Augmented Reality Technology and Its Role in Developing Speaking Skills Among Vietnamese EFL Students in English for Tourism and Hospitality

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ABSTRACT

This study investigates the effects of augmented reality (AR) on Vietnamese EFL undergraduates' speaking performance in an English for Tourism and Hospitality course at a university in Ho Chi Minh City. Using a mixed-methods design with 82 participants, the researcher administered pre-/post speaking tests, a questionnaire grounded in the Technology Acceptance Model (adapted from Cabero-Almenara et al., 2019; Fauzi et al., 2019), and focus group interviews. Quantitative results revealed significant gains in speaking scores, while survey data indicated high perceived usefulness, ease of use, and behavioral intention to adopt AR technology. Qualitative findings highlighted increased motivation, positive attitudes toward an AR-enhanced learning environment, and real-world relevance scenarios. Implementation challenges included device compatibility, variable access to technology, and technical glitches, stating the importance of teacher training and thoughtful course design. Overall, AR shows potential for strengthening speaking skills and professional readiness in tourism–hospitality contexts. The study contributes evidence to technology-mediated language instruction and argues for contextually grounded, sustainable pedagogical interventions tailored to learners' profiles and institutional resource planning.

Keywords: AR technology, speaking skills, TAM, readiness, willingness, English for Tourism and Hospitality

Introduction

The recent trends of globalization and the global economy have reinforced the growing importance of English in business and in society. Of the four basic skills (listening, speaking, reading, and writing), speaking is most likely to be considered the most important for communication, especially in professional fields as the Tourism and Hotel Business. The needs of communication on site, which is highly situational and context-dependent, and fluency, as well as quick reactions, are a part of job training for the employees later in their work. As English speaking grows increasingly required worldwide, so grows the demand for fun, fresh, and in-your-face ways to learning. Traditional learning tasks, which emphasized theories rather

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than practical experiences, fail to provide learners enough authentic opportunities to speak and to practice authentic communication with real people in real-life situations (Nguyen et al., 2022). This limit is further elevated in the specific field of ESP instruction, as is the case with students attending the ESP who have to cope with an additional difficulty in learning general English in addition to the specialized vocabulary and communicative skills relevant to specific areas such as Tourism & Hospitality (Al-Malki, 2023). English has become increasingly important in Vietnam, particularly in its areas relating to the Nation's Tourism Sector. The travel and tourism industry in Vietnam is growing fast, and as more and more international tourists are coming to the country, the demand for English speakers is on the rise. This is especially strong in the country's main cities, such as Ho Chi Minh City, which lures international visitors. Indeed, universities are finding themselves under more and more pressure to give their students the language abilities necessary to thrive in these types of working environments.

Nevertheless, despite that desire, many Vietnamese universities are teaching in traditional ways. These approaches to teaching were lecture-based and provided students with minimal opportunities for interaction. It was not enough, nevertheless, to help students use English in the real context, such as the workplace, namely the spoken form (Hoa & Tuyet, 2016).

To address these pedagogical shortcomings, there has been an emerging trend of applying AR technology for language learning. AR makes it possible for learners to use the target language in contextualized and realistic settings and induces them to participate in an interactive and immersive environment. Unlike traditional methods, AR overlays digital information on the physical environment to form an augmented reality, in which language practices are more authentic and relevant (Carmigniani & Furht, 2011). In domains such as Tourism and Hospitality, where practical and appropriate communication is considered to be crucial, the use of AR as a language learning tool is valuable and useful. Integrating AR into language lessons could help in closing the divide as the introduction of the COMMUNICATIVE approach in the teaching of languages in a typical classroom, vs. in a real-world professional/ working environment. Few people in Vietnam have applied AR in teaching English as a foreign language (EFL), especially for the development of speaking skills. Most of the current studies of AR in language education have concentrated on vocabulary learning (Ramya & Madhumathi, 2017; Zhang, 2018), reading comprehension, and language learning in general. Although those studies investigated the interactive and immersive affordances of AR, relatively little has been done on its impact on speaking proficiency. This neglected region is very significant for ESP, where communicative competence is a primary component. Students do need a certain level of good oral communication in Tourism and Hospitality. However, if they can use good oral communication skills so that they are no longer some extra skill, then this becomes an essential skill and not merely an advantage. Online instructors need to interact freely and naturally with international guests, and not only provide grammatical data but also fluency, vocabulary control, and pragmatic skills. Accordingly, there is an urgent need to explore the potential of AR in fostering the learning of these skills within professional, authentic learning environments. Furthermore, most prior studies on AR integration in language learning have been conducted in high-resource educational settings across East Asia, Europe, and North America. These “global contexts” often differ markedly from the Vietnamese context in terms of technological infrastructure, access to digital devices, and learners’ digital literacy.

The requirements for dynamic real-time communication within working settings, where fluency and context-based communication matter to future employees. With the need for English proficiency increasing globally, there was a requirement for innovative, interactive, and experiential pedagogies. Traditional pedagogical practices, which can emphasize theoretical knowledge, often struggle to provide learners with adequate space to engage in meaningful

interaction or authentic real-life communication (Nguyen et al., 2022). This limitation is most common in learning English for Specific Purposes (ESP), in which learners must overcome the dual limitation of general English competency combined with specialty words and communicative expertise applied to specific professional areas such as Tourism and Hospitality (Al-Malki, 2023). English-speaking proficiency is increasing in Vietnam, particularly for industries related to Vietnam's tourism sector. The rapid expansion of Vietnam's tourism industry, along with a continuous flow of foreign visitors, has imposed an instantaneous requirement for English-speaking qualified employees. The demand is especially seen in cities like Ho Chi Minh City, a global tourist destination. Universities are under more pressure to train students with the actual language skills required to cope with such working environments. However, despite this increased demand, the bulk of Vietnamese universities continue to maintain traditional teaching methods. Such methodologies, characterized by lecturing approaches and low levels of interaction, are nowhere near adequate in preparing students with the real needs of professional English communication, particularly in oral communications (Hoa & Tuyet, 2016).

To address these pedagogic shortcomings, AR technology has become an innovative learning tool for language learning. By creating interactive and immersive learning environments, AR provides learners with the opportunity to apply context-based and authentic language and gives them the chance to practice context-based and authentic language. Unlike conventional methods, AR overlays digital information onto physical environments, offering a merged learning space and hence enhancing the authenticity and relevance of language acts (Carmigniani & Furht, 2011). For vocational work contexts like Tourism and Hospitality, where site-specific communication is necessary, AR provides a real-world source of language. Adopting AR in language learning provides a bridge between classroom-based instruction and workplace communication needs. Its utility is pedagogically founded; however, little has been done to apply it in teaching EFL in Vietnam, especially when teaching speaking. AR has been researched in language learning on vocabulary learning (Ramya & Madhumathi, 2017; Zhang, 2018), reading, and language teaching in general. Although some studies have attempted to investigate the interactive and engaging potential of AR, relatively little research has specifically addressed the impact of AR on speaking skills. This has been an overlooked area, especially ESP, which places great significance on communicative competency. In the Tourism and Hospitality sector, effective communication is not only desirable but a sine qua non. Frontline practitioners are expected to interact confidently and spontaneously with overseas visitors, not merely grammatically accurate but also with fluency, vocabulary appropriateness, and pragmatic ability. There is thus a need to investigate how AR can be utilized for the development of these competences in actual, profession-related learning environments.

Furthermore, most of the existing studies on AR integration in language learning have been conducted in high-resource educational settings in East Asia, Europe, and North America. Such "global contexts" usually differ considerably from the Vietnamese context in terms of technological infrastructure, digital device availability, and digital literacy of learners. Consequently, there remains a significant gap in understanding how Vietnamese university students engage with AR tools, particularly in speaking-focused instruction. This study seeks to address this gap by exploring the implementation of AR technology in an English for Tourism and Hospitality course at a Vietnamese university. Drawing on the Technology Acceptance Model (TAM), Cognitive Load Theory (CLT), and constructivist learning theory, the research investigates students' perceptions, readiness, and willingness to use AR, as well as the impact of AR-supported instruction on their speaking performance.

Research Purposes

This research has two purposes:

1. To explore students' perceptions of AR technology in terms of its perceived usefulness, ease of use, and willingness to engage.
2. To examine the effects of AR-enhanced instruction in improving students' speaking skills in English for Tourism and Hospitality.

Research Questions

To achieve these two objectives, the research is conducted with the following two research questions:

1. What are students' perceptions of AR technology in terms of perceived usefulness, ease of use, readiness, and willingness to use it for their language learning?
2. What are the effects of AR technology on students' speaking skills in the English for Tourism and Hospitality course?

Literature review

Augmented Reality in Language Education

AR technology is currently incorporated into CALL in speakers of other languages as the medium applicable to afford users of virtual, immersive, interactive, and situational learning in several fields. Moreover, AR has been found to increase learners' motivation, engagement, and performance in multiple language skills (Garzón & Acevedo, 2019; Huang et al., 2021). More specifically, the visual and spatial affordances of AR have been shown to overcome cognitive overload (cf. Brown & Cairns, 2004) and promote task authenticity (cf. Mangen & Kuiken, 2014), and this could especially be helpful to L2 learners in the face of pragmatic and situational communication. Some research has focused on AR use in vocabulary learning (Zhang, 2018), reading comprehension (Yang et al., 2022), and overall English skills (Cabero-Almenara et al., 2019). However, fewer explorations have explicitly focused on speaking skills, especially in English for Specific Purposes (ESP) contexts such as Tourism and Hospitality. A recent meta-analysis by Cao and Yu (2023) affirms that while AR significantly improves learner attitudes and performance, most of these studies are concentrated in high-resource settings like East Asia, Europe, and North America. This finding highlights a research gap regarding AR's applicability in lower-resource or non-Western contexts, in Global South countries like Vietnam. In ESP learning and teaching, especially in tourism-related education, the use of AR offers many advantages. For instance, Chumphong and Embree (2022) showed that AR-supported scenario-based tasks could simulate real-life tourism interactions, enhancing learners' pragmatic competence. Similarly, Meriyati et al. (2024) reported that AR-integrated vocational training improved learners' confidence and professional readiness in service industries. These findings support the view that AR has transformative potential when implemented with precise pedagogical alignment and contextual relevance. However, much of this literature has the propensity to exaggerate AR's advantages, typically overlooking implementation concerns such as device compatibility, teacher preparedness, and cognitive overload (Şimşek et al., 2025). For example, Prasetya et al. (2024) report that students in AR-based learning settings are prone to issues if instructions are vague or when computer content makes students overwhelmed owing to poor instructional design. These issues are a challenge for the pedagogically sound incorporation of AR instruments in language courses.

English for Specific Purposes (ESP) and Speaking Skills

English for Specific Purposes (ESP) is a subgroup of English language teaching that concentrates on fulfilling the specific needs of learners in particular professional or academic fields (Dudley-Evans & St. John, 1998). In the context of Tourism and Hospitality, ESP emphasizes the acquisition of industry-specific vocabulary, expressions, and cultural knowledge that professionals need to communicate effectively with international clients and colleagues. For Vietnamese EFL students, proficiency in ETH is important, as it prepares them for real-world interactions in a rapidly globalizing industry. English speaking skills are particularly vital in this field of Tourism and Hospitality, where professionals must engage in face-to-face communication with clients, manage service interactions, and address customer inquiries (Al-Malki, 2023). However, traditional language classrooms often focus on reading, writing, and grammar at the expense of speaking skills, leaving students underprepared for the oral communication demands of their future careers (Hoa & Tuyet, 2016; Ho-Minh & Suppasetseree, 2025). AR technology offers a solution to this issue by providing students with opportunities to practice speaking in realistic, professional settings. Integration of AR technology in teaching ESP helps simulate real-world tourism activities like guest check-in, tourist information provision, and customer complaint management. With AR technology learning simulations, students refine their fluency as well as accuracy and pragmatics in speaking English. Also, proficiency in cross-cultural understanding is vital in the tourism industry. The use of AR technology broadens learners' cultural and communicative exposure (Chumphong & Embree, 2022).

Theoretical Frameworks

This study relies on five interconnected perspectives which form its theoretical basis: Constructivism, Connectivism, Cognitive Load Theory (CLT), the Technology Acceptance Model (TAM), and Immersive Learning Theory.

Constructivism

Constructivism posits that learning is active and involves constructing knowledge in a contextualized manner, as opposed to soaking it up passively (Bruner, 1990). It stresses that learners build understanding through experiences and interactions with the world, which makes this learning theory relevant for the application of AR technology to education, since it offers immersive interactivity and real-life simulations. In language acquisition, this theory posits that students do not merely learn disjointed linguistic components; instead, they engage in meaning construction with others - often through social environments (Vygotsky, 1978). AR technology is aligned with constructivist educational philosophies because it allows students to participate in significant and context-rich learning opportunities that shape their understanding. For example, learners can be virtually toured around the globe where they engage in role-play conversations with virtual tourists, guides, or hotel personnel using AR technology. Construction of language knowledge occurs when students use appropriate vocabulary, grammar structures, and cultural insights during simulated professional roles. Thus far described tasks serve to equip learners with skills while encouraging them to experiment in authentic contexts outside the classroom (Carmigniani & Furht, 2011). Thus, the emerging issues presented by augmented reality to contemporary pedagogical approaches generate positive, environmentally supported second language learning contexts beyond classical models.

Furthermore, the social constructionist view also emphasizes that learning is achieved through social interaction, mainly with the more knowledgeable other (MKO). In contrast to AR, MKO

can be simulated with avatars or peers who interact with the students in a rich language environment. In such interaction, students enable collaborative learning where they contribute information and ideas when working with collaborative AR tasks, and by so doing, they learn both language and cultural grace in areas such as tourism that require good communication and sensitivity to cross-cultural awareness (Viken et al., 2021).

Cognitive Load Theory

Cognitive Load Theory (CLT) is used here as an important perspective for AR in language learning. Learning designs have to avoid allocative extraneous load as CLT suggests, because AR working memory instruction has less processing capacity (Sweller, 1988). Inside a classroom - in language teaching and learning classes in particular, where students attempt to internalize new vocabulary, new grammatical forms, and new pronunciations, often at the same time - learners may be confronted by poorly-designed materials that prove to be parasitical on cognitive resources. This approach hinders the learning results shaped by cognitive overload, alongside using augmented reality materials. Because of multimodal opportunities available through AR technology, there is a potential pedagogical benefit since cognitive demands when processing linguistic material can be heard, seen, and read at the same time (Mousavi et al., 1995). In an English for Tourism and Hospitality course, students can be situated in simulated hotel-reception encounters that require them to coordinate multiple language processes in real time. Learners engage in interactive conversational listening, follow precisely timed audio instructions, read on-screen prompts that scaffold procedural talk (e.g., check-in, complaint handling, room-upgrade negotiation), and receive immediate, context-sensitive feedback within a holistic, immersive environment. Conversely, a course that purposefully integrates such modalities rather than just providing them in discrete streams takes some of the burden of split attention and extraneous cognitive load away and thus sustains engagement and promotes a more fluid and meaningful use of the forms of language in context rather than learned phrases. This is consistent with cognitive load theory, which suggests that cohesive instructional cues allow for schema formation and comprehension because they decrease unnecessary attention shifts (Sweller et al., 2011). Drawing this logic further, we incorporated CLT-oriented AR activities that offered authentic contexts of front-desk communicative tasks. Equally, we took advantage of input channels (aural, visual, and kinesthetic) in promoting target-directed speaking.

Notwithstanding these benefits, the findings also demonstrated the existence of a subgroup of participants who experienced a high cognitive load, primarily as a result of AR novelty and complexity in navigation. This trend highlights a double implication: AR is not only a technologically augmented delivery platform, but it is a pedagogical tool, the effectiveness of which depends on principled design. To avoid undermining oral proficiency through AR implementation, task complexity, which learners' developing schemata may optimally provide, must correspond to affordances of the interface, affordances must be narrowed to minimize extraneous cognitive load, and scaffoldings must be calibrated - orientation to AR controls, just-in-time hints, and phased task introduction. Under such circumstances, the AR-based hotel-reception simulations can be high-level communicative practices in which there is adequate developmental practice of the pragmatic competence, the interaction management, and the integration of listening-speaking, which supports evidence-informed instructional design (Sweller et al., 2011). How well AR serves its purpose in reducing cognitive load in the classroom (Singh & Chandra, 2024) will essentially depend on the fit between the technology tools and the objectives of the lesson.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), formulated by Davis in 1989, frames the factors influencing acceptance of specific technologies, including Augmented Reality (AR), in a structured manner. As highlighted in TAM, two main drivers shape an individual's intention to adopt any technology: usefulness and ease of use. Specifically, PU is defined as the extent to which someone uses something to enhance their productivity, while PEOU captures how easy it will be for them to use the application or tool (Davis et al., 1989). In the case analysis on AR technology about language learning, PU relates to how much learners perceive value in using AR technology for improving their speaking skills. To illustrate this point, if students expect that AR integrates tourism-related scenarios, which will enable them to practice English conversations during their internships or jobs, their PU will be high. With high PEOU comes low technological friction. Easy usability deals with students assessing how easy the interface navigation would be for them. If students find the AR apps' interfaces easy and intuitive, then their willingness to engage with them increases accordingly.

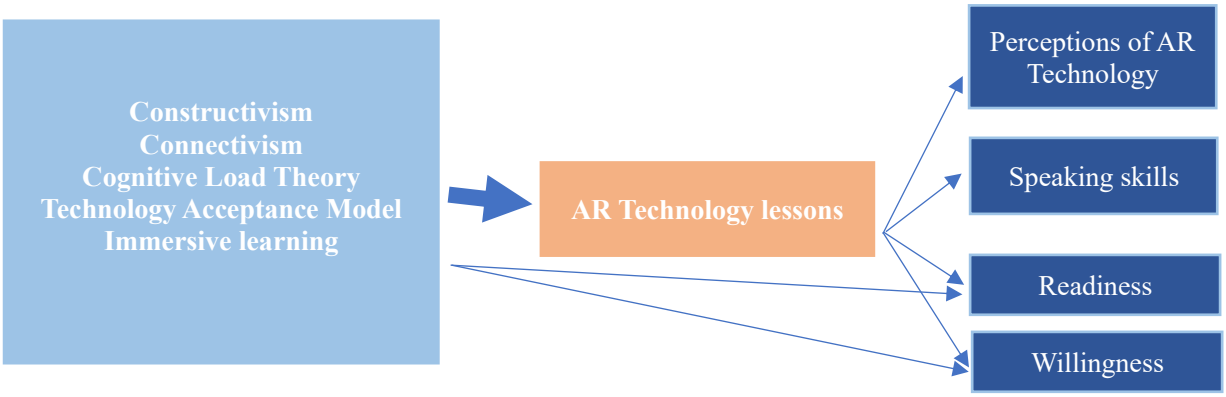
Research demonstrates that understanding how a learner views a specific technology is very important in determining if the learner is going to use it during his or her learning activities (Venkatesh & Davis, 2000). This is most applicable in the case of Vietnamese students, EFL learners who are at different levels of being advanced digitally as technology-savvy people. Trying to explore students' PU and PEOU about AR technology will enable this study to understand the elements that determine learners' preparedness and enthusiasm towards utilizing AR for speaking practice sessions in ETH classes.

Research Conceptual Framework

This study draws on research from education and technology to address the incorporation of AR in language instruction. The cornerstone theory the framework is anchored in is "constructivism," based on the belief that an active, meaningful experience helps people construct knowledge. For the AR-integrated interactions, immersed and interactive communication at a global scale is feasible for practical applications in real-world scenarios. Furthermore, connectivism emphasizes learning in a networked world where students participate with peers, and multimodal resources - reminiscent of the social networked learning environment available through AR-enabled experiences. The Cognitive Load Theory (CLT), through examining constraints of learning and instruction, also provides practical implications by suggesting that cognitive load effects of instructional design should take into account the cognitive processes of learning. Good AR tasks facilitate a reduction in extraneous cognitive load, via dual coding, for example, whereby information is presented in both visual and aural forms, thus enabling learners to attend to the communicative functions they need to carry out when speaking. From a technology perspective, the TAM is a helpful guide to understanding how learners accept AR in terms of its utility and ease of fit with their job. Given the peculiarities of ETH, previous determinants influence the levels of users' AR technology engagement. Finally, the tenets of immersive learning reinforce the argument that dealing in an actual professional environment, which imitates the contexts in which AR would boost language acquisition and learner confidence. The consultations have been analysed, summarised, and visually depicted in Figure 1 to illustrate that the way pedagogical theory combines with both technological acceptance and immersive learning enables students to become better speakers. This model rationalizes the adoption of AR in ESP instruction in a meaningful manner, emphasizing enhanced learner motivation, skill development, and professional preparation.

Figure 1

Conceptual Framework of the Study



Methods

Research Design

In this study, an explanatory sequential mixed research approach is used (Creswell, 2014; Johnson & Onwuegbuzie, 2004, 2007) in which quantitative and qualitative methods are integrated to offer a more comprehensive coverage of the research phenomenon. The purpose of the quantitative component was to assess the impact of AR technology on learners' speaking ability, which was conducted based on the one-group pre- test- post-test design (Fraenkel et al., 2019), and in order to gather the source learners' perceptions, a series of focus group discussions was conducted for the qualitative part. The second one was the triangulation of results and obtaining a broad and deep knowledge of learning results and student experience. Here, the overt use of combine also generated triangulation of data, which suggested an increased level of trustworthiness and a deeper interpretation of the data. Quantitative data were collected via pre- and post-speaking tests to measure students' oral proficiency level and focus group interviews to investigate the AR experience of the learners for qualitative comments. The research adopted a quasi-experimental design and imparted the AR experimental group with AR-integrated teaching during a systematic 9-week course. Over the duration of the intervention, AR activities were consistently integrated within the weekly ETH lessons. Each week, learners completed one to two AR-mediated tasks that simulated authentic professional interactions - such as hotel check-in role plays, tourist-information exchanges, customer-service troubleshooting, and guided tour presentations. Using mobile devices or classroom displays, students activated AR markers to access interactive three-dimensional visuals alongside embedded dialogues and short explanatory videos aligned with tour texts. Instruction followed a principled sequencing of difficulty: initial sessions emphasized concise descriptive talk and highly scaffolded exchanges, while subsequent sessions progressively required multi-turn, context-sensitive communication that integrated listening, speaking, and pragmatic decision-making. The pedagogical intent was to develop oral fluency in tandem with lexical growth and pragmatic competence, while strengthening learners' confidence in tourism-specific discourse through situated practice in realistic contexts. Within the established curriculum framework, this systematic integration of AR fostered an active learning environment and was associated with enhanced measurable skill development and heightened engagement, attributable to the alignment of multimodal input with communicative goals and the stepwise calibration of task complexity.

Research Participants

The sample of the study was 82 second and third-year English undergraduate students of Ho Chi Minh City University of Economics (UEH) majoring in English for Tourism and Hospitality (ETH). Purposeful sampling was used to select these two cohorts in terms of their unique demographic and academic profile being relevant to the phenomenon being studied. Their ESP focused on vocational courses, and foreseen tourism hospitality occupations are also among the most likely to have their ESP judged effective for the AR technology-focused communicative competence master. These students were aged from 19 to 22 and studied at an intermediate (B1) or upper intermediate (B2) level of English, according to the Common European Framework of Reference level (CEFR). Their readiness to contribute to research also made them eligible to be enrolled. Mobile preferences, literacies of applications involved, and previous experience with AR interfaces (i.e., social filters or QR codes) were collected through a demographically ordered presurvey. This indicates a profile of high-tech savvy and a mobile learning capability. Such a level of digital competence assumes that students will be able to effectively and efficiently interact with the AR language learning space. In addition, as the Tourism and Hospitality industry is dependent on technology for communication and even client servicing, the career aspirations of the students were very tightly aligned with the technology-supported communicative environmental settings of the AR lessons. The educational context adds practical importance and ecological relevance of AR technology adoption, readiness, and utility within this educational and work context.

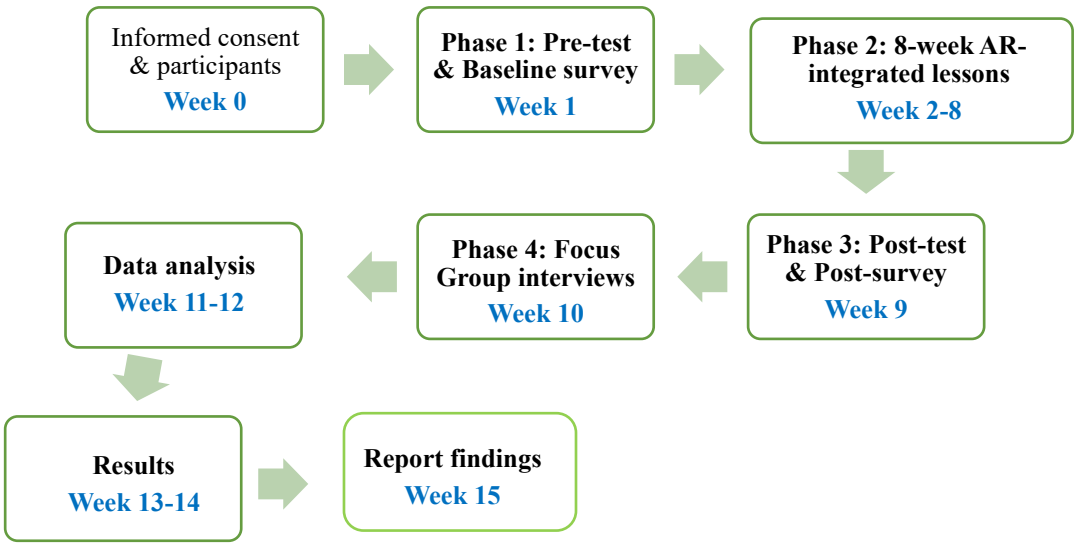
Research Procedure, Data Collection, and Instruments

Quantitative data were collected and analyzed first in this mixed-method study, after which qualitative data were gathered to provide more context. 82 students enrolled in the AR-enhanced course English for Tourism and Hospitality ETH for a duration of 9 weeks. The research procedure involved four main phases: (1) pre-intervention diagnostics, (2) instructional intervention with AR integration, (3) post-intervention assessment, and (4) qualitative follow-up through focus group interviews. To evaluate students' speaking performance, a pre-test/post-test approach was employed. The speaking test consisted of simulated tourism-related tasks, such as welcoming guests, giving local information, or responding to service complaints. Students' speaking performances were marked by two experienced raters using an analytic rubric adapted from IELTS scoring segments, including but not limited to: speaking fluently, pronunciation, lexical resource, as well as grammatical range and accuracy. The same rubric was used for both the pre- and post-tests.

A total of 82 students initially completed the pre-course survey; however, only 68 students participated in both the pre- and post-speaking tests. This reduction resulted from a variety of logistical, ethical, and voluntary factors. Unlike the online survey, the speaking tests required attendance at scheduled sessions - either virtually or in person - which posed difficulties for some participants. Additionally, four students cited technological or transport limitations as reasons for non-participation. A further three participants voluntarily withdrew from the study after the survey phase, and two declined to give consent for their voices to be recorded, citing data privacy concerns. Ultimately, 68 students consented to full participation in the speaking assessments, ensuring sufficient data for meaningful statistical analysis.

Figure 2

Research Procedure and Data Collection Timeline



To assess students' acceptance of AR, a self-report questionnaire was developed based on the Technology Acceptance Model (TAM), focusing on perceived usefulness, ease of use, readiness, and willingness to adopt AR. The questionnaire was piloted and revised prior to implementation, and its internal reliability was confirmed (Cronbach's alpha = .87). It was administered both before and after the AR-based course to examine changes in students' perceptions. Finally, focus group interviews were conducted with ten purposively selected participants to explore their perceptions, attitudes, and learning experiences regarding the use of AR. The semi-structured interviews were conducted in Vietnamese and later transcribed and translated into English for analysis. The interview questions addressed students' comfort with AR, its perceived impact on speaking performance, challenges encountered, and its potential application in real-world hospitality settings. Several recent studies informed the design of our data collection tools and analysis procedures, including Garzón & Acevedo (2019), Singh & Chandra (2024), and Şimşek et al. (2025), which demonstrate best practices in AR-integrated language learning research.

Table 1

Mapping Research Questions to Data Collection Methods

Research Question	Data Collection Method
RQ1: What are students' perceptions of AR technology in terms of perceived usefulness, ease of use, readiness, and willingness?	Pre- and post-course TAM-based questionnaire; focus group interviews
RQ2: To what extent does the use of AR technology affect students' speaking performance?	Pre-test and post-test speaking assessments

Data analysis

The quantitative data were analyzed using SPSS (version 26). Descriptive statistics were computed to summarize central tendencies and variability, while paired-sample t-tests were conducted to evaluate pre- and post-test differences in speaking performance. Effect sizes were calculated using Cohen's d to assess the magnitude of change. Qualitative data from the focus group interviews were subjected to thematic analysis following Braun and Clarke's (2006) six-phase approach, allowing for systematic coding, pattern identification, and theme development. Triangulation of both data types enhanced the validity of the overall interpretation.

Ethical Considerations

Ethical considerations will be strictly adhered to throughout the study. Informed consent will be obtained from all participants, and their confidentiality will be maintained by anonymizing the data. Participation in the study will be voluntary, and students will be informed that they can withdraw from the study at any time without penalty. The research will also comply with the ethical guidelines of the University of Economics Ho Chi Minh City.

Findings and discussion

In the investigation of the pre-questionnaire descriptive statistics from Table 2, the data presented from 82 participants indicate a comprehensive engagement with the survey, as evidenced by the absence of missing values. The completeness of the questionnaire is crucial for ensuring the reliability of the analysis. The responses, which range from 1 (strongly disagree) to 5 (strongly agree), show significant insights into the perceptions and acceptance levels of AR technology among EFL learners in Vietnam. The analysis of basic tendency and dispersion in the responses shows that the mean values across the questions lie between 3.5 and 4.5, suggesting a generally positive attitude towards AR technology. The perception of AR technology among students was significantly positive, with mean responses ranging between 3.5 and 4.5 on a 5-point scale. Such findings suggest that most students recognize the potential benefits of AR in enhancing their language learning. This positive perception likely comes from the immersive and interactive nature of AR, which is confirmed by existing literature indicating that immersive technologies can enrich learning processes. Notably, the responses indicated a divergence in opinions regarding the ease of use of AR technology, as proved by the variability in responses (standard deviations around 1) for questions relating to this aspect. This is concerning about AR technology's user-friendliness, possibly reflecting a disparity in prior technological exposure and proficiency among the students.

Table 2

Pre-Questionnaire Descriptive Statistics

Dimension		Items	Statements	Mean	SD	Level
Students' readiness for AR technology	Access to Technology	Q1	I have access to a smartphone.	4.622	0.513	High
		Q2	I have internet access on my smartphone.	4.561	0.650	High
		Q3	I usually surf the web using my smartphone.	4.476	0.671	High
		Q4	I depend on the university's Wi-Fi to access the internet.	3.207	1.074	Medium
		Q5	I have internet access when I'm outside the university.	4.134	0.940	High
		Q6	I subscribe to a personal internet plan on my smartphone.	3.707	1.083	High
	Attitudes Towards AR in Learning	Q7	I have knowledge regarding Augmented Reality (AR) technology.	3.037	0.823	Medium
		Q8	I have heard of learning using AR technology.	3.573	0.917	Medium
		Q9	Learning using AR technology is of interest to me.	3.585	0.845	Medium
		Q10	I would like to learn this course with AR technology.	3.695	0.765	High
		Q11	Learning using a Mobile AR application will be interesting.	3.817	0.669	High
	Learning Capability with Mobile AR	Q12	I am capable of using a Mobile AR application in learning.	3.500	0.790	Medium
		Q13	Training is needed to understand how to use the Mobile AR application in learning.	4.280	0.672	High

	Application	Q14	I can understand better when learning using a Mobile AR application.	3.671	0.686	Medium
		Q15	I can visualize better when learning using a Mobile AR application.	3.890	0.685	High
		Q16	I can learn independently using a Mobile AR application.	3.415	0.800	Medium
		Q17	I can learn with my classmates using a Mobile AR application.	3.902	0.601	High
		Q18	The classroom activity will be more active with the Mobile AR application.	3.890	0.754	High
		Q19	I will be excited to learn about using AR technology.	3.854	0.862	High
Students' expectancy of AR technology in Learning	**Perceived Benefits of AR in Learning**	Q20	Learning using AR technology will be beneficial.	4.110	0.667	High
		Q21	I believe that AR-enhanced learning experiences will make the learning process more engaging and enjoyable.	4.049	0.701	High
		Q22	Learning using AR technology will improve the interactive level between peers and lecturers.	3.878	0.760	High
		Q23	Learning with AR technology will significantly enhance my understanding of ESP concepts.	3.805	0.728	High
		Q24	I think that AR technology can improve my problem-solving skills within ESP contexts.	3.671	0.686	Medium
		Q25	I expect that integrating AR technology into the curriculum will enhance the overall quality of education.	3.890	0.629	High
		Q26	I believe that AR technology can provide me with a more personalized and tailored learning experience.	3.829	0.625	High

Firstly, about students' readiness for AR technology, the data under this theme suggests a high level of accessibility to the necessary technological tools among students. Items Q1 through Q3 indicate access to smartphones and the internet, with high mean scores (Q1: 4.622, Q2: 4.561, Q3: 4.476), demonstrating that most students are well-equipped technologically to engage with AR applications. However, Q4, which received a medium mean score of 3.207, reveals a reliance on university-provided Wi-Fi, highlighting a potential area of concern for off-campus learning where such access might not be available. Conversely, items Q5 and Q6 suggest a high degree of internet accessibility outside the university context (Q5: 4.134, Q6: 3.707), which is crucial for AR learning experiences that students might engage in outside traditional classroom settings. Secondly, the theme of attitudes towards AR in learning reveals a moderate to high interest and willingness among students to engage with AR technology in their language learning. While basic awareness and interest in AR, as indicated by Q7 (3.037) and Q8 (3.573), are in the medium range, the tendency towards using AR for learning specific courses (Q9: 3.585, Q10: 3.695) shifts slightly higher. Particularly, Q11, with a mean score of 3.817, suggests that the potential of learning using mobile AR applications is perceived positively, pointing to a significant curiosity and openness among students towards integrating AR into their learning. Thirdly, about learning capability with mobile AR applications, the responses reflect a blend of confidence and perceived need for additional support when using mobile AR applications. Students express a medium level of confidence in their ability to use AR for learning autonomously (Q12: 3.500, Q16: 3.415). However, they recognize the need for training (Q13: 4.280), which scores highly, indicating an awareness of the potential complexities involved in using AR effectively. The perceived enhancements to learning experiences through AR—such as improved understanding (Q14: 3.671), better visualization (Q15: 3.890), and more active classroom activities (Q18: 3.890)—are recognized positively. This suggests that while students are optimistic about their limited capabilities, they acknowledge the benefits that AR can bring to their educational experiences. Finally, about the students' willingness to AR technology in learning, the responses are highly positive, with students recognizing the multifaceted benefits of AR in their language learning. Items such as Q20 and Q21, scoring 4.110 and 4.049, respectively, reflect high expectations for the benefits of AR in making learning more engaging and enjoyable. Similarly, enhancements in interactive levels between peers and lecturers (Q22: 3.878) and significant improvements in understanding specialized terms (Q23: 3.805) are anticipated. The medium scores for improving problem-solving skills within ESP contexts (Q24: 3.671) suggest some implications about the extent to which AR can influence cognitive skills. Nevertheless, the overall high scores on items like Q25 (3.890) and Q26 (3.829) underscore a strong belief that AR can personalize and enhance the quality of education.

The perceptions toward AR technology revealed a generally favorable inclination, with many students affirming that AR could make learning more engaging and enjoyable. Such attitudes are likely influenced by the novelty and interactive elements of AR, which have the potential to transform conventional learning settings into dynamic and stimulating environments. This aligns with scholarly evidence, such as Suksan et al. (2022), who noted enhanced motivation and engagement among students utilizing interactive educational technologies. Despite some reservations linked to the ease of use, there was a pronounced readiness among students to adopt AR in their educational endeavors. Over half of the respondents expressed a willingness to utilize AR more extensively, a readiness possibly spurred by optimistic expectations regarding the technology's impact on their educational outcomes.

Students' Level of Acceptance of the AR Technology

The post-questionnaire descriptive statistics resulted from the complete responses of 82 participants, offering a comprehensive understanding of student perceptions toward the adoption of AR technology in educational settings. This analysis was structured around various dimensions: Perceived Usefulness, Perceived Ease of Use, Perceived Enjoyment, Attitudes and Acceptance towards AR, and Intention to Use. According to Abdul Ghafar's (2013) interpretation of mean ranges, the results predominantly indicate a spectrum of medium to high acceptance levels for AR, suggesting a strong inclination among language learners towards embracing this technology. The descriptive statistics are shown in Table 3.

Within the dimension of Perceived Usefulness, the acceptance levels were consistently high, with mean scores ranging from 3.720 to 3.927. This indicates that students perceive AR as a significant enhancer of learning and performance. Statements such as "The use of this AR system can enhance my learning and performance in this course" and "I believe the AR system is a valuable tool for learning" received high mean scores, underlining the students' recognition of AR's potential benefits. Such perceptions are vital as they underscore the belief in AR as a transformative educational tool, capable of improving both understanding and academic performance through its integration.

However, certain aspects under the Perceived Ease of Use and some elements of Perceived Enjoyment demonstrated medium levels of acceptance, notably items that addressed the usability of the AR system. For instance, items P5 and P6, which assessed the ease of navigating and learning to use the AR system, scored 3.549 and 3.402, respectively. These scores suggest that while many students find AR systems manageable, a significant portion encounter difficulties with initial usability. The differential experiences with, and perceived effectiveness of, the instructional materials are further evident within the enjoyment dimension. Specifically, the satisfaction associated with the AR system - indexed by item P9 - was reported at a medium level, signaling neither unequivocal enthusiasm nor rejection. This pattern directs attention to usability and broader user-experience considerations in the design and implementation of AR technologies, particularly given learner heterogeneity. Moreover, several items with only medium acceptance attracted notable neutrality or partial disagreement, suggesting uneven uptake across the cohort. In this respect, the dispersion around item P6 (SD = 0.901) is informative: such variability plausibly reflects differences in students' technological self-efficacy and prior exposure to comparable tools, alongside divergent expectations about the role of AR in language practice. Taken together, these results indicate that a generally positive reception of AR may coexist with friction points that condition instructional effectiveness. To translate acceptance into reliable learning gains, AR tasks should foreground clear and concise directions, minimize procedural complexity at entry, and scaffold multi-step operations through staged guidance; the aim is to lower initial abandonment while enabling competence accrual over time. Equally, designs should calibrate challenge so that effort is perceived as worthwhile, reduce unexplained hurdles that disrupt goal pursuit, and incorporate motivational affordances that help trigger and sustain a state of task absorption commonly described as "flow." Under such conditions, variation in learner experience is more likely to converge toward consistently effective, enjoyable use. Items P11 through P23 are focused on attitudes towards AR technology and its perceived impact on the learning environment. Starting with item P11, which assessed the engaging nature of AR in learning, it recorded a high mean score of 3.866 with a relatively low standard deviation of 0.662. This suggests a strong consensus among students that AR technology makes the educational experience more engaging, indicating a positive reception towards interactive learning modalities.

Table 3

Post Questionnaire Descriptive Statistics

Dimension	Items	Statements	Mean	SD	Level
Perceived Usefulness	P1	The use of this AR system can enhance my learning and performance in this course.	3.768	0.690	High
	P2	Implementing the AR system during classes can enhance my understanding of complex concepts.	3.817	0.591	High
	P3	I believe the AR system is a valuable tool for learning.	3.927	0.681	High
	P4	My academic performance can improve through the use of AR technology.	3.720	0.758	High
Perceived Ease of Use	P5	I find the AR system is easy to navigate and operate.	3.549	0.877	Medium
	P6	Learning how to use the AR system presents no difficulties for me.	3.402	0.901	Medium
	P7	Instructions for using the AR system are clear and comprehensible.	3.720	0.758	High
Perceived Enjoyment	P8	Using the AR system is an enjoyable experience.	3.951	0.768	High
	P9	I derive satisfaction from using the AR system.	3.671	0.817	Medium
	P10	I believe that the AR system combines learning and enjoyment effectively.	3.805	0.728	High
Attitudes and acceptance of AR	P11	The integration of AR technology in learning makes the educational experience more engaging.	3.866	0.662	High
	P12	I did not experience boredom while using the AR system.	3.646	0.776	Medium
	P13	I support the idea of utilizing AR systems in the classroom setting.	3.793	0.828	High
	P14	I am enthusiastic about embracing new technology.	3.829	0.750	High
	P15	AR technology enhances the achievement of course learning objectives.	3.817	0.818	High
	P16	I feel at ease when using AR for learning in this course.	3.573	0.738	Medium
	P17	AR technology promotes more active classroom participation.	3.793	0.766	High
	P18	Group work becomes more intriguing when augmented by AR.	3.732	0.610	High
	P19	Learning through AR offers flexibility during the learning process.	3.732	0.771	High
	P20	AR technology is beneficial for enhancing the course content.	3.854	0.687	High
	P21	AR aids in visualizing course elements effectively.	3.780	0.685	High
	P22	AR enhances the understanding of sequential processes in tourism and hospitality.	3.793	0.582	High
	P23	I would recommend AR technology to my peers for learning in this course.	3.720	0.742	High
Intention to use	P24	In the future, I am inclined to use AR systems if the opportunity arises.	3.768	0.790	High
	P25	I am interested in using AR systems to study other subjects.	3.756	0.794	High

The response to item P12, which evaluated boredom levels while using AR, presented a medium acceptance level with a mean of 3.646 and a standard deviation of 0.776. This medium score implies that while many students found AR engaging, there remains a segment that did not perceive a significant reduction in boredom, highlighting an area where AR implementation could be optimized to capture and maintain student interest more effectively. Items P13 and P14, reflecting support for AR use in classrooms and enthusiasm for new technologies, respectively, scored high with means of 3.793 and 3.829. These results underscore a generally positive attitude towards the integration of innovative technologies in educational settings, suggesting that students are open to and supportive of incorporating such tools into their learning processes. Regarding the perceived effectiveness of AR in enhancing learning outcomes, item P15 reported a high mean score of 3.817. This illustrates that students are cognizant of the capacities of augmented reality insight and the ability to achieve course learning outcomes, which suggests there is potential for augmented reality to enhance learning. The areas of active learning, collaborative learning, flexibility, enhancing content, and visualization were captured in statements P16 (ease of use in a learning setting) and P17 (enhancement of willingness to participate), both items achieving high levels of acceptance. This highlights that AR makes learning more fun and makes it more comprehensive. The same pattern was identified in responses P18 to P23, which elaborated on teamwork, adaptability, visualization of material, and understanding of complex processes to generate a better understanding. General meanings state that AR can be useful in the majority of learning components. The Intention to Use Dimension under statements P24 (indications to apply AR technology in the future) and P25 (indications of using AR in other learning areas), both also achieved consensus with a high acceptance value of 3.768 and 3.756 respectively indicating excellent agreement which indicates students' willingness to move into AR systems in the future regardless of learning beyond this specific program or area. This indicates a more aggressive acceptance and a more positive attitude across broader acceptance of AR technology, suggesting widespread use across other educational contexts.

While the data demonstrates general awareness of the meaningful benefits that AR can be applied to transform educational experiences, merely demonstrating awareness does not provide a sufficient basis for acceptance, and deriving the most educational benefits from AR. The first step to facilitating the opportunities of AR to innovate education is to increase the usability of AR systems. The second step, and any instructional AR experience, should not neglect a continuum of user familiarity with the AR experience. Finally, users of AR need to become meaningfully aware of its benefits, and in ways that can be easily demonstrated to everyone involved. All of this is crucial for realizing the potential possibilities of AR technologies to innovate educational practice and educational outcomes, and produce a more engaging and productive learning environment.

Students' Perceptions toward AR Technology Lessons

Looking for patterns in the focused group data across the ETH course, the researcher identified patterns (in the form of themes) summarizing the groundbreaking AR technology lessons for professional skills development and learning new languages. The interviews were filled with descriptions of how AR technology has enhanced engagement, technological proficiency, readiness to practice, and language skills. The topics illustrate the impressive outcomes of AR technology lessons in language learning, professionalism, and skill improvement. The photovoice narratives offer persuasive descriptions of the extent to which the AR technology offers opportunities for increased interactivity and technical skills, as well as possible adaptive challenges, professional skill preparedness, and a fuller engagement with language outcomes through multimodal combinations. The main topics reveal to what extent AR classes can

establish motivating and well-situated learning environments, further enhancing student motivation and learning drive, interest, and student experience. The other was being more involved in that interactive immersion, and that was a theme across them. For example, Participants' iterative/disruptive learning uses technologies as an AR device and one of the devices in a learning environment that served as the instigator in transforming the learning experience from a traditional model of interaction to hands-on experiences and enhancing the learning experiences. In particular, one participant explained how immersive the AR engagement was and stated,

> *"It made learning more interactive and engaging compared to traditional methods. Being able to interact with virtual environments felt like stepping into a new world of learning" (Participant 1).*

Another participant elaborated on the contrast with conventional education methods:

> *"Initially, I was a bit overwhelmed with the technology, but once I got the hang of it, it was really exciting. It's a unique way to learn that captures your interest much more than just reading a textbook" (Participant 2).*

These factors point to AR being able to provide rich, interactive learning environments that are the basis for student engagement and motivation.

The second prominent theme derived from the discussions was technology skills and problem-solving. Participants did have troubles with certain AR technology early in the workshop, but the troubles were framed as opportunities to acquire useful skills. Moving from struggle to proficiency created a transformative experience for the students, as one participant noted,

> *"Yes, after a few sessions, it became quite intuitive. The hands-on experience helped build my confidence, especially since the interface was user-friendly and the instructions were clear" (Participant 4).*

Another participant discussed how overcoming these challenges enhanced their technical and linguistic capabilities:

> *"At first, figuring out how to effectively use the scanning triggers was tricky. I needed to become more proficient with technology. However, with practice, I became more comfortable, which directly improved my technical and language skills" (Participant 2).*

These participants value the dual benefits of AR technology in facilitating not only language learning but also in enhancing technical literacy and problem-solving skills.

The theme of preparation for professional realities was also vital in the narratives. Participants recognized that the skills developed through AR simulations were directly applicable to their future careers in tourism and hospitality. The realistic simulations provided essential practice in customer service and real-time problem-solving skills. One participant emphasized,

> *"Virtual interaction and real-time problem-solving are key skills for hospitality management, and engaging with AR has prepared me well for these challenges" (Participant 9).*

This comment illustrates a practical application of AR technology in preparing students for the realities of the hospitality industry. Finally, the discussions illustrated how AR technology helped support greater speaking performance through integrating multimodal capacities. Having the multimedia component within the AR platform was very helpful for language development, as one participant noted,

> *"The opportunity to hear native speakers through these audio triggers and then practice with the video examples helped me improve my pronunciation and fluency. It was like having a tutor right there in the moment" (Participant 9).*

Moreover, the collaborative tasks within the AR-based lessons significantly enhanced communicative competence, as another participant said,

> *"Using the videos helped me visualize real-life scenarios better. Watching a dialogue between a hotel manager and a guest, and then acting it out, really improved my conversational skills" (Participant 8).*

In general, these themes demonstrate that AR is considered by participants to be a worthwhile pedagogical tool to enhance the students' learning experience, explicitly cited by participants as evidence of AR's usefulness for increasing engagement, technological literacy, professionalism, and language skills, and pointing to changes in pedagogies, curricula, or supporting a more radical reimagining of teaching and learning. Quantitative and qualitative data results indicate that the AR technology has a positive effect on learners' overall speaking performance, in the framework of English for Tourism and Hospitality. Numbers from the quantitative data showed that there was a significant difference in the sum of speaking points after the teaching phase, including AR elements, towards an overall storyline of students' oral skills being on an upward trend. The qualitative data also highlighted that AR activities were thought to be related to greater engagement, enhanced technology confidence, and served as scaffolding for real-life communicative competence development…Despite these challenges, students expressed a great deal of interest in, and value of learning in an AR-mediated way, suggesting potential for AR in EFL learning - in particular for industry-specific English (e.g., tourism and hospitality orientated).

Students' Test Scores on their Speaking Skills

The results from the speaking tests revealed a statistically significant improvement in students' oral performance after completing the AR-integrated English for Tourism and Hospitality course. As shown in Table 4, a paired samples t-test indicated a substantial increase in scores from the pre-test to the post-test, with a t-value of -8.297 ($df = 67$, $p < .001$). This result confirms that the difference in means is not due to chance, but rather reflects a reliable effect of the AR-based instructional intervention.

Table 4

Paired Samples T-Test results

							95% CI for Cohen's d	
Measure 1	Measure 2	t	df	p	Cohen's d	SE Cohen's d	Lower	Upper
Pre-test_Score	- Post-test_Score	-8.297	67	< .001	-1.006	0.192	-1.296	-0.711

Note. Student's t-test.

The mean score improved from 5.419 (SD = 0.736) in the pre-test to 6.324 (SD = 0.657) in the post-test (see Table 5), demonstrating a notable average gain of 0.905 points. This gain represents a meaningful increase in speaking proficiency over the 9-week course. The standard

error of the difference was 0.109, further supporting the precision of this estimate. In addition to statistical significance, the practical relevance of the improvement was underscored by the effect size. Cohen's d was calculated at -1.006, which exceeds the threshold for a large effect size (Cohen, 1988). The 95% confidence interval for this effect ranged from -1.296 to -0.711, suggesting that the observed gains were both robust and educationally meaningful.

Table 5

Descriptives of the Pre-test and Post-test

	N	Mean	SD	SE	Coefficient of variation
Pre-test_Score	68	5.419	0.736	0.089	0.136
Post-test_Score	68	6.324	0.657	0.080	0.104

To confirm the appropriateness of the t-test, assumption checks were conducted. As reported in Table 6, the Shapiro-Wilk test for normality yielded a W value of 0.908 ($p < .001$), indicating some deviation from normal distribution. However, given the large sample size ($n = 68$) and the robustness of the t-test to minor violations of normality, the analysis proceeded with parametric testing.

Table 6

Assumption Checks

Test of Normality (Shapiro-Wilk)

		W	p
Pre-test_Score	- Post-test_Score	0.908	< .001

Note. Significant results suggest a deviation from normality.

The substantial improvements across all sub-skills—fluency, pronunciation, lexical range, and grammatical accuracy—were further supported by rater observations. Evaluators noted reduced hesitation, increased spontaneity, improved intonation, and more coherent and contextually appropriate language use in students' post-test performances. These qualitative impressions were consistent with the quantitative results and reinforced the conclusion that AR-supported instruction positively influenced students' speaking development.

Taken together, these findings provide strong empirical support for the effectiveness of AR-enhanced learning environments in improving students' spoken English within the context of English for Tourism and Hospitality. The large effect size, consistent improvements across sub-skills, and corroborative qualitative data suggest that the AR intervention not only facilitated measurable language gains but also enhanced learners' confidence and communicative competence. While promising, these results also highlight the need for careful planning when implementing AR technologies, including teacher training, student support, and equitable access to devices and connectivity.

Discussion

The findings of this study underscore the transformative potential of AR in both EFL and ESP education, particularly in enhancing speaking skills within the professional context of English for Tourism and Hospitality (ETH). Integrating AR into the ETH course significantly improved student engagement, motivation, and communicative performance. The immersive and interactive nature of AR-based tasks was a key driver of learner engagement, supporting previous research that emphasizes AR's capacity to contextualize learning and sustain motivation (Garzón & Acevedo, 2019; Prasetya et al., 2024). Students frequently described AR-

enhanced activities as "engaging and authentic," echoing Zhang et al.'s (2022) claim that AR promotes sustained interest through context-specific applications.

Quantitative results demonstrated statistically significant improvements in students' overall speaking proficiency. Although sub-skill scores were not isolated, rater feedback and qualitative data indicated perceived gains in fluency, pronunciation, and vocabulary use. These outcomes are consistent with studies by Luo et al. (2023) and Chumphong and Embree (2022), who found that AR-assisted role-playing activities can enhance communicative competence and reduce speaking anxiety. However, unlike most prior research, which has focused on general EFL learners or decontextualized tasks, this study was conducted within a targeted ESP curriculum, addressing the specific oral communication needs of tourism and hospitality professionals. This applied focus represents a significant contribution to the existing literature, which has largely overlooked AR's pedagogical value in vocationally oriented language education. Furthermore, the multimodal affordances of AR - such as visual, auditory, and tactile inputs - facilitated more effective vocabulary acquisition and conversational practice. These benefits enabled learners to practice and replicate tourism-based real-world contexts, thereby developing their pragmatic knowledge for the purpose of professional interactions. These findings correspond to a constructivist perspective similar to those noted by Boulton and Garrison (2016), who emphasize the significance of contextualized and experiential learning, and provide further evidence that AR can bridge the divide between higher education, where the teaching of specific concepts is paramount, and the pragmatics of the workplace (Garzón et al., 2019). The findings also provided evidence that AR worked to create collaborative learning situations. The group-based AR activities allowed students to work collaboratively as groups with their peers through teamwork, peer scaffolding, and collaborative problem-solving, which demonstrates elements of connectivist learning theory (Siemens, 2005) in how collaborating with peers broadened their experiences. The participants stated that these team activities helped to improve their performance in speaking and to practice a greater ease of interaction, which is important to any job occupation in tourism. This represents a critical departure from early accounts of AR in SLA, which ignored social aspects of language learning and a work-based context for a more collaborative perspective of language and socialization. These findings collectively indicate L2 learning gains for students and an acknowledgement of how AR has the potential to be utilized in relation to enhancing professional competencies in ways that have not been emphasized in prior literature on AR and language learning. By placing AR in the context of the ESP course in the actual world communicative need, the study confirms the proposed argument that the AR technology is promising software for a significant impact on linguistic-situated AP and occupational readiness for EFL learners. Even though the benefits of AR were clear in this study, particularly when participants were involved and there was no interference, AR also had its own issues. The most significant obstacles were technical - pesky software bugs and download speeds that felt nearly glacial. In certain situations, learning was impeded due to these technological failures. This was consistent with the results as reported by Prasetya et al. (2024); the same technological readiness required for AR was also a concern for the successful implementation of AR pedagogies. On a relevant note, participants also expressed the need for clear instructions with AR tasks, reiterating that the development of lessons is essential in planning structured and pedagogically driven learning. Such challenges might also be addressed with scaffolding, through the use of supportive resources (simple vocabulary lists or model dialogues), but, in this case as well, the scaffolding would be in the form of explicit prompts and would serve to redirect the language objectives of the learners. The latter, however, demands investment firstly in robust and dependable AR platforms, in strong technological infrastructures and capacities, and in teacher CPD. As noted by Zhang et al. (2022) and what was reported by teachers in this study, the importance of teacher training for successful AR and

for how to cope with technical problems is highlighted. In addition, it would allow evidence accumulation of perceived sustainable effects of AR on learner motivation and performance. The findings of the study can also be interpreted in the light of the Cognitive Load Theory since it has highlighted the need to take into account the limited capacity of working memory with respect to complex learning.

When well designed, AR-based lessons can lessen extraneous cognitive load through multisensory modalities of information presentation: visual, auditory, and spatial elements, aiding cognitive processing. For example, the use of interactive 3D model views, visual annotations, and contextual prompts in the AR-supported speaking tasks allowed learners to engage with language input and context simultaneously, at the same time, diminishing the modelling requirement and allowing learners more direct access to language use. Furthermore, the structured nature of the AR activities in this study, designed to increase in complexity over the nine-week time period, also followed principles for managing intrinsic cognitive load through gradual schema construction. In recent research by Singh and Chandra (2024) on AR applications, students' understanding improved significantly, and cognitive load decreased when learning abstract concepts involved modifying abstract concepts in a multimodal environment. These findings support the claim that AR designed in alignment with CLT principles creates pedagogically effective and cognitively manageable learning environments, particularly in context-specific professions like tourism and hospitality.

The findings of this study have several implications for EFL and ESP education. To begin with, the demonstrated effects of AR (Augmented Reality) on speaking skills suggest the potential for AR to be a worthwhile adjunct to the traditional language teaching approaches. AR connects the gap between classroom learning and real-life communication by creating authentic, interactive, and immersive experiences; an important aspect of marketing for the tourism and hospitality context, where spoken communication is needed. Further, the significant decrease in speaking anxiety suggests students engage with AR in a low-stress environment (Sweller, 2011; cognitive load theory) focused on producing the language in a common context. Future studies will address the weaknesses of this study and examine the generalizability and richness of the findings. The educational value of AR remains relevant in various learning environments and cultural settings. AR technology shows potential to connect with different cultural settings, but researchers should conduct comparative studies from similar backgrounds to clarify how students interact with AR based on their cultural features, which potentially match specific cultural elements in AR perception of usefulness and ease of use (Venkatesh et al., 2003). The expansion of AR through accessible and inclusive designs would create equity benefits for students because it would establish more learning opportunities for all students across different educational settings and ability levels. The study adds to existing knowledge about technology-enhanced language learning (TELL) by establishing AR as a tool that motivates students and enhances their participation in speaking development. The current barriers to AR implementation exist, but the technology proves its ability to transform language instruction through professional practice integration and educational applications for future research development.

Conclusion

This study examined whether AR technology could improve the speaking skills of Vietnamese EFL undergraduate students in an employer-initiated context of ETH. Combining qualitative

and quantitative methods - pre- and post-tests, TAM-based questionnaires, and focus groups - the study has provided clear evidence of the effectiveness of AR for improving fluency, accuracy, vocabulary used, and pronunciation. Results confirm that AR technology can connect students' learning in the classroom and their communication in the real world through immersive lived experiences with contextual opportunities. Students engaged positively in virtual role-plays and industry simulations, which allowed them to practice speaking in a simulated, authentic environment. Students also demonstrated more positive attitudes with increasing confidence and time spent with AR technology. These results reflect students' high acceptance and willingness to adopt AR as a language learning tool. As with every new initiative in education, the study also demonstrated limitations and highlighted some challenges, including technical challenges and the need for guidance. Unfortunately, it is beyond the scope of this study to problematize these examples of limitations, but they served as a warning for planning and implementation decisions made for the language course, as AR should add learning ease and experience, not reduce it. AR technologies present a potentially useful avenue for improving speaking capabilities in ESP settings, particularly in tourism and hospitality. AR allows for interactive and immersive approaches, enabling educators to create a much more vibrant and efficient language learning focus, designed to approximate the communication needs involved in future communication contexts.

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