

Usability and Acceptance of a Mobile Augmented Reality Tourism English Learning Application (MARTEL) among Chinese Vocational College Students

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ABSTRACT

The rapid growth of the global tourism industry has increased demand for tourism management graduates with strong English communication skills. Nonetheless, Tourism English courses in Chinese vocational education are depending still on lecture-based through conventional teaching tools, thus limit students' opportunities to practice real-life language communication. In addressing this challenge, this study aims to evaluate the Mobile Augmented Reality Tourism English Learning (MARTEL) application to enhance students' engagement and practical communication abilities. A quantitative research design was employed involving 429 students from a vocational college in China. Data obtained were analysed using descriptive statistics and Structural Equation Modelling (SEM) to examine the usability and acceptance of the application. The results indicated that students are at early stage while the frequency usage of the application are at moderate level. Conversely, usability evaluation reported a high satisfaction rate of 84.4%. SEM analysis revealed that students' Perceived Usefulness, Facilitating Conditions, and Attitude significantly influenced their acceptance of MARTEL. The findings demonstrate that MARTEL enhances students' learning, motivation and supports the development of practical English communication skills. Hence, the study proposes a curriculum–technology integration framework that offers a scalable approach for integrating immersive technologies into vocational language education.

Keywords: Mobile Augmented Reality Tourism English Learning Application (MARTEL), Tourism English; Vocational Education; Technology Acceptance; Structural Equation Modeling (SEM)

INTRODUCTION

Tourism Management programs in Chinese higher vocational education face increasing pressure to develop students' English communication competencies for international tourism service environments. However, current Tourism English instruction that focuses on textbook-driven and lecture-based have provided limited interaction and insufficient exposure to authentic tourism scenarios (Hsu et al., 2025). Consequently, students often experience low engagement and difficulty transferring theoretical knowledge into practical communication contexts. This limitation is reflected in the relatively low College English Test Band-4 (CET-4) performance among Tourism Management students. The pass rate was reported approximately 5% below the national average (40%), while more than 85% of students remain at beginner proficiency levels despite years of formal English learning. These outcomes reveal a clear mismatch between vocational training and industry expectations, highlighting the urgent need for innovative and technology-enhanced pedagogical approaches that can support contextualized and practice-oriented language learning.

In addressing these suggestions, Augmented Reality (AR) has offers potential in creating immersive and interactive learning experiences through integration of virtual elements into real-world environments. AR can bridge the gap between theoretical instruction and practical language use through simulations of authentic tourism tasks such as guiding visitors at scenic attractions or managing hotel check-in. Moreover, through the

accessibility and portability of mobile technologies, Mobile Augmented Reality (MAR) has enabled flexible, contextualized learning beyond classroom settings. Thus, integrating MAR into vocational Tourism English education has holds both practical and theoretical significance, as it aligns with vocational education's emphasis on job-ready skills while expanding research on immersive technologies in language learning contexts (Deng, Zhang & Zhao, 2025).

Although previous studies have demonstrated the effectiveness of AR in enhancing learner engagement, motivation, and language performance, most research has focused on general English learning settings (Fareed & Kirkil, 2025; Chiew, et. al., 2025; Dhas, 2024). Evidence within vocational and industry oriented contexts remains limited, particularly where practical communication skills are central learning outcomes (Bozhu & Xizi, 2025). Furthermore, technology integration in Tourism English education continues to rely mainly on conventional multimedia resources, such as MOOCs and video-based materials. Those multimedia applications are lack of interactive and contextual immersion necessary for skill-based training. Conversely, some studies have explored virtual reality (VR) simulations for tourism service training. Unfortunately, due to high cost and limited scalability, its adoption in vocational colleges were reported as low (Annamalai, Uthayakumaran & Zyoud, 2023).

Despite the increasing accessibility of MAR through smartphones, its application in Tourism English education, especially within Chinese higher vocational institutions remains underexplored (Crogman et al., 2023). Existing AR language learning tools often employ generic scenarios or Western tourism contexts that do not align with local tourism environments and contexts or national vocational curriculum objectives (Aldeeb et al., 2024; Asoodar et al., 2024; Ebadi & Raygan, 2023). This mismatch between technological design and vocational learning needs has called to develop and evaluate a contextually tailored MAR-based learning solution. This effort hoped to supports authentic tourism communication practices and aligns with the national vocational curriculum requirements (Deri et al., 2024; Huang et al., 2024). Hence, the present study will evaluate developed Mobile Augmented Reality Tourism English Learning (MARTEL) application in enhancing vocational language education students' engagement and practical communication abilities.

Integration of Mobile Augmented Reality in Tourism English Learning

Augmented Reality (AR), particularly Mobile Augmented Reality (MAR), has gained increasing attention as a transformative approach in language education. This is due to MAR ability to integrate virtual elements into real-world environments, enabling immersive and interactive learning experiences (Wenfei et al., 2023). In the context of English language learning, MAR has been widely reported to enhance student engagement and language performance, while simultaneously reducing anxiety and cognitive load through contextualised and experiential learning (Chen et al., 2024; Firdaus et al., 2024). These affordances are particularly relevant to vocational education, where the emphasis is placed on developing practical and job-ready communication skills.

Within Tourism English education, MAR offers distinct pedagogical advantages by enabling the simulation of authentic tourism scenarios, such as tour guiding and hospitality interactions. This contextual immersion approach will develop student's communication competencies by bridging the gap between theoretical knowledge and real-world application (Schmidt & Stumpe, 2025). Furthermore, the accessibility and flexibility of MAR will allow students to engage in situated learning beyond classroom boundaries (Deng et al., 2025). Empirical evidence suggests that MAR environments to promote higher levels of participation, knowledge retention, and skill transfer, particularly in practice-oriented learning contexts (Mokmin et al., 2025).

Despite these potentials, the integration of AR in Tourism English learning remains limited and underdeveloped. Existing instructional approaches continue to rely heavily on conventional multimedia tools, such as slides presentation and video-based resources, which lack of interactivity and contextual immersion required for effective skill acquisition. Although virtual reality (VR) has been explored in tourism education, its high cost and limited scalability restrict its implementation in resource-constrained vocational institutions (Shen et al., 2022). In contrast, MAR presents a more feasible alternative. However, current MAR applications are often generic, lacking alignment with local tourism contexts and vocational curriculum objectives, thereby reducing their pedagogical relevance (de Lurdes & Sarkar, 2024).

Moreover, several challenges continue to hinder effective MAR integration, including limited digital competencies among educators and learners, high development demands, and infrastructural constraints (Zhao et al., 2026). The effectiveness of MAR usage is also influenced by critical factors such as usability, perceived usefulness, engagement, and contextual relevance, which must be carefully considered in instructional design (Wu & Lai, 2024). Given these gaps, there is a need to develop a contextually grounded and curriculum aligned MAR applications tailored to vocational Tourism English education. Therefore, this study aims to assess the need and evaluate a mobile augmented reality Tourism English learning application, namely Mobile Augmented Reality Tourism English Learning (MARTEL) to enhance students' engagement and practical communication abilities in authentic tourism contexts.

MARTEL was designed and developed through systematic processes encompassing needs analysis, content and instructional design, AI and interface development, expert validation and iterative refinement. The application provides contextual based practical learning experiences such as hotel services, tourist attractions, and travel assistance. Moreover, MARTEL include mobile accessibility, contextualised learning, integrative AR experiences, multimodal learning support, and authentic task based learning activities. These features support learners' engagement, motivation, self-directed learning and experiential language practice, hence offering a practical approach by integrating AR into vocational language education.

RESEARCH METHODOLOGY

This study employed a quantitative design to examine the needs, usability, and acceptance of MAR, namely the Mobile Augmented Reality Tourism English Learning (MARTEL) application. A two phases approach was adopted. In Phase One, a needs analysis was conducted using a structured questionnaire to assess students' current usage and satisfaction with existing instructional tools. In Phase Two, a four week intervention was implemented, involving two hours of guided MARTEL use per week alongside optional self-directed practice. Finally a questionnaire was shared to students to evaluate MARTEL usability and acceptance. A total of 429 Tourism Management students (aged 18–20) from a Chinese vocational college participated in this study. Two instruments were employed, the first questionnaire consisted of 12 item needs analysis questionnaire ($\alpha = 0.839$), while second questionnaire comprised a 37-item evaluation instrument based on the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) constructs. All these items were grouped as six constructs and tested through reliability ability ($\alpha = 0.91 - 0.95$). Data obtained were then analysed using SPSS 26.0 (descriptive statistics) and SmartPLS 4.0 (SEM), with standard fit indices (RMSEA, GFI, CFI) and path coefficients (β) employed to test the relationships between constructs.

RESEARCH FINDINGS

The research findings of this study are divided into three subsections namely descriptive analysis, evaluation of the measurement model, and analysis of the SEM.

Descriptive Analysis

The demographic data indicates that majority (63.4%, $n = 272$) of the participants that involved in this study are female, as compared to male students (36.6%, $n = 157$). In terms of academic level, first-year students comprised for 74.4% ($n = 319$) followed by the second-year students (25.6%, $n = 110$). This data suggesting that early-stage learners were more engaged with the MARTEL intervention.

Table 1: Respondents' Demographic Background

Respondents' Demographic Background		Frequency	Percent
Gender	Female	272	63.4
	Male	157	36.6
Current grade	1st year	319	74.4
	2nd year	110	25.6

Frequency of use	1 – 3 times a week	249	58.0
	4 - 6 times a week	134	31.2
	7 – 9 times a week	22	5.1
	More than 10 times a week	24	5.6
Duration per visit	0 - 5 minutes	63	14.7
	6 – 10 minutes	96	22.4
	11 - 15 minutes	136	31.7
	16 -20 minutes	82	19.1
	21 -25 minutes	16	3.7
	26 -30 minutes	13	3.0
	More than 30 minutes	23	5.4

Analysis of MARTEL usage indicates that majority of students (58.0%, n = 249) reported using the application 1–6 times per week, while 31.2 percent (n = 134) using it 4–6 times weekly. These findings inform that high-frequency usage remained limited. In terms of duration per visit, most students engaged in short learning sessions, with 31.7 percent (n = 136) using MARTEL for between 11–15 minutes per session, followed by 22.4 percent (n = 96) for 6–10 minutes and 19.1 percent (n = 82) for 16–20 minutes.

Measurement Model Evaluation

In ensuring measurement robustness, reliability and validity assessments were conducted across six core constructs (Attitude, Perceived Usefulness, Facilitating Conditions, Social Influence, Usability, and Continuance Intention). As reported in Table 2, all constructs demonstrated high internal consistency, with Cronbach's α ranging from 0.912 to 0.953, and composite reliability (CR) values exceeding the recommended threshold of 0.70 (0.916–0.955). Convergent validity was established, as all average variance extracted (AVE) values surpassed 0.50 (0.508–0.841). Finally, all item loadings exceeded 0.50, confirming adequate construct representation.

Table 2: Reliability and Convergence Validity Test

Constructs	Items	Loading	Cronbach's α	CR	AVE
Attitude	ATT1	0.899	0.953	0.955	0.841
	ATT2	0.897			
	ATT3	0.933			
	ATT4	0.944			
	ATT5	0.911			
Perceived Usefulness	PU1	0.766	0.932	0.934	0.622
	PU2	0.710			
	PU3	0.804			
	PU4	0.779			
	PU5	0.751			
Facilitating Condition	FC1	0.874	0.919	0.921	0.756
	FC2	0.786			

	FC3	0.922			
	FC4	0.867			
	FC5	0.894			
Social Influence	SI1	0.897	0.923	0.928	0.764
	SI2	0.878			
	SI3	0.803			
	SI4	0.883			
	SI5	0.897			
Usability	Satisfaction1	0.635	0.912	0.916	0.508
	Satisfaction2	0.666			
	Satisfaction3	0.683			
	Error1	0.669			
	Error2	0.681			
	Error3	0.696			
	Learnability1	0.710			
	Learnability2	0.710			
	Learnability3	0.737			
	Memorability1	0.786			
	Memorability2	0.782			
	Memorability3	0.778			
Continuance Intention	CI1	0.928	0.952	0.955	0.839
	CI2	0.928			
	CI3	0.868			
	CI4	0.933			
	CI5	0.921			

Conversely, discriminant validity was verified using the Heterotrait–Monotrait ratio (HTMT) with all values below the 0.90 threshold, as presented in Table 3. The highest HTMT value (0.894) between Usability and Perceived Usefulness remained within acceptable limits, indicating satisfactory construct distinctiveness. These results specify that the measurement model is both reliable and valid for subsequent structural analysis.

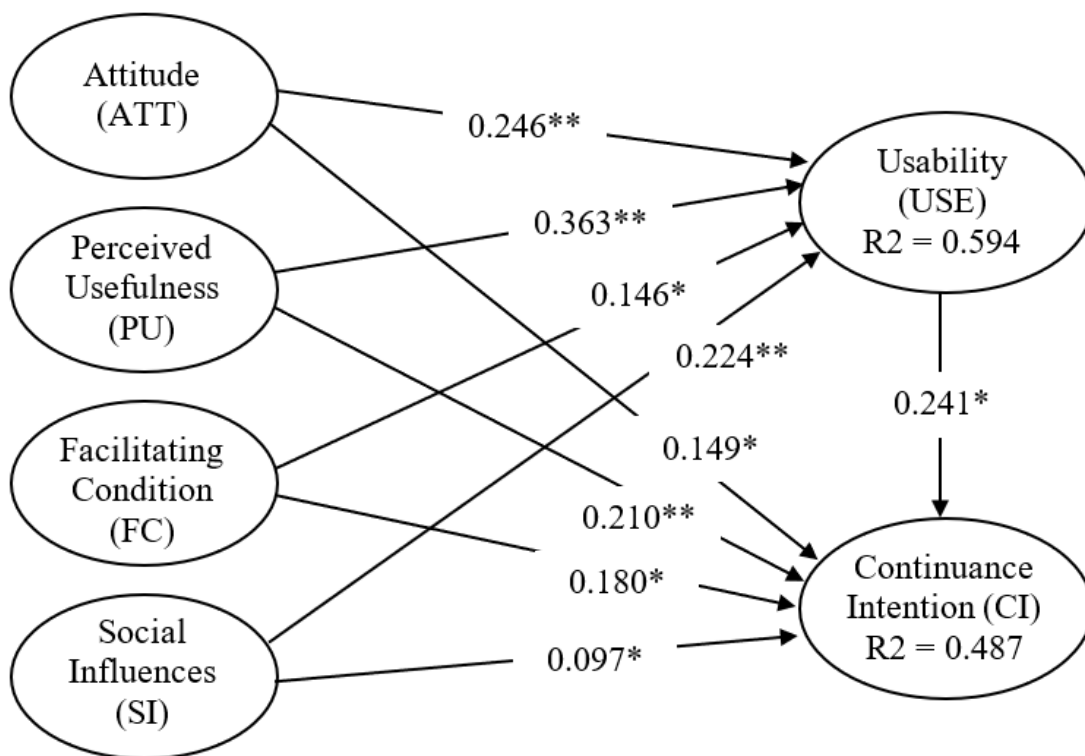
Table 3: Heterotrait-Monotrait Ratio (HTMT) for the Six Constructs

Constructs	ATT	CI	FC	PU	SI
CI	0.549				
FC	0.429	0.539			
PU	0.677	0.676	0.503		
SI	0.421	0.514	0.577	0.546	
USE	0.717	0.719	0.615	0.894	0.659

Structural Equation Model (SEM) Analysis

The structural relationships between constructs were examined using PLS-SEM. Results from Figure 1 indicate that constructs of Attitude ($\beta = 0.246$, $p < 0.001$), Facilitating Conditions ($\beta = 0.146$, $p = 0.001$), and Social Influence ($\beta = 0.224$, $p < 0.001$) have show significant positive effects on Usability (USE), with Perceived Usefulness appearing as the strongest predictor ($\beta = 0.363$, $p < 0.001$).

In predicting Continuance Intention (CI), constructs of Attitude ($\beta = 0.149$, $p = 0.014$), Perceived Usefulness ($\beta = 0.210$, $p = 0.001$), Facilitating Conditions ($\beta = 0.180$, $p = 0.003$), and Usability ($\beta = 0.241$, $p = 0.003$) were found to be significant, whereas Social Influence was not ($\beta = 0.097$, $p = 0.154$). This suggests that continuance intention is primarily driven by individual perceptions of value and system quality, rather than external social pressures. The model demonstrates substantial explanatory power accounted for 59.4% of variance in Usability and 48.7% in Continuance Intention. This finding also indicates that while social influence enhances perceived usability, it does not directly translate into sustained usage intention.



Note: ** $p < 0.01$; * $p < 0.05$

Figure 1: Model Fit

DISCUSSION

The rapid global tourism expansion have urged vocational graduates to perform strong English communicative competence. Hence, Tourism English conventional instruction that limited to lecture-based approaches seem to be inadequate in supporting practical language application, particularly in vocational contexts where communicative performance is essential (Chen et al., 2024; Firdaus et al., 2024). The mismatch between learning outcomes and industry expectations with the urgency for contextualized and technology-enhanced pedagogies are essential. Nevertheless, finding from the present study demonstrates that MARTEL usage is dominated by early stage user. The study also informs that frequency usage of the application are at moderate level.

Consistent with findings from previous studies, these results indicates that existing digital tools (e.g. online platforms and multimedia resources) remain pedagogically limited due to low interactivity and weak contextual alignment, resulting in poor engagement and perceived learning inefficiency (Shen et al., 2022). Although previous study has indicated that immersive and experiential learning environments through AR-based

approaches significantly enhance motivation, engagement, and contextual understanding in language learning (Chen et al., 2024; Mokmin et al., 2025) its usage is still unexplored.

On the other hand, the SEM analysis informed that Perceived Usefulness (PU) has emerged as the strongest predictor of usability and continuance intention, followed by Attitude (ATT), Facilitating Conditions (FC), and Usability (USE). These findings are consistent with established theories of Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT), which emphasize the central role of perceived value and system quality in technology adoption (Venkatesh et al., 2022). Conversely, Social Influence (SI) significantly affected usability but did not directly influence continuance intention, suggesting that sustained engagement is primarily driven by intrinsic perceptions of usefulness rather than external pressures. This highlights a critical distinction between initial adoption and long-term usage behavior in educational technology contexts.

Overall, the findings demonstrate that MAR-based applications, particularly MARTEL can effectively address the limitations of traditional Tourism English instruction by enhancing engagement, usability, and practical communication skills. However, the results also emphasize that successful implementation depends not only on technological innovation but also on contextual relevance, user readiness, and perceived pedagogical value, thus providing important implications for future vocational curriculum design and digital learning integration.

CONCLUSION

This study contributes to the growing body of research on the integration of immersive technologies application, such as Mobile Augmented Reality (MAR) in enhancing Tourism English learning within higher vocational contexts. The study also has developed and evaluated the MARTEL application in addressing the mismatch between graduates' language competencies with a global challenge of international tourism industry. The findings inform that MARTEL can mitigate the limitations of traditional and lecture-based instruction by uplifting students' engagement, usability and authentic language application, particularly in Tourism English learning.

From a theoretical perspective, this study has highlighted Perceived Usefulness, Attitude, and Facilitating Conditions as important determinants of both usability and continuance intention, especially in vocational and immersive learning contexts. On the other hand, the non-significance of Social Influence in predicting continuance intention emphasises the importance of learner's intrinsic and autonomy toward value-driven technology adoption (Venkatesh et al., 2023; Deng et al., 2025). This finding has provided insight into technology acceptance behaviour in vocational education, where practical relevance and perceived utility are more important than external influences.

Conversely, the study has offered a validated model for integrating MAR into vocational language curricula. This model was tested through contextualised and scenario-based design that aligned with industry needs. Furthermore, through the development of MARTEL that supports flexible and experiential learning, the application has been found to enhance students' learning performance and readiness for real world tourism communication. These findings are particularly relevant for policymakers and educators who are seeking solutions to modernise vocational education and improve graduate employability in a globalised economy (Chen et al., 2025; Mokmin et al., 2024). In conclusion, this study provides empirical, theoretical, and practical contributions by providing more responsive, technology-enhanced, and industry-aligned learning ecosystems through MAR integration into vocational Tourism English education.

REFERENCES

1. Aldeeb, F. H., Sallabi, O. M., Elaish, M. M., et al. (2024). Enhancing students' learning achievements, self-efficacy, and motivation using mobile augmented reality. *Journal of Computer Assisted Learning*, 40(4), 1823-1837.
2. Annamalai, N., Uthayakumaran, A., & Zyoud, S. H. (2023). High school teachers' perception of AR and VR in English language teaching and learning activities: A developing country perspective. *Education and Information Technologies*, 28(3), 3117-3143.

3. Asoodar, M., Janesarvatan, F., Yu, H., et al. (2024). Theoretical foundations and implications of augmented reality, virtual reality, and mixed reality for immersive learning in health professions education. *Advances in Simulation*, 9(1), 36.
4. Bozhou, C., & Xizi, L. (2025). Industry-Driven Teaching Reform in Vocational Undergraduate Education: A Case Study of 'Tourism English' Course in Response to Free Trade Port Industry Needs. *Frontiers in Educational Research*, 8(3).
5. Chen, C. H. & Hsu, C. C. (2024). Mobile augmented reality-supported language learning: Effects on students' learning achievement and cognitive load. *Interactive Learning Environments*, 32(2), 456-472.
6. Chiew, F. L., Kho, G. H. X., Kong, M. Y., et al. (2025). Augmented Reality (AR) in ESL Classrooms: A Quasi-Experimental Study on Enhancing Speaking Skills. *Karya Journal of Emerging Technologies in Human Services*, 1(1), 38-47.
7. Deng, Y., Zhang, Y., & Zhao, R. (2025). Investigating learning behaviors in desktop-based simulated and VR headset-based immersive 3D learning environments: a cross-media comparative study. *Education and Information Technologies*, 1-25.
8. de Lurdes Calisto, M., & Sarkar, S. (2024). A systematic review of virtual reality in tourism and hospitality: The known and the paths to follow. *International Journal of Hospitality Management*, 116, 103623.
9. Deri, M. N., Zaazie, P., & Singh, A. (2024). Digital future of the hospitality industry and hospitality education globally. In *International handbook of skill, education, learning, and research development in tourism and hospitality* (pp. 221-243). Singapore: Springer Nature Singapore.
10. Dhaas, A. (2024). Augmented reality in education: a review of learning outcomes and pedagogical implications. *American Journal of Computing and Engineering*, 7(3), 1-18.
11. Ebadi, S., & Raygan, A. (2023). Investigating the facilitating conditions, perceived ease of use and usefulness of mobile-assisted language learning. *Smart Learning Environments*, 10(1), 30.
12. Fareed, A. L. S., & Kirkil, G. (2025). Integrating Technology Acceptance Model with UTAUT to Increase the Explanatory Power of the Effect of HCI on Students' Intention to Use E-Learning System and Perceive Success. *IEEE Access*.
13. Firdaus, M., Christanti, A., Noviyanti, M., Mahsunah, E., Laili, M., Kurniati, R. F., & Purnomo, R. (2024, September). How can AR Improve Outcomes in English Language Testing: Insights from a Global Research Review. In *2024 International Conference on ICT for Smart Society (ICISS)* (pp. 1-6).
14. Huang, A., de la Mora Velasco, E., & Haney, A. (2024). Examining instructional technologies in hospitality and tourism education: A systematic review of literature. *Journal of Hospitality & Tourism Education*, 36(2), 113-131.
15. Mokmin, N. A. M., Rassy, R. P., & Yie, D. L. (2025). Evaluating augmented reality in physical education for dyslexic students from the perspectives of teachers and students. *Scientific Reports*, 15(1), 7682.
16. Schmidt, R., & Stumpe, B. (2025). Systematic review of mobile augmented reality applications in geography education. *Review of Education*, 13(1).
17. Shen, S., Xu, K., Sotiriadis, M., & Wang, Y. (2022). Exploring the factors influencing the adoption and usage of Augmented Reality and Virtual Reality applications in tourism education within the context of COVID-19 pandemic. *Journal of hospitality, leisure, sport & tourism education*, 30.
18. Venkatesh, V., Morris, M. G., Davis, F. D., & Davis, G. B. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, 27(3), 425-478.
19. Wenfei, Z., Rahmat, M. K., Nizar, N. N. M., & Maaruf, S. Z. (2023). Need analysis survey of designing and developing a mobile augmented reality application for tourism English learning in higher vocational education, China. *International Journal of Academic Research in Progressive Education and Development*, 12(2), 1132-1147.
20. Wu, H. K. & Lai, C. H. (2024). Exploring the role of augmented reality in enhancing student engagement and learning motivation. *Computers & Education*, 200, 104804.
21. Zhao, G., Yang, L., Wang, J., & Li, J. (2026). A Chinese language learning application that integrates generative AI into augmented reality environment to improve children's literacy and reading skills. *Innovation in Language Learning and Teaching*, 1-20.