization is developing rapidly but empirical research integrating technology use, self-regulation, and learner autonomy remains comparatively limited. The article proposes a research model and methodological framework that can be applied to Uzbek university students and identifies implications for English language teachers, curriculum designers, and higher-education institutions.

Keywords: digital technology, learner autonomy, self-regulation, EFL, English language learning, university students, artificial intelligence, Uzbekistan.

INTRODUCTION

The rapid digitalization of higher education has substantially changed the conditions under which university students learn foreign languages. English language learners increasingly have access to online courses, mobile applications, learning management systems, digital libraries, video platforms, automated feedback systems, conversational agents, and generative artificial intelligence. These technologies have reduced the dependence of language learning on the physical classroom and have created opportunities for students to select learning resources, determine the pace of learning, obtain immediate feedback, and practise language skills according to individual needs. Consequently, the question of learner autonomy has become increasingly important in technology-mediated English language education.

Learner autonomy should not, however, be equated simply with the availability or frequency of technology use. Autonomous learning involves learners taking responsibility for important aspects of their learning, including identifying needs, establishing goals, selecting resources and strategies, monitoring progress, and evaluating outcomes. Recent research continues to demonstrate that technology can create conditions favourable to such behaviour, but the actual realization of autonomy depends on learners' cognitive, motivational and regulatory capacities. Lai et al., for example, conceptualize self-directed learning with technology as involving the creation

of a personalized learning environment and the management of learning processes through self-regulation [1, pp. 379–397].

The empirical evidence supports the importance of this distinction. Lai et al. investigated 322 university students and found that self-regulation predicted several forms of self-directed technological activity for English learning, particularly instruction-, information-, and socialization-oriented activities [1, pp. 379–397]. Their findings are particularly relevant because they demonstrate that technology-mediated autonomous learning is not a single behavioural category: different forms of technology use may require different levels of cognitive effort and regulation.

Similar evidence is provided by Pyo and Lee, who examined 91 university students over a 14-week period. Their mobile-assisted blended learning intervention produced significantly stronger outcomes in English listening and learner autonomy than conventional instruction. The study also found that learner autonomy was positively associated with listening performance [2, pp. 465–480]. This finding suggests that the pedagogical value of digital technology may become stronger when technology is embedded in a learning design that deliberately requires learners to make decisions and regulate their own learning.

The relationship between technology and autonomy is also evident in studies of web-based learning. Oubadi and Lamkhanter, using questionnaires and semi-structured interviews with Moroccan university EFL students, reported that students perceived online learning environments as supporting greater responsibility for their own learning, particularly when such environments provided flexibility, interaction, and opportunities for autonomous language-learning practices [3, pp. 343–356].

Khotimah, Basthomi and Eliyanah provide further evidence from an Indonesian EFL context. Their 16-week exploratory case study focused on eight students' self-selected reading activities in technology-mediated distance learning. The authors found that opportunities to make choices about learning materials contributed to the development of planning skills, learning strategies, and learning commitment [4, pp. 217–226]. This finding is theoretically important because it indicates that autonomy can emerge through meaningful learner choice rather than through technology itself.

The growing use of generative artificial intelligence has introduced a new dimension to this discussion. ChatGPT and similar systems can provide individualized explanations, language practice, feedback, text revision and conversational interaction. Sujannah, Suwarso and Unsiah examined 140 ESP students and found a medium correlation between ChatGPT use for independent English learning and learning autonomy [5, Article 2517508]. The authors nevertheless emphasize the need for pedagogical guidance because the relationship between technology use and autonomy should not be interpreted as evidence that technology automatically produces independent learning.

Recent research also demonstrates the potential risks of technology-mediated autonomy. Mohebbi's systematic review of 18 peer-reviewed studies identified positive contributions of AI to language learning through immediate feedback, personalization and engagement, but also emphasized concerns regarding technological over-reliance and unequal access to advanced technologies [6, Article 2433814]. Thus, a technologically rich environment may simultaneously expand learners' opportunities and create new forms of dependence.

This tension is particularly relevant to the Uzbek higher-education context. A 2026 study of self-directed learning among EFL university students in Uzbekistan argues that digitalized language learning requires a combination of metacognitive regulation, digital-tool appropriation and self-organizational agency [7, pp. 29–34]. This suggests that the Uzbek context should not be analysed solely in terms of access to digital resources; attention must also be paid to the learner characteristics that determine how those resources are appropriated.

The present article therefore addresses the following research problem: although digital technologies increasingly facilitate English language learning among university students, the mechanism through which technology contributes to learner autonomy remains insufficiently conceptualized in the Uzbek EFL context. In particular, the role of self-regulation as an intermediate mechanism deserves further attention.

The purpose of this study is to develop and theoretically substantiate a conceptual model explaining how digital technology use may contribute to learner autonomy in English language learning among Uzbek university students, with self-regulation positioned as a potential mediating mechanism.

The study addresses three research questions:

RQ1. What forms of digital technology use are most relevant to autonomous English language learning?

RQ2. How is self-regulation associated with technology-mediated autonomous English language learning?

RQ3. How can self-regulation function as a mediating mechanism between digital technology use and learner autonomy among Uzbek university students?

LITERATURE REVIEW

Learner autonomy in digital language learning

Learner autonomy is a multidimensional construct rather than a single observable behaviour. In practical terms, autonomous language learners are expected to participate actively in defining learning goals, planning activities, selecting appropriate resources, monitoring their performance, adjusting strategies and evaluating learning outcomes. Digital environments potentially strengthen each of these dimensions because they offer learners a wider range of choices.

The systematic review conducted by Ye, Qi and Abdullah demonstrates that research on autonomous learning and ICT in language education has increasingly focused on university students and on quantitative, qualitative and mixed-method designs [8, pp. 6–13]. Their review is significant because it indicates that technology-mediated autonomy should be examined through multiple methodological perspectives rather than reduced to students' attitudes toward technology.

The digital environment changes the practical meaning of learner choice. In a conventional classroom, students' resources, learning sequence and pace are often largely determined by the teacher and curriculum. In a digital environment, learners may select videos, podcasts, applications, AI tools, online dictionaries, interactive exercises or social communication spaces. Consequently, autonomy can potentially expand; at the same time, the number of available choices may create problems of selection, distraction and ineffective learning.

Zhu, Soo and Wan Mustapha's study of 450 Chinese college EFL students is particularly relevant to this issue. Their findings showed a moderate level of readiness for autonomous English learning in a digital environment. Students demonstrated some capacity to modify learning plans and strategies, but weaknesses remained in self-evaluation and in achieving longer-term language-learning goals [9, pp. 35–49]. The findings demonstrate that digital access and autonomous competence are not equivalent.

This distinction is highly applicable to Uzbek university students. Students may possess smartphones, internet access and numerous English-learning applications without necessarily possessing the metacognitive skills required to organize effective learning. Therefore, the quality of digital learning should be evaluated not merely by the quantity of technology use but by the degree to which technology supports purposeful learner action.

Self-regulation as the mechanism of autonomous learning

Self-regulation provides an important theoretical bridge between digital technology and learner autonomy. In technology-mediated learning, students must make decisions without

constant teacher supervision. They need to establish objectives, allocate time, maintain attention, monitor progress and modify strategies when an approach proves ineffective.

Lai et al. provide particularly strong empirical support for this argument. Their structural equation modelling analysis showed that self-regulation significantly predicted instruction-oriented, information-oriented and socialization-oriented technological activities. For instruction-oriented activities, self-regulation had a significant direct effect, while its role was less important for entertainment-oriented activities [1, pp. 379–397]. The finding indicates that purposeful educational technology use requires greater regulatory effort than casual digital consumption.

This distinction is important for the interpretation of digital technology in language education. Watching English-language videos for entertainment and deliberately selecting a video to practise listening comprehension are both forms of digital exposure, but they differ in intentionality, monitoring and learning regulation. Similarly, using ChatGPT to obtain an answer and using ChatGPT to receive feedback, evaluate alternatives and revise one's own work represent different levels of learner autonomy.

The relationship can therefore be represented as:

Digital technology use → Self-regulation → Learner autonomy.

Digital technology provides opportunities, self-regulation transforms those opportunities into purposeful learning activity, and learner autonomy reflects the learner's increasing capacity to manage the learning process.

Artificial intelligence and autonomous English learning

Generative AI has intensified the relationship between technology and learner autonomy. Unlike earlier digital resources, conversational AI can interact with learners, generate explanations, provide examples, simulate communication and respond to individual requests. This creates the possibility of highly personalized learning.

Sujannah, Suwarso and Unsiah's study of 140 ESP students found a medium correlation between ChatGPT use for independent English learning and learning autonomy [5, Article 2517508]. Although the result is encouraging, correlation should not be interpreted as causation. Students with stronger autonomy may simply be more likely to use ChatGPT productively.

Al Zakwani and P.M. similarly investigated 190 EFL students using a mixed-method design and reported generally positive perceptions of ChatGPT for English learning and learner independence. Students particularly valued flexibility and convenience [10, pp. 813–824]. However, positive perception does not necessarily establish actual growth in autonomous competence.

The risk of substitution is therefore central. When AI performs cognitive tasks that students should perform themselves, technology may increase short-term efficiency while reducing opportunities for independent thinking. Conversely, when AI is used as a scaffold that supports planning, feedback, reflection and revision, it may strengthen self-regulated learning.

Mohebbi's systematic review supports this balanced interpretation. Across 18 peer-reviewed studies, AI-based language-learning tools were associated with personalized learning, immediate feedback and engagement, but the review also identified over-reliance and unequal access as important concerns [6, Article 2433814]. Thus, responsible AI integration requires pedagogical structures that preserve learner agency.

Digital technology in the Uzbek context

The Uzbek higher-education system is experiencing an increasing integration of digital learning resources. This development creates new opportunities for English language learners because digital platforms can supplement classroom instruction and extend learning beyond scheduled lessons.

The 2026 study by Mamadaliyeva is particularly relevant because it situates self-directed learning within the EFL context of technical universities in Uzbekistan. The study conceptualizes

self-directed learning in digital environments as involving metacognitive regulation, digital-tool appropriation and self-organizational agency [7, pp. 29–34]. This conceptualization closely corresponds to the proposed model of the present article.

At the same time, Uzbek learners cannot simply be assumed to behave in the same way as students studied in East Asian, European or Middle Eastern contexts. Cultural expectations, institutional teaching practices, students' previous educational experiences, English proficiency, digital literacy and access to technology may influence the development of autonomy. This provides a justification for investigating the Uzbek context separately rather than transferring conclusions from international research without modification.

METHODOLOGY

Research design

The present article adopts a theoretically grounded analytical research design based on a critical synthesis of recent empirical studies. The methodological purpose is not to present fabricated primary survey results but to establish a scientifically testable framework for examining digital technology, self-regulation and learner autonomy among Uzbek university students.

The analysis prioritizes research published during 2024–2026 and focuses on studies involving university-level EFL learners, technology-mediated language learning, learner autonomy, self-regulation and artificial intelligence. Studies were selected according to their relevance to at least one of the three core constructs of the proposed model.

The literature synthesis was organized around four analytical categories:

1. forms of digital technology use;
2. dimensions of self-regulation;
3. dimensions of learner autonomy;
4. educational outcomes and challenges associated with technology-mediated learning.

Conceptual model

Based on the reviewed evidence, the article proposes the following conceptual model:

DIGITAL TECHNOLOGY USE
↓
Access to resources
Personalized learning
Immediate feedback
Flexible learning pace
Digital communication
AI-assisted practice
↓
SELF-REGULATION
↓
Goal setting
Planning
Effort regulation
Attention control
Self-monitoring
Strategy adjustment
Self-evaluation
↓
LEARNER AUTONOMY
↓
Independent decision-making
Learning responsibility

Resource selection
Learning management
Self-assessment
Continuous learning

The model proposes that digital technology has both direct and indirect relevance to learner autonomy. The direct pathway reflects opportunities created by technology, while the indirect pathway assumes that self-regulation transforms those opportunities into autonomous learning behaviour.

Proposed hypotheses

H1. Digital technology use is positively associated with learner autonomy in English language learning.

H2. Digital technology use is positively associated with students' self-regulation.

H3. Self-regulation is positively associated with learner autonomy.

H4. Self-regulation mediates the relationship between digital technology use and learner autonomy.

H5. Purposeful educational uses of digital technology are more strongly associated with learner autonomy than entertainment-oriented technology use.

These hypotheses are consistent with Lai et al.'s finding that self-regulation predicts cognitively demanding forms of technology-mediated English learning [1, pp. 379–397], as well as with evidence that mobile-assisted blended learning can strengthen both learner autonomy and English listening performance [2, pp. 465–480].

RESULTS

The literature synthesis produces five principal findings.

First, digital technology expands the structural conditions for learner autonomy. Online resources, mobile applications and AI-based platforms provide learners with greater choice concerning content, time, pace and learning strategies. Evidence from Moroccan and Indonesian university EFL contexts indicates that flexibility and learner choice can support autonomous behaviour [3, pp. 343–356; 4, pp. 217–226].

Second, technology use is not homogeneous. Lai et al. demonstrate that students engage in different technological activities for instruction, information, entertainment and socialization, and that self-regulation contributes differently to these categories [1, pp. 379–397]. Therefore, future research should measure not merely "frequency of technology use" but the purpose and quality of use.

Third, self-regulation emerges as a central explanatory mechanism. Students who establish goals, manage effort and monitor their learning are more likely to transform digital resources into purposeful learning activity. The evidence from 322 university students examined by Lai et al. particularly supports this relationship [1, pp. 379–397].

Fourth, AI tools can support autonomy but may also create dependency. Recent studies report positive associations between ChatGPT use and learner autonomy, while systematic evidence simultaneously highlights over-reliance as a potential limitation [5, Article 2517508; 6, Article 2433814]. Consequently, the pedagogical value of AI depends substantially on how students use it.

Fifth, the Uzbek context requires context-specific empirical research. Existing work on Uzbekistan has begun to examine self-directed learning, AI-supported language learning and digital tools, but the integrated relationship among digital technology use, self-regulation and learner autonomy remains insufficiently established [7, pp. 29–34]. This constitutes the central research opportunity identified by the present article.

DISCUSSION

The findings support a shift from a technology-centred to a learner-centred understanding of digital English language education. The key question should not be whether students have access

to digital technology, but whether technology changes the learner's role from passive recipient to active manager of learning.

This distinction is theoretically consistent with the evidence of Lai et al., where self-regulation predicted technologically mediated activities that required greater cognitive effort [1, pp. 379–397]. Technology becomes educationally meaningful when learners use it intentionally: setting goals, selecting appropriate materials, monitoring comprehension and evaluating progress.

The results also suggest that learner autonomy should be understood as a dynamic capacity rather than a permanent personality characteristic. Khotimah et al. demonstrate that opportunities for meaningful choice in technology-mediated learning can contribute to planning skills, learning strategies and learning commitment [4, pp. 217–226]. Thus, autonomy can be developed through carefully designed learning environments.

The evidence from Pyo and Lee is also important for instructional design. Their 14-week intervention demonstrated that mobile-assisted blended learning was associated with stronger listening performance and higher learner autonomy than conventional instruction [2, pp. 465–480]. This indicates that digital technology is most effective when integrated into a pedagogical structure rather than introduced as an isolated tool.

For Uzbek universities, this implies that simply providing students with digital platforms is unlikely to be sufficient. Teachers should explicitly teach digital learning strategies, including goal setting, source evaluation, time management, self-monitoring and reflective evaluation.

The role of AI requires particularly careful treatment. Generative AI can provide immediate feedback and individualized assistance, but excessive dependence may reduce opportunities for learners to generate ideas and solve linguistic problems independently. The evidence reviewed by Mohebbi supports both the pedagogical potential and the risks of AI-mediated language education [6, Article 2433814].

Therefore, AI literacy should become part of learner autonomy education. Students should be taught not only how to ask AI systems for information, but also how to verify outputs, compare alternatives, identify errors, formulate independent responses and reflect on the learning process.

The proposed mediating role of self-regulation provides a useful explanation for why the same technology may produce different outcomes for different students. Two learners may have access to identical digital resources, but the learner who sets goals, manages time, monitors progress and evaluates results is more likely to convert those resources into autonomous learning.

This argument is especially relevant in the Uzbek context. Mamadaliyeva's recent analysis identifies metacognitive regulation, digital-tool appropriation and self-organizational agency as important components of self-directed EFL learning in Uzbekistan [7, pp. 29–34]. The present framework extends this perspective by explicitly positioning self-regulation as a potential mechanism linking technology use with learner autonomy.

IMPLICATIONS FOR ENGLISH LANGUAGE TEACHING

The findings suggest several practical implications.

First, English teachers should move from simply recommending digital resources toward teaching students how to use them strategically.

Second, digital assignments should include explicit learning goals. Instead of instructing students merely to "watch an English video," teachers can require students to identify a learning objective, select an appropriate resource, record difficulties and evaluate progress.

Third, AI-based tools should be incorporated through guided tasks. Students can be required to compare their own answer with AI feedback, explain which corrections they accept or reject, and revise their work independently.

Fourth, reflective activities should be integrated into digital learning. Short learning journals, progress checklists and self-assessment tasks can help students develop metacognitive awareness.

Fifth, universities should strengthen digital literacy alongside language education. Students need to know how to evaluate the reliability of online resources, protect academic integrity, distinguish useful feedback from incorrect AI-generated information and avoid excessive dependence on automated systems.

Finally, learner autonomy should remain connected to teacher support. Autonomy does not mean removing teachers from the learning process. Rather, the teacher's role can evolve from information provider toward facilitator, strategist, feedback provider and designer of learning environments.

LIMITATIONS

The principal limitation of this article is methodological. Because primary survey data from Uzbek university students were not supplied for the present manuscript, the article does not claim original statistical findings from a newly recruited sample. Instead, it develops an evidence-based conceptual and methodological framework from recent literature.

A second limitation concerns the heterogeneity of existing studies. Research differs in participants, instruments, educational settings and definitions of learner autonomy. Direct quantitative comparison is therefore inappropriate.

A third limitation is the rapidly changing nature of generative AI. Digital tools evolve faster than conventional educational research cycles, meaning that findings concerning specific AI systems may require periodic reassessment.

Future empirical research should therefore test the proposed model with a sufficiently large sample of Uzbek university students using validated scales and mediation analysis. A mixed-method design would be particularly valuable because quantitative relationships alone cannot fully explain how students experience digital autonomy.

CONCLUSION

Digital technology has considerable potential to strengthen learner autonomy in English language learning, but its educational effect should not be understood as automatic. The reviewed evidence demonstrates that digital environments create opportunities for flexible access, personalization, learner choice and immediate feedback, while the actual transformation of these opportunities into autonomous learning depends substantially on students' ability to regulate their learning.

The central argument of this article is that self-regulation can be conceptualized as a key mechanism connecting digital technology use with learner autonomy. Goal setting, planning, effort regulation, self-monitoring, strategy adjustment and self-evaluation determine whether students use digital technologies purposefully or merely consume digital content.

The proposed model is particularly relevant to Uzbek university students because the digitalization of higher education is creating new learning opportunities while simultaneously requiring stronger metacognitive and digital competencies. Existing Uzbekistan-focused research confirms the growing importance of self-directed learning in digital EFL environments, but further empirical investigation is required to establish the strength and nature of the relationships among digital technology use, self-regulation and learner autonomy.

Future research should empirically test the five hypotheses proposed in this article through a questionnaire-based or mixed-method study involving Uzbek university students. Such research would provide stronger evidence for the development of technology-enhanced English language curricula in Uzbekistan and would clarify whether self-regulation genuinely mediates the relationship between digital technology and learner autonomy.

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