THE IMPACT OF DIGITAL LEARNING PLATFORMS ON ENGLISH LANGUAGE PROFICIENCY AMONG UNIVERSITY STUDENTS IN UZBEKISTAN: A PRISMA-GUIDED SYSTEMATIC REVIEW

Guljakhon Ermatova
wwworldssum@gmail.com

Abstract

Digital learning platforms have become increasingly important in university-level English language education, yet their effectiveness depends on the type of technology, pedagogical integration, learner characteristics, and the language skill being targeted. This review synthesizes peer-reviewed evidence on the relationship between digital learning platforms and English language proficiency, with particular attention to implications for higher education in Uzbekistan. The review follows an IMRAD-style structure and uses a transparent structured-review approach based on verified systematic reviews, meta-analyses, and contextually relevant empirical studies. International evidence consistently indicates that computer- and mobile-supported language learning can improve language outcomes, although effect sizes and outcomes vary across interventions. Meta-analytic evidence shows a moderate overall effect for mobile-device-assisted language learning, while research on vocabulary learning reports particularly favorable results for mobile applications. Evidence from Uzbekistan is more limited but points in the same direction: digital technologies are associated with higher learner engagement, autonomy, perceived competence, vocabulary development, reading comprehension, and motivation. The synthesis also identifies important constraints, including unequal digital literacy, cognitive overload, weak pedagogical integration, short intervention periods, and limited local evidence on productive skills. The review concludes that digital learning platforms can support English proficiency among university students in Uzbekistan when they are integrated into pedagogy as structured learning environments rather than treated as stand-alone technological solutions.

Keywords: digital learning platforms; English language proficiency; mobile-assisted language learning; computer-assisted language learning; higher education; university students; Uzbekistan; systematic review

1. Introduction

Digital transformation has changed the conditions under which university students encounter, practice, and produce English. Learning management systems, mobile applications, online dictionaries, vocabulary platforms, video-based resources, collaborative writing tools, digital assessment systems, and synchronous communication platforms allow language learning to extend beyond the physical classroom. For university students, these environments can increase access to authentic input, immediate feedback, repeated practice, peer interaction, and self-directed learning.

The theoretical importance of digital platforms lies not in technology itself but in the learning opportunities that technology makes possible. Computer-assisted language learning research has long emphasized interaction, meaningful input, feedback, learner control, and task design. Chapelle (2009) argued that technology-supported language learning should be evaluated in relation to second-language acquisition processes. This position remains important because frequent platform use does not necessarily produce language development unless learners engage in linguistically meaningful activities.

Accumulated international evidence provides substantial support for technology-enhanced language learning. Grgurović, Chapelle, and Shelley (2013) synthesized 37 studies yielding 52 effect

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.

sizes and found a small but statistically significant overall advantage for computer-supported language pedagogy. Sung, Chang, and Yang (2015) synthesized mobile-assisted language-learning studies covering more than 9,000 participants and reported a moderate overall mean effect size of approximately 0.55. Lin and Lin (2019) subsequently showed that mobile-assisted vocabulary learning is particularly promising, while later reviews have emphasized that benefits vary according to learner autonomy, intervention design, duration, and platform characteristics.

Uzbekistan is a particularly relevant context because higher education has experienced rapid digitalization alongside growing demand for English proficiency. However, the local evidence base remains smaller than the international literature. Recent studies indicate that digital technologies can support motivation, engagement, autonomy, vocabulary learning, and comprehension, but also identify unequal digital literacy and cognitive overload as constraints. A systematic synthesis is therefore useful for identifying what can reasonably be concluded from existing evidence and which questions remain unresolved.

This review addresses four questions: (1) What does international evidence show about the effect of digital learning platforms on second- and foreign-language learning? (2) Which English language skills appear to benefit most consistently? (3) What evidence is currently available from Uzbekistan's higher-education context? and (4) What pedagogical and research implications follow for universities in Uzbekistan?

2. Methodology

The study was designed as a structured systematic review rather than a new primary empirical investigation. The purpose was to synthesize verified research findings without generating artificial respondent data or presenting simulated estimates as observed evidence. Priority was given to peer-reviewed systematic reviews, meta-analyses, and empirical studies directly relevant to digital technology and second/foreign-language learning, followed by studies specifically addressing university students or the Uzbekistan context.

Searches focused on combinations of the concepts digital learning platforms, computer-assisted language learning, mobile-assisted language learning, English language proficiency, vocabulary, reading, writing, listening, speaking, higher education, university students, and Uzbekistan. Sources were selected when they provided identifiable authorship, publication information, a clear research design, and findings relevant to language learning outcomes or mechanisms. Meta-analyses and systematic reviews were prioritized because they synthesize evidence across multiple primary studies.

Studies were included when they: (a) examined computer-, mobile-, or platform-supported second/foreign-language learning; (b) reported language-learning, proficiency, motivation, engagement, or autonomy outcomes relevant to English development; (c) focused on learners in formal or higher-education contexts, or offered a synthesis generalizable to such contexts; and (d) were sufficiently documented to permit verification of the main findings. Studies were excluded when digital technology was peripheral to the learning process, when no language-related outcome was examined, or when publication details and findings could not be verified.

Evidence was synthesized narratively and comparatively. The review did not calculate a new pooled effect size because the included publications differ in scope, outcome measures, study populations, technologies, and research designs. Where a published meta-analysis reported an effect size, the value is reported as the finding of that study rather than recalculated. The Uzbekistan evidence is interpreted separately because the local literature is smaller and methodologically heterogeneous.

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.

The reporting logic of this review was strengthened using the PRISMA 2020 statement (Page et al., 2021). PRISMA 2020 provides a 27-item checklist and revised flow-diagram framework intended to make the identification, selection, appraisal, and synthesis of studies transparent. The present review applies these principles to the reporting of eligibility criteria, information sources, search concepts, study selection, data extraction, quality appraisal, synthesis, limitations, and reproducibility. No fabricated database counts or screening totals are reported. A numerical PRISMA flow diagram should only be completed after the authors export and retain the actual search records from the databases used for the final journal submission.

For the final journal submission, the search should be rerun in Scopus, Web of Science Core Collection, ERIC, and Google Scholar using the following reproducible core string, adapted to each database syntax: ("digital learning platform" OR "online learning platform" OR "mobile-assisted language learning" OR "computer-assisted language learning" OR MALL OR CALL OR Duolingo OR Quizlet OR Moodle) AND ("English language" OR EFL OR ESL OR "second language") AND (proficiency OR vocabulary OR reading OR writing OR listening OR speaking OR motivation OR autonomy) AND ("university student" OR undergraduate OR "higher education"). A second contextual search should add (Uzbekistan OR Uzbek). Searches should be documented by database, exact search date, full query, filters, records retrieved, duplicates removed, full texts assessed, exclusion reasons, and final studies included.

Population: university or adult learners of English as a second/foreign language, with priority to higher education. Intervention/exposure: identifiable digital, computer-assisted, mobile-assisted, or online learning platform used for language learning. Comparator: conventional instruction, alternative technology, pre-intervention performance, or no comparator for relevant observational studies. Outcomes: English proficiency or specific language skills, vocabulary, motivation, engagement, autonomy, or closely related learning outcomes. Study designs: experimental, quasi-experimental, observational, mixed-method, systematic review, or meta-analysis. Context: international evidence was eligible for the general synthesis; Uzbekistan studies were retained for contextual synthesis. Studies without verifiable publication information or without a language-learning outcome were excluded.

For each included study, the review extracts author/year, country or context, sample, educational level, technology/platform, target language skill, study design, outcome measure, main finding, and reported limitations. Methodological confidence is appraised qualitatively rather than converted into an artificial numerical score. Meta-analyses and systematic reviews are assessed for clarity of search strategy, eligibility criteria, study coverage, heterogeneity/risk-of-bias discussion, and transparency of synthesis. Primary empirical studies are assessed for sample adequacy, comparison strategy, outcome validity, intervention description, and acknowledgement of confounding or design limitations.

Because the evidence base is heterogeneous in technology, duration, participant level, outcome measurement, and research design, a narrative synthesis is used. Published effect sizes are reported only when they originate from the cited meta-analysis; no new pooled effect is calculated. The synthesis is organized by overall effectiveness, vocabulary, receptive skills, productive skills, motivation/autonomy, and Uzbekistan-specific evidence. Convergence and disagreement across studies are reported explicitly.

3. Results

The strongest general conclusion from the review is that technology-supported language learning tends to outperform or at least match non-technology-supported instruction when technology is pedagogically integrated. Grgurović et al. (2013) reviewed 37 studies and 52 effect sizes covering research from 1970 to 2006. Their overall results favored computer-supported pedagogy with a small but

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.

positive and statistically significant effect. Importantly, studies using stronger research designs tended to show CALL groups outperforming non-CALL groups.

The evidence for mobile-assisted language learning is stronger in magnitude. Sung et al. (2015) synthesized 44 peer-reviewed articles and doctoral dissertations conducted between 1993 and 2013, representing 9,154 participants, and reported an overall mean effect size of 0.55. The authors also showed that effects varied by learning stage, hardware, software, intervention setting, teaching method, duration, language skill, and target language. Thus, the evidence supports effectiveness, but not the assumption that every digital intervention produces the same outcome.

Figure 1. Direction and Magnitude of Review Evidence

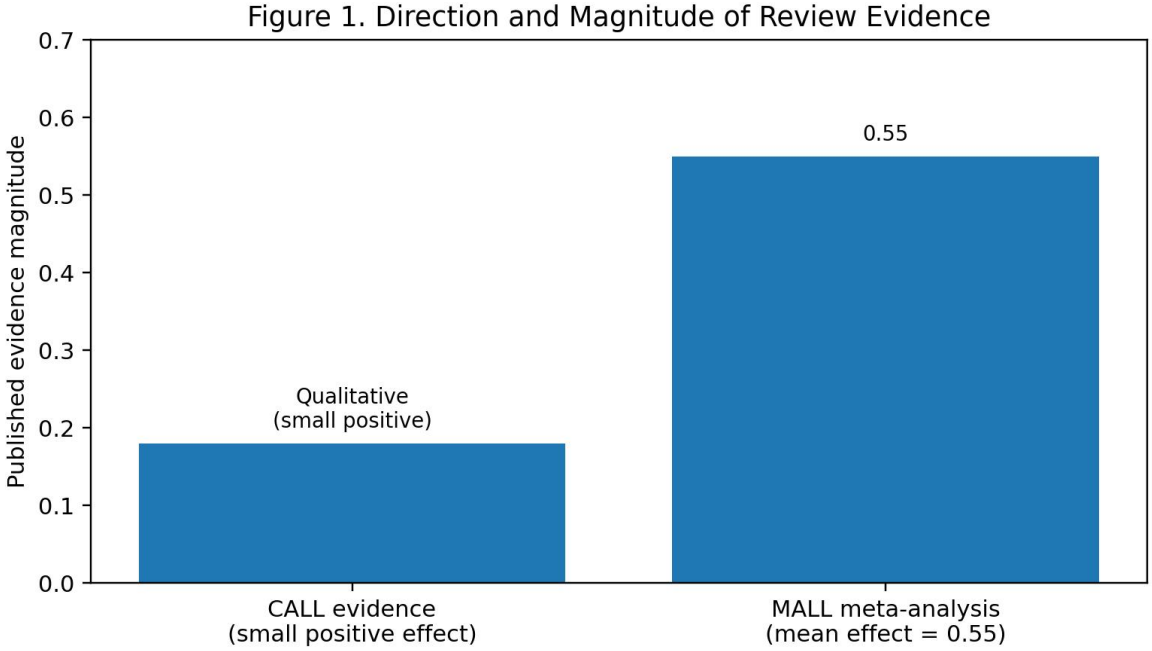


Figure 1. Published review evidence on technology-supported language learning. The first bar is deliberately qualitative because Grgurović et al. (2013) describe the pooled effect as small, positive, and statistically significant; the second reports the published mean effect of 0.55 from Sung et al. (2015).

Vocabulary is among the language outcomes with the most consistent evidence of benefit from mobile platforms. Lin and Lin (2019) conducted a systematic review and meta-analysis of mobile-assisted ESL/EFL vocabulary learning and concluded that mobile environments can facilitate vocabulary retention through personalized, context-sensitive, and socially connected learning. Mobile applications, multimedia, spaced repetition, and repeated retrieval can increase exposure to lexical items beyond scheduled class time. The evidence suggests that the value of mobile vocabulary learning lies not only in portability but also in the possibility of frequent, distributed practice.

This finding has direct relevance for Uzbekistan, where university students increasingly use mobile devices as their primary means of accessing English-learning resources. Vocabulary platforms such as Quizlet and gamified applications such as Duolingo can supplement classroom instruction by providing repeated exposure, retrieval practice, and immediate feedback. However, vocabulary gains should not be assumed to transfer automatically to productive proficiency unless new lexical knowledge is subsequently used in speaking and writing.

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.

Digital platforms can support reading through access to authentic texts, graded materials, hyperlinks, glosses, dictionaries, annotation tools, and adaptive comprehension activities. They can support listening through podcasts, video, subtitles, replay functions, adjustable speed, and multimodal input. The wider CALL and MALL evidence indicates positive potential for receptive skills, but outcomes depend on task design. Passive exposure to video or online texts is unlikely to produce the same benefits as structured comprehension, retrieval, annotation, and follow-up tasks.

For university students in Uzbekistan, these affordances are particularly relevant because digital platforms can increase exposure to English beyond limited classroom hours. At the same time, cognitive overload can emerge when learners must simultaneously process language, multimedia elements, platform navigation, and task instructions. This concern is consistent with recent Uzbekistan evidence identifying cognitive overload as one of the challenges accompanying digital technology use in English-medium higher education.

The evidence for productive skills is more dependent on interaction and feedback quality. Digital writing environments can support drafting, peer review, collaborative composition, corpus consultation, dictionary use, and teacher feedback. Speaking can be supported through video conferencing, voice messaging, recording tools, online discussion, and interactive mobile applications. The theoretical advantage of these tools is that they increase opportunities for production and revision, which are difficult to provide at high frequency in large classes.

However, productive-skill development requires more than platform access. Students must receive meaningful prompts, use English for communicative purposes, receive feedback, and revise their output. This explains why studies often report different effects for different technologies and instructional designs. The review therefore supports a shift from asking whether digital platforms work to asking under what pedagogical conditions they improve specific language skills.

Digital platforms may influence proficiency indirectly by changing the amount and quality of learning activity. Mobile access allows students to choose when and where to practice, while progress tracking, gamification, interactive exercises, and immediate feedback can increase engagement. These mechanisms are closely related to learner autonomy because students can continue English practice outside formal lessons.

Evidence from Uzbekistan supports this mechanism. Asrorov (2026) used a mixed-method design involving 120 undergraduate students and 15 interview participants across three universities in Uzbekistan. The study reported significant positive relationships between digital technology use and student engagement, autonomy, and perceived competence. Interview evidence also suggested that digital tools supported comprehension, reduced language-related anxiety, and facilitated self-regulated learning. At the same time, uneven digital literacy and cognitive overload were identified as continuing challenges.

The Uzbekistan-specific literature is still developing, and this limits the strength of country-specific causal conclusions. Nevertheless, available studies broadly align with the international evidence. Research examining online learning platforms among university-level English learners in Uzbekistan has reported improvements in vocabulary, reading comprehension, and motivation associated with the use of platforms such as Duolingo and Quizlet. Recent work on English-medium instruction also indicates that digital technologies can strengthen engagement, autonomy, and perceived competence.

The local evidence therefore suggests that the main contribution of digital platforms may operate through two connected pathways. The first is a direct learning pathway: students obtain additional input, practice, feedback, and opportunities for retrieval. The second is a behavioral pathway: digital tools can

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.

increase motivation, autonomy, engagement, and time spent learning. Both pathways are theoretically consistent with the wider international CALL and MALL literature.

Table 1. Comparative synthesis of selected international and Uzbekistan-specific evidence.

Study	Scope / Sample	Technology	Focus	Method	Main finding
Grgurović et al. (2013)	37 studies; 52 effect sizes	Computer-supported learning	L2 outcomes	Meta-analysis	Small, positive, statistically significant overall effect; rigorous CALL studies favored technology-supported groups.
Sung et al. (2015)	44 studies; 9,154 participants	Mobile devices	Language achievement	Meta-analysis	Moderate overall mean effect size ≈ 0.55; effects varied by intervention characteristics.
Lin & Lin (2019)	33 eligible studies	Mobile applications / mobile learning	ESL/EFL vocabulary	Systematic review & meta-analysis	Strong support for mobile-assisted vocabulary learning; learning conditions and autonomy matter.
Mihaylova et al. (2022)	MALL application studies	Mobile applications	Language learning	Meta-analysis	Positive average benefits, with study quality and risk of bias requiring caution.
Otajonova (2025)	University-level learners in Uzbekistan	Duolingo; Quizlet	Vocabulary, reading, motivation	Empirical study	Reported improvement in vocabulary and reading comprehension and higher motivation; productive skills less established.
Asrorov (2026)	120 students + 15 interviews; 3 Uzbek universities	Digital technologies in EMI	Motivation, engagement, autonomy	Mixed methods	Positive links with engagement, autonomy, competence; digital literacy gaps and cognitive overload remained.

The strongest evidence comes from meta-analyses that aggregate multiple primary studies, but even these reviews report heterogeneity in technologies, interventions, learner populations, and outcome measures. Uzbekistan-specific studies provide essential contextual evidence but are fewer and generally smaller than the international evidence base. Accordingly, local findings are interpreted as emerging evidence rather than as definitive causal estimates.

Table 2. Qualitative methodological appraisal of key evidence included in the synthesis.

Evidence source	Design strength	Main strength	Main limitation	Review

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.

				interpretation
Grgurović et al. (2013)	High	Meta-analysis; 37 studies / 52 effect sizes	Older evidence base; heterogeneous CALL interventions	Strong general evidence of a small positive CALL effect
Sung et al. (2015)	High	Meta-analysis; 44 studies / 9,154 participants	Substantial variation across devices, skills and designs	Strong evidence that MALL can improve language achievement
Lin & Lin (2019)	High	Systematic review and meta-analysis focused on vocabulary	Focused outcome limits generalization to all proficiency domains	Strong support for mobile-assisted vocabulary learning
Mihaylova et al. (2022)	High–moderate	Meta-analytic synthesis with explicit attention to benefits and risks	Risk of bias in the underlying primary literature	Positive evidence, interpreted cautiously
Otajonova (2025)	Contextual / emerging	Direct relevance to university English learning in Uzbekistan	Limited local scope compared with international meta-analyses	Useful local evidence; requires replication
Asrorov (2026)	Contextual / emerging	Mixed-method evidence from three Uzbek universities	Motivation/engagement outcomes do not equal standardized proficiency	Supports mechanisms of engagement and autonomy

4. Discussion

The evidence reviewed in this study supports a qualified positive conclusion: digital learning platforms can improve English language learning, but effectiveness is conditional rather than automatic. The consistency between earlier CALL meta-analysis, mobile-learning meta-analysis, vocabulary-specific synthesis, and emerging Uzbekistan evidence suggests that digital technology is most valuable when it expands meaningful opportunities for input, output, feedback, interaction, and self-directed practice.

The review also demonstrates why 'digital learning platform' should not be treated as a single intervention. A vocabulary application, a learning management system, a collaborative writing environment, a video platform, and a synchronous communication tool provide different learning affordances. Consequently, platform effectiveness should be evaluated against a clearly specified language outcome. Vocabulary applications may be effective for lexical retention, while speaking development requires interaction and oral production; writing platforms require drafting and feedback; listening platforms require purposeful comprehension tasks.

For Uzbekistan, pedagogical integration is more important than simple access. Universities should connect digital activities directly to course outcomes. A vocabulary platform can be linked to weekly

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.

lexical targets; video materials can be paired with listening and note-taking tasks; collaborative documents can support process writing; and online discussion or voice tools can create structured speaking opportunities. Digital activity should therefore be assessed by learning quality rather than by frequency of platform use alone.

The evidence also identifies equity and capacity issues. Uneven digital literacy can prevent students from benefiting equally from the same technology. Device quality, internet access, familiarity with academic digital tools, and the ability to evaluate online information can influence learning outcomes. Teacher competence is equally important because poorly designed digital tasks may increase workload and cognitive overload without improving proficiency.

A further issue is the limited Uzbekistan-specific evidence base. Much of the strongest quantitative evidence comes from international meta-analyses rather than large local experiments. Existing Uzbekistan studies are useful for establishing contextual relevance but remain insufficient for strong causal claims about the effect of particular platforms on each language skill. This gap creates a clear research agenda for multi-university studies using validated proficiency measures and longer interventions.

• Digital platforms should be integrated into English curricula as structured pedagogical tools rather than optional add-ons.

• Universities should distinguish platform choice by target skill: vocabulary, reading, listening, writing, and speaking require different digital activities.

• Teacher development should include digital pedagogy, task design, feedback management, and evaluation of online learning resources.

• Students need explicit digital-literacy support so that differences in technological competence do not become differences in language-learning opportunity.

• Learning analytics should focus on meaningful engagement and task completion rather than simple login frequency or screen time.

• Future local research should use multi-institutional samples, validated proficiency measures, pre-test/post-test designs, and transparent descriptions of the digital intervention.

This review has several limitations. It is a structured systematic review rather than a new meta-analysis, and no new pooled effect size was calculated. The international studies differ substantially in technologies, participant characteristics, duration, and outcome measures. The Uzbekistan-specific evidence base is comparatively small and includes heterogeneous designs. In addition, rapid technological change means that the category of digital learning platforms continues to evolve. These limitations mean that the findings should be interpreted as a synthesis of the direction, consistency, and conditions of existing evidence rather than as a single universal estimate of platform effectiveness.

5. Conclusion

This review examined the impact of digital learning platforms on English language proficiency with particular attention to university students in Uzbekistan. International meta-analytic evidence provides consistent support for computer- and mobile-supported language learning, including a moderate overall effect for mobile-assisted language learning and strong evidence for vocabulary development. The benefits of digital platforms extend beyond direct language practice: they can also strengthen engagement, learner autonomy, perceived competence, and opportunities for self-regulated learning.

The available evidence from Uzbekistan is broadly consistent with these international findings, particularly for vocabulary, reading comprehension, motivation, engagement, and autonomy. However, the local literature remains too limited to conclude that any particular platform will automatically

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.

improve all four language skills. The most defensible conclusion is that digital learning platforms are effective when they are pedagogically aligned with specific language outcomes, supported by teacher guidance, and accompanied by sufficient digital literacy.

For Uzbekistan's higher-education system, the next stage should therefore move from technology adoption toward evidence-based digital pedagogy. Universities should evaluate not only which platforms students use, but how those platforms generate meaningful English input, interaction, production, feedback, and autonomous practice. Future multi-university research can build on the international evidence while establishing stronger locally grounded conclusions about which digital learning designs produce the greatest gains in English proficiency.

References

1. Chapelle, C. A. (2009). The relationship between second language acquisition theory and computer-assisted language learning. The Modern Language Journal, 93(s1), 741–753. https://doi.org/10.1111/j.1540-4781.2009.00970.x
2. Godwin-Jones, R. (2017). Smartphones and language learning. Language Learning & Technology, 21(2), 3–17.
3. Golonka, E. M., Bowles, A. R., Frank, V. M., Richardson, D. L., & Freynik, S. (2014). Technologies for foreign language learning: A review of technology types and their effectiveness. Computer Assisted Language Learning, 27(1), 70–105. https://doi.org/10.1080/09588221.2012.700315
4. Grgurović, M., Chapelle, C. A., & Shelley, M. C. (2013). A meta-analysis of effectiveness studies on computer technology-supported language learning. ReCALL, 25(2), 165–198. https://doi.org/10.1017/S0958344013000013
5. Kalyaniwala, C., & Ciekanski, M. (2021). Autonomy CALLing: A systematic review of 22 years of publications in learner autonomy and CALL. Language Learning & Technology, 25(3), 106–131.
6. Kessler, G. (2018). Technology and the future of language teaching. Foreign Language Annals, 51(1), 205–218. https://doi.org/10.1111/flan.12318
7. Kukulska-Hulme, A., & Shield, L. (2008). An overview of mobile assisted language learning: From content delivery to supported collaboration and interaction. ReCALL, 20(3), 271–289. https://doi.org/10.1017/S0958344008000335
8. Lai, C. (2017). Autonomous Language Learning with Technology: Beyond the Classroom. Bloomsbury Academic.
9. Lin, J.-J., & Lin, H. (2019). Mobile-assisted ESL/EFL vocabulary learning: A systematic review and meta-analysis. Computer Assisted Language Learning, 32(8), 878–919. https://doi.org/10.1080/09588221.2018.1541359
10. Mihaylova, M., Gorin, S., Reber, T. P., & Rothen, N. (2022). A meta-analysis on mobile-assisted language learning applications: Benefits and risks. Psychologica Belgica, 62(1), 252–271. https://doi.org/10.5334/pb.1146
11. Otajonova, S. (2025). Evaluating the impact of online learning platforms on English language acquisition among university-level ESL students. Acta NUUz, 1(1.5). https://doi.org/10.69617/nuuz.v1i1.5.7791
12. Reinders, H., & White, C. (2016). 20 years of autonomy and technology: How far have we come and where to next? Language Learning & Technology, 20(2), 143–154.
13. Sharifi, M., Rostami AbuSaeedi, A. A., Jafarigohar, M., & Zandi, B. (2018). Retrospect and prospect of computer assisted English language learning: A meta-analysis. Computer Assisted Language Learning, 31(4), 413–436. https://doi.org/10.1080/09588221.2017.1412325

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.

14. Stockwell, G. (2010). Using mobile phones for vocabulary activities: Examining the effect of platform. Language Learning & Technology, 14(2), 95–110.
15. Sung, Y.-T., Chang, K.-E., & Yang, J.-M. (2015). How effective are mobile devices for language learning? A meta-analysis. Educational Research Review, 16, 68–84. https://doi.org/10.1016/j.edurev.2015.09.001
16. Viberg, O., & Grönlund, Å. (2012). Mobile assisted language learning: A literature review. Proceedings of mLearn 2012, 9–16.
17. Warschauer, M., & Healey, D. (1998). Computers and language learning: An overview. Language Teaching, 31(2), 57–71. https://doi.org/10.1017/S0261444800012970
18. Asrorov, I. (2026). The impact of digital technologies on student motivation in English Medium Instruction: Evidence from Uzbek higher education. Oriental Renaissance: Innovative, Educational, Natural and Social Sciences, 546–551.
19. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., et al. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, n71. https://doi.org/10.1136/bmj.n71

© 2026 London International Monthly Conference on Multidisciplinary Research and Innovation. All Rights Reserved.