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BEYOND THE HYPE: AI OUTPERFORMS VR/AR AND GAMIFICATION IN FOREIGN LANGUAGE EDUCATION

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ABSTRACT

Aim/Purpose	This study aims to identify the most effective digital technology for foreign language education by comparing artificial intelligence (AI), virtual and augmented reality (VR/AR), and gamification, using a mixed-methods design and drawing systematic parallels with existing literature.
Background	Although emerging technologies are often promoted for their pedagogical potential, there is limited evidence on whether teachers' real-world experiences confirm or challenge these theoretical claims.
Methodology	A convergent mixed-methods survey was conducted with 154 in-service English and foreign language teachers from 37 countries. Questionnaire data were analyzed using descriptive statistics, composite indices, and item-level measures, while qualitative responses were thematically coded. Both strands were integrated and compared with prior research to assess convergence or divergence between theory and practice.
Contribution	The study provides an evidence-based comparison of teachers' perceptions with theoretical expectations, clarifying which technologies deliver proven pedagogical value and which remain primarily motivational or experimental.
Findings	AI was the most widely adopted (88.3%) and consistently rated highest for skill development, learner autonomy, and workload reduction. Gamification (72.1%) was valued for motivation and engagement, while VR/AR (16.9%) was praised for immersion yet limited by financial and infrastructural barriers.

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	Open-ended responses reinforced these patterns and emphasized AI's role as a "pedagogical assistant".
Recommendations for Practitioners	Teachers and institutions should prioritize AI adoption for scalable, adaptive, and feedback-rich instruction, while employing gamification and VR/AR as supplementary tools for motivation and immersion.
Recommendations for Researchers	Future research should test AI's long-term impact on competence development through experimental and longitudinal designs, and develop sustainable models for VR/AR integration.
Impact on Society	Findings highlight AI as the most pedagogically effective and scalable technology, informing decisions on teacher training, institutional investment, and digital education policy.
Future Research	Future research should address ethical concerns surrounding AI, such as plagiarism, over-reliance, and bias, and examine contextual factors that influence adoption across regions and levels of teaching experience.
Keywords	artificial intelligence, virtual and augmented reality, gamification platforms, digital technology, foreign language education

INTRODUCTION

Digital transformation is reshaping how foreign languages are taught and learned worldwide. Over the past decade, teachers and researchers have increasingly explored the integration of new technologies to enhance learning, expand instructional possibilities, and support learner development (Huang et al., 2021; Luo, 2023). Among these innovations, three categories have received particular attention: artificial intelligence (AI), virtual and augmented reality (VR/AR), and gamification platforms. Each technology brings unique affordances and challenges.

AI has emerged as a leading tool due to its capacity to provide personalized learning, adaptive feedback, and data-driven insights that support both learners and teachers (Godwin-Jones, 2022; Huang et al., 2023; Ji et al., 2023). VR/AR, by contrast, offers immersive and context-rich learning opportunities but remains constrained by cost, infrastructure, and scalability issues (Nikou et al., 2024; Ozgun & Sadik, 2023). Gamification, while effective in boosting motivation and participation, is often criticized for its limited cognitive impact and over-reliance on surface-level engagement (Luo, 2023; Mogavi et al., 2022).

Despite this growing body of research, much of the literature emphasizes theoretical affordances rather than real-world integration. How teachers actually adopt, evaluate, and adapt technologies in practice remains underexplored. This gap is significant because teachers are the primary mediators between technology and pedagogy, and their adoption patterns directly determine whether emerging tools deliver meaningful value or remain supplementary novelties.

To address this gap, the present study investigates how language teachers across 37 countries adopt and evaluate AI, VR/AR, and gamification. Using a convergent mixed-methods survey, it systematically compares teachers' reported practices and perceptions with claims made in the literature, identifying where theory and classroom realities converge or diverge.

Accordingly, this study was guided by the following research questions:

1. To what extent are AI, VR/AR, and gamification adopted in foreign language education across international contexts?
2. What contextual factors influence teachers' adoption and perceptions of these technologies?
3. What digital technologies do teachers perceive as the most useful, and why?
4. How do these perceptions converge with or diverge from claims in the existing literature?

LITERATURE REVIEW

The growing integration of digital technologies into foreign language education has produced a wide body of scholarship, with studies exploring technologies such as AI, VR/AR, and gamification. Much of this literature, however, emphasizes the theoretical affordances of these innovations while offering limited insight into how teachers actually perceive and implement them in practice. This section reviews prior studies to situate research within broader debates about the pedagogical value of emerging technologies.

AI-ENHANCED PRACTICES IN LANGUAGE EDUCATION

Artificial intelligence has rapidly emerged as a central component in language education, providing tools that facilitate adaptive learning, personalized interaction, and data-driven instruction. Conversational agents, such as chatbots, are frequently used to promote task-based communication and oral fluency; however, researchers stress that these systems are more effective when integrated with teacher support rather than functioning alone (Ji et al., 2023).

AI also plays a significant role in writing instruction. Intelligent writing assistants provide scaffolded feedback on coherence, grammar, lexical variety, and rhetorical organization, thereby enhancing metacognitive awareness and encouraging iterative improvement (Godwin-Jones, 2022). In another study, a flipped foreign language classroom used a mind map-guided chatbot system to improve oral fluency and preparation through personalized dialogue and visual analytics (Lin & Mubarok, 2021).

Learner attitudes further demonstrate AI's impact. Many students consider AI-based platforms approachable, supportive, and effective for self-paced study. Engagement and self-efficacy are especially strengthened when students perceive AI as a collaborative partner instead of an evaluator (An et al., 2023).

Broad analyses of recent scholarship point to three main thematic clusters of AI integration in language education: adaptive instruction and assessment, personalization with affective interaction, and collaborative learning support (Huang et al., 2023). These clusters illustrate how AI contributes simultaneously to cognitive, emotional, and social aspects of learning.

Taken together, these findings indicate that AI is no longer experimental in language education but has become a practical tool for delivering formative feedback, adaptive pathways, and enhanced learner autonomy.

INTEGRATING GAMIFICATION INTO LANGUAGE INSTRUCTION

The use of gamification in educational settings outside of gaming has become a widespread practice in foreign language instruction. Its primary aim is to foster motivation, engagement, and vocabulary growth. Research shows that gamified environments can contribute to improved learner attitudes, lexical retention, and grammatical accuracy, yet the degree of effectiveness is strongly influenced by pedagogical alignment, the choice of game mechanics, and assessment design (Al-Dosakee & Ozdamli, 2021; Luo, 2023).

In higher education contexts, gamification has been shown to strengthen autonomy and student engagement, while also cultivating more positive attitudes toward language learning. Still, a wide range of platforms lacks embedded feedback functions that would promote both cognitive and metacognitive development (Arip & Hashim, 2024).

Common mechanics such as badges, points, and leaderboards are often effective in generating short-term motivation. However, their educational value is only realized when accompanied by meaningful feedback and careful integration into curriculum goals (Luo, 2023). Without such alignment, gamified systems risk prioritizing competition and mechanics over learning objectives, sometimes even reinforcing unproductive or unhealthy learner behaviors (Mogavi et al., 2022).

Gamification has also gained popularity in mobile-assisted language learning. Gamified platforms utilize spaced repetition, reward systems, and peer competition to foster lexical fluency and support grammar practice (Luo, 2023). While these applications can successfully encourage regular study habits and strengthen memory, their contribution to higher-level competencies such as spontaneous speaking and strategy-based learning regulation remains limited.

Overall, gamified platforms demonstrate value in motivating learners and scaffolding basic skills; however, their ability to promote deeper competencies remains limited. Compared to other technologies, gamification often falls short in supporting communicative and metacognitive growth.

Virtual and Augmented Reality in Language Education

In foreign language education, AR and VR are often used to provide learners with contextualized experiences that link language to action. AR, in particular, has gained attention for its accessibility on mobile devices and its capacity to overlay linguistic prompts on real-world objects. Such contextual visualization supports vocabulary acquisition and reading comprehension, and it has been especially useful for beginners who benefit from associating words with tangible referents (Christou et al., 2025).

VR, on the other hand, creates fully immersive environments where learners can experience a strong sense of presence. Through headsets and interactive spaces, students engage in communicative scenarios that foster not only linguistic skills but also intercultural awareness. Nevertheless, research also highlights limitations, such as small sample sizes and inconsistent methods of outcome measurement, which make results less generalizable (Cai et al., 2022; Peixoto et al., 2021).

Across both AR and VR, motivational gains are consistently observed. Learners report higher engagement, confidence, and willingness to communicate, especially when these tools are paired with task-based communicative activities. Experiencing language as lived interaction, rather than abstract knowledge, contributes to more dynamic practice opportunities (Huang et al., 2021).

Despite these benefits, the role of AR and VR in classrooms remains largely supplementary. Their scalability is hindered by high infrastructure costs, technical demands, and the need for specialized teacher training. Moreover, unlike AI-supported systems, most VR/AR applications are less likely to provide adaptive feedback mechanisms, which limits their effectiveness in tracking performance or personalizing instruction (Ozgun & Sadik, 2023). For this reason, they are best positioned as complementary tools that enrich language practice without focusing on responsive and individualized instruction.

Comparative Perspectives of AI, VR/AR, and Gamification Platforms

While VR/AR and gamification contribute valuable dimensions to foreign language instruction, AI demonstrates the strongest pedagogical impact. AI distinguishes itself by offering real-time adaptive feedback, personalized scaffolding, and data-informed analytics – features that competing technologies rarely provide.

Gamified systems, for instance, are effective in stimulating engagement and motivation, but they generally do not deliver individualized instructional support (Colomo-Magaña et al., 2024). Conversely, AI-based writing assistants and chatbots guide learners through iterative cycles of production, reflection, and revision, ensuring deeper competence formation (Godwin-Jones, 2022). Similarly, conversational AI platforms support continuous communicative practice, whereas VR/AR applications often lack adaptive language mechanisms and require more complex classroom integration (Ji et al., 2023).

AI also provides broader affective and metacognitive benefits. Systems capable of simulating social presence have been shown to increase learner trust, motivation, and collaborative interaction (Wang et al., 2024). When framed as supportive facilitators, rather than evaluators, AI tools further reduce anxiety and strengthen learners' perceived control over the learning process (An et al., 2023).

To illustrate these differences, Table 1 compares the main affordances of AI, VR/AR, and gamification in foreign language learning.

Table 1. Comparative affordances of AI, VR/AR, and gamification

Dimension	AI	VR/AR	Gamification
Pedagogical alignment	Strong alignment with foreign language education; adaptive and data-driven	Context-rich, situational learning; often supplementary	Enhances motivation, but limited scaffolding for foreign language acquisition
Feedback mechanisms	Real-time, personalized, adaptive feedback	Limited feedback; often lacks adaptivity	Rarely embedded; focus on rewards and progress indicators
Instructional functions	Writing assistance, chatbots, learning analytics, adaptive content delivery	Immersion, cultural exposure, and vocabulary retention	Vocabulary drills, grammar practice, motivation through extrinsic rewards
Cognitive support	High: supports metacognition and iterative practice	Moderate: contextualized learning, but outcome measurement inconsistent	Basic: supports memorization, less effective for higher-order skills
Affective engagement	High: fosters motivation, reduces anxiety, enhances learner trust	High: immersive presence reduces anxiety	Moderate: increases short-term motivation, risk of distraction
Scalability	High: mobile- and web-based, easily adaptable	Moderate: costly infrastructure, teacher training required	High: mobile apps widely available
Overall value	Core pedagogical tool with multidimensional support	Supplementary role, strong in affective and contextual learning	Supplementary role, best for motivation and engagement

Taken together, these comparisons reveal that AI is not merely an add-on technology but a core pedagogical agent capable of addressing cognitive, affective, and social dimensions of foreign language education. VR/AR and gamification play important motivational and contextual roles, yet their impact remains limited by the absence of adaptive feedback and performance tracking.

Drawing on reviewed literature, this study conceptualizes the comparative pedagogical value of AI, VR/AR, and gamification across three key dimensions: cognitive, affective, and practical. The cognitive dimension reflects how each technology supports learning processes and skill development; the affective dimension captures their influence on motivation, engagement, and anxiety reduction; and the practical dimension represents issues of scalability, accessibility, and implementation.

As illustrated in Figure 1, AI occupies a central position in this framework because it encompasses all three domains, integrating adaptive feedback, personalized scaffolding, and scalability. VR/AR primarily contribute to the affective and contextual aspects of learning, while gamification enhances motivation and engagement. Together, these relationships form the conceptual model that guided the analysis and interpretation of this study.

The model synthesizes findings from prior research, positioning AI as the core pedagogical agent that integrates cognitive, affective, and practical dimensions of learning, while VR/AR and gamification serve complementary motivational and contextual roles.

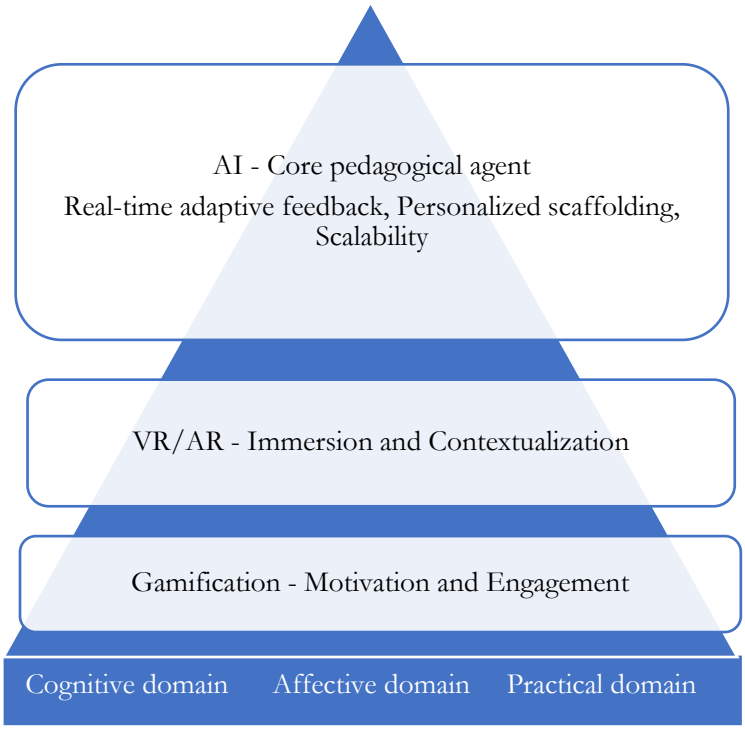

Figure 1. AI-centered pedagogical value model for digital language learning

METHODS

To address the gap between theory and practice, the present study adopted a convergent mixed-methods design that combined quantitative survey data with qualitative insights from open-ended responses. This approach enabled the examination of teachers' adoption patterns, perceptions, and reported challenges while at the same time building a parallel with existing literature. Aligning empirical evidence with theoretical claims allowed the study to confirm or challenge assumptions about the pedagogical potential of AI, VR/AR, and gamification.

RESEARCH DESIGN

This study employed a convergent mixed-methods design (Creswell & Plano Clark, 2018), combining quantitative and qualitative strands to examine how digital technologies such as AI, VR, AR, and gamification are integrated into foreign language education. Beyond identifying adoption patterns and teacher perceptions worldwide, the design also established a parallel with existing literature, allowing the empirical results to confirm or challenge theoretical claims about the pedagogical value of these technologies.

PARTICIPANTS

Participants were in-service English and foreign language teachers. Recruitment was carried out through professional networks, particularly LinkedIn, which ensured access to a diverse group of teachers across different countries, institutional contexts, and levels of teaching experience. This strategy enabled international representation and provided perspectives from teachers in both developed and developing educational systems. In total, 154 teachers completed the survey. Most respondents reported between 6 and 10 years of teaching experience.

Instrument Development

The survey was created in Google Forms to ensure accessibility and ease of completion. The instrument consisted of four sections:

- *Background information:* participants indicated their teaching role, years of teaching experience, and country of practice. No personal identifiers were collected to preserve anonymity.
- *Technology adoption:* teachers selected what digital technologies they had used in their practice, focusing on three categories – AI, VR/AR, and gamification. They also reported the frequency of use.
- *Perceived pedagogical impact:* a series of Likert-scale statements asked respondents to evaluate the benefits and challenges of these technologies on a scale from 1 (strongly disagree) to 5 (strongly agree). This included items on motivation, learner autonomy, skill development, and potential drawbacks such as distraction or over-reliance.
- *Open-ended reflection:* a short open-ended question invited participants to indicate which technology they personally found most useful in their teaching and explain why.

Pilot testing and validation

Before distribution, the survey was piloted with five experienced teachers to ensure clarity and appropriateness of wording. Minor adjustments were made to simplify instructions and reduce the overall time required. This step improved the reliability and face validity of the instrument, ensuring that participants could complete it smoothly without confusion.

Data Collection

The survey link was distributed via LinkedIn between May and August 2025. The choice of LinkedIn was deliberate, as it provided access to a professional audience of practicing teachers worldwide, rather than students or pre-service teachers. Participation was voluntary and unpaid.

Data Analysis

Quantitative data were analyzed using descriptive statistics (frequencies, percentages, means, and standard deviations) to identify adoption patterns and overall perceptions of AI, VR, AR, and gamification. In addition, composite indices were calculated for each technology, and item-level means were reported to provide more detailed insight. These results were then considered in relation to existing literature, enabling a comparison between teachers' perceptions and theoretical claims about the pedagogical value of these technologies. Qualitative data from the open-ended question were analyzed using thematic coding, which allowed for the identification of common themes in teachers' justifications for preferring certain technologies. Qualitative data from the open-ended item were analyzed thematically following Braun and Clarke's (2006) six-phase procedure. Coding was conducted manually by the researchers, with repeated readings to ensure internal consistency and accurate theme identification. Selected quotations were included in the results to illustrate these perspectives. Both strands were integrated at the interpretation stage: quantitative results outlined adoption levels and perceived benefits, while qualitative themes illustrated the reasoning behind these patterns. This triangulation, combined with explicit reference to the literature, increased the validity and richness of the findings.

Ethical Considerations

The study adhered to ethical principles of voluntary participation, informed consent, and anonymity. At the beginning of the Google Form, participants were informed of the study's purpose, assured that their responses would remain confidential, and notified that by completing the survey, they were consenting to participate. No identifiable information was collected.

RESULTS

The results section presents evidence on both the scope of adoption and the perceived pedagogical impact of AI, VR/AR, and gamification. First, adoption rates are presented to indicate the degree to which each technology has been adopted in teaching practice. Second, it summarizes composite and item-level measures of perceived benefits and challenges, supplemented by qualitative insights that illustrate teachers' reasoning in their own words. Together, these findings provide the basis for identifying which technology is perceived as the most effective for supporting foreign language education.

PARTICIPANT PROFILE

A total of 154 in-service English and foreign language teachers completed the survey. Their profiles are presented in Table 2.

Table 2. Participant profile

Category	Subcategory	% of participants
Role	School teacher	14.9%
	University teacher	55.2%
	Language school teacher	14.3%
	Self-employed teachers	11.7%
	Other category	1.2%
Experience	1-5 years	18.1%
	6-10 years	39.6%
	11-20 years	37.6%
	20+ years	4.7%
Countries	Kazakhstan	21.4%
	India	13%
	Turkey	10.4%
	China	8.4%
	United States	5.8%
	Other 32 countries	41%

The participants represented 37 different countries, highlighting the international scope of the study. The largest group came from Kazakhstan (21.4%), India (13%), Turkey (10.4%), China (8.4%), and the United States (5.8%), with the remaining 32 countries distributed across Europe, Asia, the Middle East, and Latin America, accounting for less than 5% each.

In terms of teaching roles, most participants identified as university teachers (55.2%), followed by school teachers (14.9%), language school teachers (14.3%), self-employed teachers (11.7%), and other categories (1.2%). The range of instructional contexts indicates that digital technologies are not limited to higher education but are also becoming more widespread at the school level.

The distribution of teaching experience revealed that the majority of teachers had 6-10 years of experience (39.6%). Teachers with 11-20 years of experience accounted for 37.6%, while the smallest groups were those with 1-5 years (18.1%) and 20+ years (4.7%) of experience, respectively.

ADOPTION OF DIGITAL TECHNOLOGIES

Survey results demonstrated that digital technologies have gained significant traction among language teachers, but the extent of adoption varied considerably across different tools. Respondents were allowed to select more than one category, reflecting the fact that many teachers regularly use multiple technologies in parallel.

- *Artificial Intelligence:* AI emerged as the most widely adopted category, with 88.3% (n = 136) of respondents reporting regular use. The most frequently mentioned tools included ChatGPT, Grammarly, and automated assessment platforms, which were employed to support writing development, provide instant feedback, and streamline grading. Teachers emphasized AI's capacity to personalize instruction and reduce routine workload, making it the most integrated technology in everyday classroom practice.
- *Gamification platforms:* 72.1% of teachers (n = 111) reported using gamification-based applications, most commonly Kahoot, Quizizz, or Duolingo. These platforms were primarily used to enhance student motivation, participation, and recall of vocabulary or grammar structures. However, their pedagogical role was often described as supplementary, with teachers noting that gamification was most effective for short-term engagement rather than sustained skill development.
- *Virtual and Augmented Reality:* By contrast, VR/AR was reported by only 16.9% (n = 26) of respondents, primarily in experimental or pilot contexts. Teachers highlighted the value of immersive simulations for cultural exposure and contextualized language use, but widespread integration was hindered by technical complexity, high equipment costs, and limited institutional support. Consequently, VR/AR adoption remained confined to specific, well-resourced environments.

These trends are illustrated in Figure 2, which shows adoption rates by technology. AI leads as the most accessible and pedagogically integrated technology, gamification occupies a motivational niche, and VR/AR lags behind due to infrastructural and practical constraints.

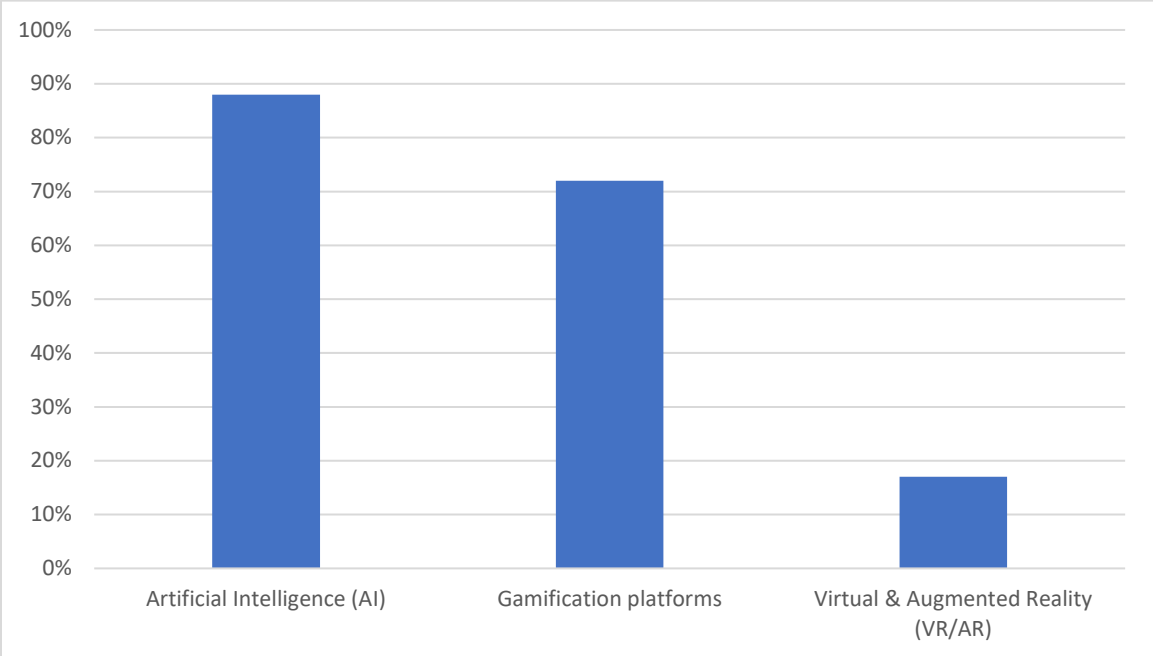

Figure 2. Adoption rates by technology (multiple responses allowed)

Perceived Pedagogical Impact

Teachers evaluated AI, VR/AR, and gamification on technology-specific Likert items (1-5 scale). Negatively worded items were reverse-coded so that higher values indicate more favorable perceptions.

- AI supports learner independence and self-study.
- AI tools help improve students' writing and speaking skills.
- AI may encourage plagiarism or over-reliance on technology (reverse-coded).
- Gamification increases student motivation to participate.
- Gamification can distract students from real learning goals (reverse-coded).
- VR/AR makes language learning more engaging and less stressful.
- VR/AR is difficult to implement due to cost and technical barriers (reverse-coded).

To allow for comparison across technologies, composite indices were calculated for each, and the results are summarized in Table 3.

Table 3. Composite ratings by technology (N = 154)

Technology	Mean (M)	Standard deviation (SD)
AI	3.50	0.39
Gamification	3.07	0.33
VR/AR	2.99	0.37

As shown in Table 3, AI received the highest overall evaluation (M = 3.50, SD = 0.39), followed by gamification (M = 3.07, SD = 0.33). VR/AR obtained the lowest composite rating (M = 2.99, SD = 0.37). To examine whether these differences were statistically significant, a Friedman test was conducted. The result showed a significant overall effect, $x2(2) = 164.76$, $p < .001$, indicating that teachers did not evaluate the three technologies equally. Overall, these findings confirm a clear hierarchy: AI was perceived as the most pedagogically valuable technology, gamification was valued to a moderate extent, and VR/AR received the lowest evaluations overall. To provide greater detail, item-level results for each question are presented in Table 4.

Table 4. Item-level ratings
(1-5 Likert scale, reverse-coded where indicated, N = 154)

Item (abbreviated)	M	SD
AI helps writing and speaking	4.45	0.72
AI supports independence and self-study	4.60	0.64
AI encourages plagiarism (rev)	1.46	0.61
VR/AR is engaging and less stressful	4.63	0.65
VR/AR is difficult to implement (rev)	1.34	0.73
Gamification increases motivation	4.83	0.44
Gamification distracts students	1.31	0.73

At the item level, gamification was most strongly endorsed for its motivational benefits (M = 4.83), and teachers largely rejected the idea that it distracts from learning (M = 1.31, reverse-coded). VR/VR was praised for its immersive and stress-reducing qualities (M = 4.63), but respondents agreed that implementation challenges limited its practicality (M = 1.34, reverse-coded). AI received consistently positive evaluations, especially for supporting independence (M = 4.60) and improving writing and speaking skills (M = 4.45). Concerns about plagiarism or over-reliance were minimally endorsed (M = 1.46, reverse-coded).

Hence, the composite and item-level results reinforce that AI was seen as the most impactful technology for language learning, gamification was valued primarily for motivational purposes, and VR/AR, while engaging, was hindered by cost and implementation barriers.

Open-Ended Responses

The open-ended question "Which technology do you find the most useful, and why?" was answered by all 154 participants. Teachers' responses strongly echoed the survey findings. Figure 3 illustrates that AI was the most cited technology (67.5%, n = 104), followed by gamification (23.4%, n = 36), and VR/AR (8.4%, n = 13), with one teacher noting that they do not use any digital technologies (0.7%). These responses provided valuable qualitative insights that complemented the quantitative results.

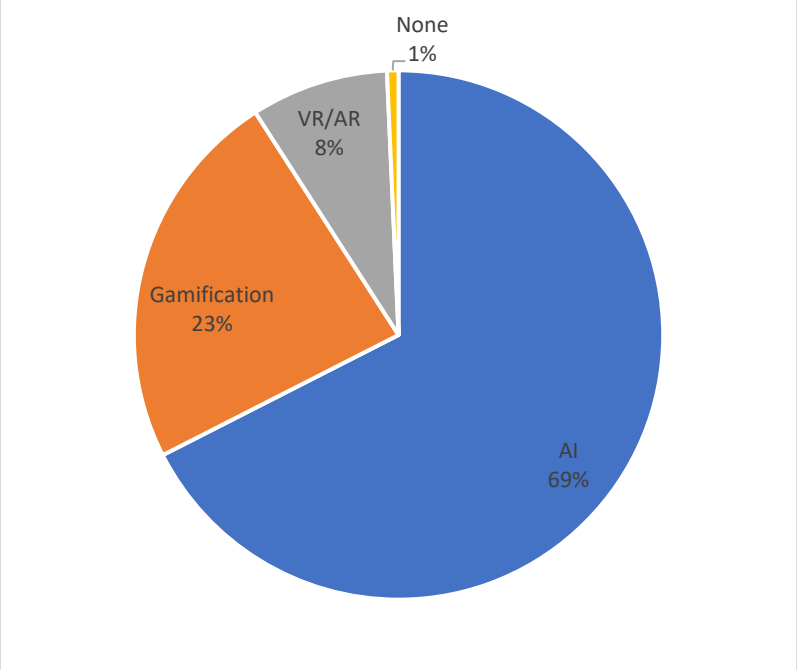

Figure 3. Distribution of respondents' technology preferences

Respondents highlighted AI's efficiency in streamlining lesson preparation, often describing it as a personal assistant for immediate feedback or even a colleague that supports teachers. Gamification was consistently associated with motivation and sustained student interest, particularly in keeping learners engaged during lessons. VR/AR, while less common, was valued for its ability to visualize abstract ideas and bring learning experiences closer to real life. Representative quotes are presented in Table 5.

Table 5. Selected teacher responses

Technology	Representative quote	Participant ID	Role	Country	Experience (years)
AI	AI, because it helps me create materials in minutes instead of hours.	P4	University teacher	Turkey	6-10
AI	AI, because it gives quick feedback.	P143	University teacher	Kazakhstan	6-10
AI	AI. ChatGPT is my best colleague in teaching.	P118	University teacher	Turkey	11-20

Technology	Representative quote	Participant ID	Role	Country	Experience (years)
Gamification	Gamification. It increases student motivation.	P84	Language school teacher	UK	11-20
Gamification	I actually prefer gamification; it keeps students interested.	P40	University teacher	England	11-20
VR/AR	VR because it visualizes abstract ideas.	P101	University teacher	USA	11-20
VR/AR	VR and AR, as they are close to real life.	P111	Self-employed	China	11-20

Comparative Insights

Further analysis revealed two consistent patterns across responses:

> *Experience effect:* Teachers with fewer than 20 years of experience were more likely to regularly adopt AI and gamification. In contrast, those with more than 20 years tended to be cautious adopters, preferring traditional, proven methods. Notably, one teacher with over 20 years of experience explicitly stated that they did not use any digital technologies at all. This highlights how professional background and digital literacy strongly shape adoption patterns.
>
> *Regional effect:* Adoption and perception also varied by context. Teachers in developing regions most often emphasized infrastructural and financial barriers, citing unreliable internet access and insufficient funding for advanced tools such as VR/AR, and therefore tended to prefer AI and gamification. By contrast, teachers in developed regions have raised ethical concerns about AI use, including issues of plagiarism and over-reliance on automated support, which reflects broader debates in digital education. Despite this, the majority of teachers everywhere heavily rely on AI. As for VR/AR, its use was concentrated primarily among Chinese teachers, with some additional uptake noted among American respondents, while it was rarely mentioned elsewhere.

Taken together, these comparative insights indicate that while AI is globally dominant, the context of teaching strongly influences both adoption and perception. Experience level and regional context jointly shape how teachers perceive and integrate digital tools, highlighting the need for differentiated professional development and policy approaches to maximize their pedagogical value.

Discussion

The results of this mixed-methods study indicate that AI has emerged as the most impactful digital technology in foreign language education, surpassing gamification and VR/AR in both adoption and perceived effectiveness. This finding resonates with recent literature underscoring AI's transformative potential in language teaching, including adaptive learning, intelligent tutoring systems, and automated feedback (Godwin-Jones, 2022; Huang et al., 2023; Ji et al., 2023).

Why AI Outperforms Other Technologies

Gamification was recognized in this study as useful for increasing motivation (M = 4.83), but teachers noted that its pedagogical impact was limited to engagement rather than skill mastery. This observation mirrors the findings by Luo (2023) and Mogavi et al. (2022), who emphasize that gamification's strength lies in affective factors such as enjoyment and participation rather than consistent improvements in language learning. While tools such as Kahoot or Duolingo create short-term

enthusiasm, their effects on deeper skills such as communicative fluency or strategic learning remain constrained without strong pedagogical alignment.

VR/AR showed the lowest adoption rate (8.4%) and effectiveness (M = 1.34), mainly due to resource barriers. This finding aligns with Peixoto et al. (2021), Cai et al. (2022), and Ozgun and Sadik (2023), who observed that despite VR/AR's immersive potential, classroom implementation remains sporadic and experimental, constrained by high costs and technical demands. Although VR/AR affords cultural immersion and contextual learning benefits, their pedagogical contribution often stops at motivation and situational practice rather than long-term skill integration.

By contrast, AI not only facilitates engagement but also enhances linguistic accuracy and learner autonomy, with 88.3% of teachers in this study reporting frequent integration (see Figure 1). This finding is consistent with Godwin-Jones (2022), Ji et al. (2023), and An et al. (2023), who highlight AI's ability to provide instant corrective feedback, track learner patterns, and personalize learning pathways, thereby enabling students to work independently at scale. Moreover, AI was praised for reducing teacher workload – a benefit also identified by Wang et al. (2024) and Zhu and Wang (2025), who found that AI-powered writing assistants and chatbots automated repetitive correction and administrative tasks, allowing teachers to focus on higher-order instruction such as fostering critical thinking, guiding communicative practice, and supporting learner reflection.

Taken together, these results demonstrate why AI consistently outperforms gamification and VR/AR in pedagogical impact. Unlike the other technologies, AI contributes across cognitive, affective, and social dimensions, offering adaptability, feedback, and workload efficiency simultaneously. Its multidimensional role positions AI not as a supplementary motivational tool, but as a core instructional partner capable of reshaping foreign language pedagogy at scale.

Pedagogical Impact of AI

The survey responses emphasized four primary contributions of AI, which aligned with findings from recent literature and were consistently supported by item-level results in Table 4:

- *Accelerated feedback:* Teachers valued AI's capacity to deliver instant correction and formative input. In the survey, AI was strongly endorsed for improving students' writing and speaking skills (M = 4.45) and for supporting independence (M = 4.60). This corresponds with research highlighting AI-powered writing assistants and chatbots as effective in providing scaffolded, real-time feedback that supports iterative learning and improved accuracy (Godwin-Jones, 2022; Ji et al., 2023). Unlike gamification, which primarily motivates through points and rewards, AI feedback adapts to learner performance and provides targeted guidance.

- *Personalized learning:* AI's adaptability to different learner levels and contexts was widely recognized. Consistent with Huang et al. (2023), personalization emerged as a central advantage of AI tools over other digital technologies, allowing for adaptive instruction and individualized pathways. By contrast, VR/AR immersion and gamification rewards are applied uniformly to all learners and do not adjust dynamically to individual needs.

- *Learner autonomy:* Students' independent use of AI tools reflected their perception of AI as a supportive, non-threatening collaborator. The survey indicated strong agreement that AI promotes self-study and independence (M = 4.60) while concerns about plagiarism and over-reliance were minimally endorsed (M = 1.46, reverse-coded.) This finding echoes An et al. (2023), who reported that AI enhances self-efficacy, engagement, and self-regulated learning when learners view it as a partner rather than a judge. Unlike VR/AR, which requires structured classroom setups, AI can be accessed flexibly by students outside class, extending opportunities for autonomous practice.

- *Workload reduction:* Teachers frequently mentioned that AI reduced the time spent on routine correction and feedback, positioning AI as a "pedagogical assistant". In the survey's open-

ended question, many noted that AI helps generate lesson materials and automate quizzes, which streamlines preparation. This observation resonates with studies showing that AI systems can automate repetitive tasks while also freeing teachers to focus on higher-order teaching activities (Godwin-Jones, 2022; Wang et al., 2024). Neither gamification nor VR/AR offers workload reduction; instead, they often require additional preparation and classroom management.

In contrast, neither gamification nor VR/AR was reported to provide these core instructional benefits. Gamification primarily supported affective engagement and short-term motivation (Luo, 2023; Mogavi et al., 2022), while VR/AR remained contextually bound and resource-intensive, offering situational immersion but limited adaptability or feedback mechanisms (Ozgun & Sadik, 2023; Peixoto et al., 2021).

Limitations of the Study

Several limitations should be acknowledged when interpreting these findings. First, reliance on self-reported data may have led participants to overestimate or underestimate the actual classroom impact of digital tools. Second, the recruitment strategy, conducted primarily through LinkedIn, likely attracted teachers who are more digitally active and professionally networked. This may have introduced sampling bias by underrepresenting teachers with limited access to or interest in online professional platforms, thereby producing more favourable perceptions of AI and other technologies. Third, while the parallel with existing literature added depth, the survey's brevity limited the extent to which nuanced theoretical claims could be fully tested. Even so, the strong convergence between the survey results and existing literature reinforces confidence in the conclusion that AI presently provides the most substantial pedagogical value among emerging digital technologies.

Implications for Practice and Research

For teaching practice, the findings suggest that teachers should prioritize the adoption of AI tools, particularly for providing timely feedback and supporting differentiated instruction. At the institutional level, AI may represent a more cost-effective investment than resource-intensive technologies such as VR/AR labs, offering broader accessibility and scalability. From a research perspective, future studies should examine the long-term impact of AI on learner achievement using experimental and longitudinal designs. Such research would provide stronger evidence of AI's sustained pedagogical value and clarify its role in foreign language education.

Closing Remarks

Taken together, the findings suggest that AI is not just an emerging innovation, but the leading digital technology for language teaching, as validated by both teacher perceptions and scholarly literature. While gamification and VR/AR contribute value in motivational and immersive contexts, they remain supplementary. AI stands out as a scalable, evidence-based, and pedagogically effective solution to the challenges of contemporary foreign language education.

Conclusion

This study examined language teachers' perceptions of AI, gamification, and VR/AR in foreign language education through an internationally distributed mixed-methods survey. The results consistently indicated that AI was perceived as the most useful and impactful digital technology, surpassing gamification and VR/AR in adoption, accessibility, and pedagogical contribution.

Gamification was valued for its impact on student motivation and engagement; however, its effects were primarily affective rather than cognitive, aligning with prior findings that highlight gamification's capacity to increase participation and short-term persistence, but with limited impact on higher-order competences (Luo, 2023; Mogavi et al., 2022). VR/AR, while offering immersive and context-rich learning experiences, remains constrained by technical and financial barriers, which

largely restrict its integration to experimental or well-funded environments. These limitations mirror observations in recent studies, which note the high costs, infrastructure demands, and lack of adaptive feedback mechanisms associated with immersive platforms (Ozgun & Sadik, 2023; Peixoto et al., 2021).

By contrast, AI was consistently highlighted as transformative because it supports personalized learning, real-time feedback, learner autonomy, and teacher workload reduction. These findings converge with prior research that identifies AI as a paradigm-shifting technology, capable of delivering adaptive instruction, enhancing self-regulated learning, and serving as a pedagogical assistant for teachers (An et al., 2023; Godwin-Jones, 2022; Ji et al., 2023; Wang et al., 2024).

Nevertheless, several limitations must be acknowledged: reliance on self-reported perceptions, potential sampling bias towards digitally active teachers, and absence of direct outcome measures. Future studies should adopt experimental and longitudinal designs to assess the sustained impact of AI on language development.

Despite these constraints, the evidence suggests that AI currently offers the most scalable and pedagogically effective solution among digital technologies in language education. While gamification and VR/AR retain value as supplementary tools for motivation and immersion, AI uniquely combines accessibility, adaptability, and evidence-based instructional benefits, positioning it as the most promising pathway for teachers seeking to integrate technology into their practice.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

References

Al-Dosakee, K., & Ozdamli, F. (2021). Gamification in teaching and learning languages: A systematic literature review. *Revista Românească Pentru Educaţie Multidimensională, 13*(2), 559–577. https://doi.org/10.18662/rrem/13.2/436

An, X., Chai, C. S., Li, Y., Zhou, Y., & Yang, B. (2023). Modeling students' perceptions of artificial intelligence assisted language learning. *Computer Assisted Language Learning, 38*(5–6), 987–1008. https://doi.org/10.1080/09588221.2023.2246519

Arip, A. J., & Hashim, H. (2024). Gamification in English as a Second Language instruction: A systematic review. *International Journal of Academic Research in Progressive Education and Development, 13*(4), 2837–2863. https://doi.org/10.6007/IJARPED/v13-i4/24069

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Cai, Y., Pan, Z., & Liu, M. (2022). Augmented reality technology in language learning: A meta-analysis. *Journal of Computer Assisted Learning, 38*(4), 929–945. https://doi.org/10.1111/jcal.12661

Christou, E., Vassiliou, P., & Parmaxi, A. (2025). Augmented reality in language learning: A systematic literature review of the state-of-the-art and task design considerations. *Innovation in Language Learning and Teaching*, 1–28. https://doi.org/10.1080/17501229.2025.2504706

Colomo-Magaña, E., Colomo-Magaña, A., & Ariza, A. C. (2024). Pre-service primary teachers' perceptions of gamification as a methodology. *Journal of Technology and Science Education, 14*(1), 109–122. https://doi.org/10.3926/jotse.2204

Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.

Godwin-Jones, R. (2022). Partnering with AI: Intelligent writing assistance and instructed language learning. *Language Learning & Technology, 26*(2), 5–24. https://doi.org/10.64152/10125/73474

Huang, X., Zou, D., Cheng, G., Chen, X., & Xie, H. (2023). Trends, research issues and applications of AI in language education. *Journal of Educational Technology & Society, 26*(1), 112–131.

Huang, X., Zou, D., Cheng, G., & Xie, H. (2021). A systematic review of AR and VR enhanced language learning. *Sustainability, 13*(9), 4639. https://doi.org/10.3390/su13094639

Ji, H., Han, I., & Ko, Y. (2023). A systematic review of conversational AI in language education: Focusing on the collaboration with human teachers. *Journal of Research on Technology in Education, 55*(1), 48–63. https://doi.org/10.1080/15391523.2022.2142873

Lin, C. J., & Mubarok, H. (2021). Learning analytics for investigating the mind map-guided AI chatbot approach in an EFL flipped speaking classroom. *Educational Technology & Society, 24*(4), 16–35. https://doi.org/10.30191/ETS.202110_24(4).0002

Luo, Z. (2023). The effectiveness of gamified tools for foreign language learning (FLL): A systematic review. *Behavioral Sciences, 13*(4), 331. https://doi.org/10.3390/bs13040331

Mogavi, R. H., Guo, B., Zhang, Y., Haq, E.-U., Hui, P., & Ma, X. (2022). When gamification spoils your learning: A qualitative case study of gamification misuse in a language-learning app. *Proceedings of the Ninth ACM Conference on Learning @ Scale* (pp. 175–188). Association for Computing Machinery. https://doi.org/10.1145/3491140.3528274

Nikou, S. A., Perifanou, M., & Economides, A. A. (2024). Exploring teachers' competences to integrate augmented reality in education: Results from an international study. *TechTrends, 68*, 1208–1221. https://doi.org/10.1007/s11528-024-01014-4

Ozgun, O., & Sadik, O. (2023). Implementation of VR technologies in language learning settings: A systematic literature review. *Educational Policy Analysis and Strategic Research, 18*(4), 32–61. https://doi.org/10.29329/epasr.2023.631.2

Peixoto, B., Pinto, R., Melo, M., Cabral, L., & Bessa, M. (2021). Immersive virtual reality for foreign language education: A PRISMA systematic review. *IEEE Access, 9*, 48952–48962. https://doi.org/10.1109/ACCESS.2021.3068858

Wang, X., Pang, H., Wallace, M. P., Wang, Q., & Chen, W. (2024). Learners' perceived AI presences in AI-supported language learning: A study of AI as a humanized agent from community of inquiry. *Computer Assisted Language Learning, 37*(4), 814–840. https://doi.org/10.1080/09588221.2022.2056203

Zhu, M., & Wang, C. (2025). A systematic review of research on artificial intelligence in language education: Current status and future implications. *Language Learning & Technology, 29*(1), 1–29. https://doi.org/10.64152/10125/73606

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