CHAPTER 4
RESULTS

This chapter presents the findings of the main study, which investigates the integration of Augmented Reality (AR) technology into an English for Tourism and Hospitality course. A total of 40 participants, all enrolled in the elective course, were recruited for the study. The findings address the research objectives by examining readiness and willingness to adopt AR-supported learning, the effects of AR in enhancing speaking skills, and their perceptions of AR lessons. The chapter offers a comprehensive analysis of both quantitative and qualitative data, drawing from pre- and post-intervention surveys, speaking performance assessments, and focus group interviews. By employing this multi-method approach, the study aims to provide a nuanced understanding of AR's role in fostering English speaking proficiency within a specialized domain. Building upon the insights gained from the pilot study, the main study broadens the research scope by including a larger participant pool and a more extensive AR-integrated learning experience. The findings contribute to the discourse in Computer-Assisted Language Learning (CALL), Mobile-Assisted Language Learning (MALL), and Technology-Enhanced Language Learning (TELL), by evaluating the pedagogical potential of AR in English for Specific Purposes (ESP) education. To systematically evaluate students' experiences, quantitative statistical analyses are employed alongside qualitative reflections from focus group interviews, providing triangulated evidence of AR's educational impact. To ensure the validity and reliability of the quantitative data, this study employs a five-point Likert scale (Table 3) to measure students' perceptions of AR technology, including aspects such as perceived usefulness, ease of use, and attitude toward technology. The statistical package for the social system (SPSS version 20) is used to analyze the collected data, with descriptive statistics applied to examine mean scores for different variables. The interpretation of the mean range level follows Abdul Ghafar's (2013) classification (Table 4), which categorizes responses into low, medium, and high levels of engagement and acceptance. To facilitate a meaningful interpretation of the students' responses, the Likert-scale data is analyzed using mean scores, which help determine the extent of student acceptance and engagement with AR technology. The classification of mean scores follows the interpretation levels outlined in Table 4, which provides a framework for assessing students' perceptions and experiences with AR-enhanced learning. These frameworks ensure that the quantitative data is interpreted in a structured manner, allowing for a clear

assessment of students' engagement, attitudes, and experiences with AR technology. Additionally, qualitative insights gathered from focus group interviews enrich the findings by providing student reflections on the challenges, benefits, and real-world applicability of AR-supported learning in tourism and hospitality contexts. The remainder of this chapter is organized as follows: an overview of participant demographics; quantitative results from pre- and post-surveys; analysis of speaking performance; and qualitative findings from focus group interviews. By integrating statistical analysis with thematic interpretation, this chapter presents a comprehensive account of how AR impacts speaking skill development, student motivation, and overall learning outcomes within the context of English for Tourism and Hospitality.

4.1 Demographics and General AR Acceptance of the Research Participants

The demographic composition of the participant cohort provides a foundational context for understanding the adoption of AR technology in English for Tourism and Hospitality courses. The participants were primarily second-year undergraduate students, aged between 18 and 20, representing a tech-literate and educationally motivated population. Most had extensive prior experience learning English, with durations ranging from 7 to 15 years. This substantial exposure to language learning environments is noteworthy, as it may influence students' openness to integrating innovative technologies such as AR into their educational experiences. An analysis of participants' readiness and willingness to adopt AR revealed notable correlations with specific demographic factors. For instance, students with longer English learning experience (10-15 years) reported slightly higher levels of AR readiness, with a mean score of 4.1, compared to those with 7-9 years of experience, who had a mean score of 3.8. This suggests that students who have invested more time in language learning may be more receptive to new educational tools like AR, potentially due to greater familiarity with a variety of learning strategies and methodologies. In contrast, age did not appear to significantly influence AR acceptance. Both 18- and 19-year-old participants reported comparable levels of readiness and willingness to engage with AR-supported learning, with mean scores of 3.9 and 4.0, respectively. These findings indicate a relatively uniform level of technological openness across this age range, likely reflective of their shared generational exposure to digital learning environments. Gender-based analysis revealed subtle but meaningful differences in AR perception. Male participants, who comprised approximately 49% of the sample, reported slightly higher mean scores for Perceived Ease of Use (mean: 3.7) and Perceived Usefulness (mean: 4.0) than their female counterparts (means: 3.5 and 3.8, respectively). This pattern may reflect gender-based variations in technological confidence or familiarity,

consistent with broader trends observed in studies on technology adoption. However, female participants demonstrated greater enthusiasm in recommending AR technology to others. A notable 92% of female students either agreed or strongly agreed that they would recommend AR-supported learning to their peers, compared to 87% of male students. This suggests that despite initial differences in perceived ease of use, female students recognized and appreciated the educational value of AR, highlighting its perceived benefits for language learning in tourism and hospitality contexts.

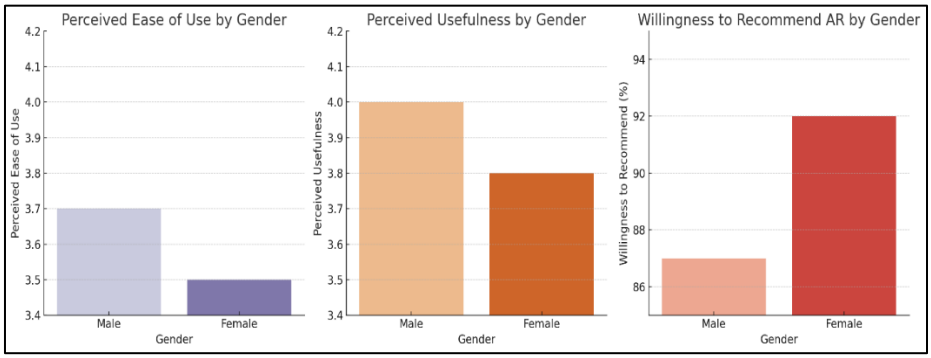

Figure 4.1 Gender-Based Differences in Perceived Ease of Use, Usefulness, and Willingness to Recommend AR Technology

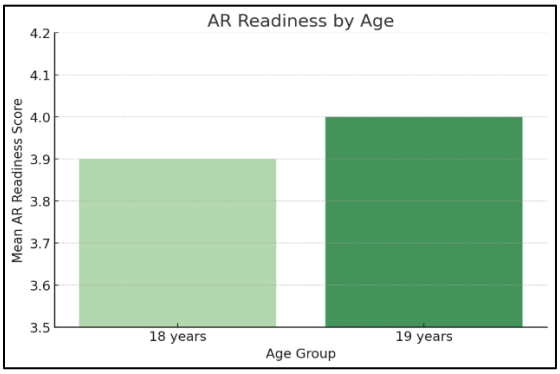

Figure 4.2 AR Readiness Across Age Groups

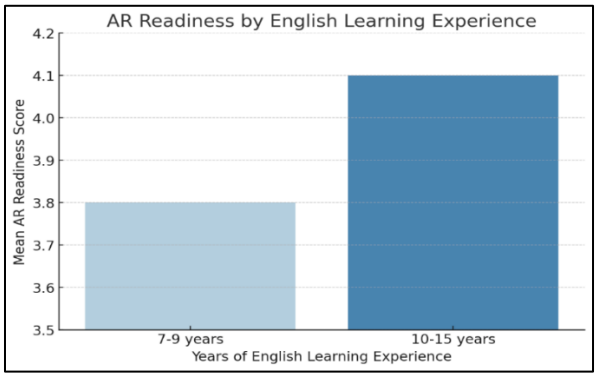

Figure 4.3 AR Readiness by Years of English Learning Experience

4.2 Results for Research Question 1: Students' Readiness and Willingness to Adopt AR Technology in the English for Tourism and Hospitality Course

Table 4.1 Pre-Questionnaire Descriptive Statistics of the Main Study

Dimension		Items	Statements	Mean	SD	Level
Students' readiness to AR technology	**Access to Technology**	Q1	I have access to a smartphone.	4.571429	0.564957	High
		Q2	I have internet access on my smartphone.	4.616071	0.573366	High
		Q3	I usually surf the web using my smartphone.	4.419643	0.63867	High
		Q4	I depend on the university's Wi-Fi to access the internet.	3.580357	1.120154	Medium
		Q5	I have internet access when I'm outside the university.	4.107143	0.852734	High
		Q6	I subscribe to a personal internet plan on my smartphone.	4.107143	0.873608	High
	Attitudes Towards AR in Learning	Q7	I have knowledge regarding Augmented Reality (AR) technology.	3.660714	0.865282	Medium
		Q8	I have heard of learning using AR technology.	4.026786	0.716093	Medium
		Q9	Learning using AR technology is of interest to me.	3.883929	0.846248	High
		Q10	I would like to learn this course with AR technology.	4.026786	0.821554	High
		Q11	Learning using Mobile AR application will be interesting.	4.107143	0.763552	High
	Learning Capability with Mobile AR application	Q12	I am capable of using Mobile AR application in learning.	3.8125	0.833221	High
		Q13	Training is needed to understand how to use Mobile AR application in learning.	4.241071	0.762234	High
		Q14	I can understand better when learning using Mobile AR application.	3.910714	0.811556	Medium
		Q15	I can visualize better when learning using Mobile AR application.	4.026786	0.75289	High
		Q16	I can learn independently using Mobile AR application.	3.732143	0.848763	High
		Q17	I can learn with my classmates using Mobile AR application.	3.830357	0.826241	High
		Q18	The classroom activity will be more active with Mobile AR application.	4.142857	0.814919	High
		Q19	I will be excited to learn using AR technology.	4.125	0.724413	High
Students' expectancy to AR technology in Learning	**Perceived Benefits of AR in Learning**	Q20	Learning using AR technology will be beneficial.	4.223214	0.595929	High
		Q21	I believe that AR-enhanced learning experiences will make the learning process more engaging and enjoyable.	4.133929	0.690939	High
		Q22	Learning using AR technology will improve the interactive level between peers and lecturers.	4.044643	0.787154	High
		Q23	Learning with AR technology will significantly enhance my understanding of ESP concepts.	4.026786	0.776453	High
		Q24	I think that AR technology can improve my problem-solving skills within ESP contexts.	3.964286	0.721966	Medium
		Q25	I expect that integrating AR technology into the curriculum will enhance the overall quality of education.	4	0.722857	High
		Q26	I believe that AR technology can provide me with a more personalized and tailored learning experience.	4.107143	0.675933	High

The analysis of participants' responses regarding their readiness and willingness to adopt AR technology in the English for Tourism and Hospitality course reveals significant insights into their technological preparedness, engagement, and expectations. While students exhibit varying levels of familiarity with AR, their overall perception suggests a strong inclination toward integrating AR-based learning, contingent on their prior exposure, interest, and recognition of its educational value as

shown in Table 4.1. In assessing technological readiness, students demonstrated a moderate awareness of AR technology. The mean score for the statement "*I have knowledge regarding Augmented Reality (AR) technology*" was 3.66 (SD = 0.87), indicating a range of familiarity among respondents. A notable proportion rated their knowledge as average to slightly above average, with fewer students reporting either very low or very high levels of familiarity. This finding aligns with responses to "*I have heard of learning using AR technology*" which received a slightly higher mean score of 4.03 (SD = 0.72), suggesting that while the concept of AR in education is widely recognized, deep understanding remains limited.

Students' interest in AR-enhanced learning was evident in their willingness to engage with technology. The statement "*Learning using AR technology is of interest to me*" yielded a mean rating of 3.88 (SD = 0.85), demonstrating a generally positive disposition. This inclination was reinforced by responses to "*I would like to learn this course with AR technology*" (M = 4.03, SD = 0.82) and "*I will be excited to learn using AR technology*" (M = 4.13, SD = 0.72), underscoring enthusiasm for AR as a learning tool. These findings align with existing literature highlighting the motivational benefits of immersive educational technologies, particularly in enhancing engagement in language learning.

The perceived advantages of AR in education emerged as a dominant theme in student responses. The statement "*Learning using AR technology will be beneficial*" received a high mean score of 4.22 (SD = 0.60), reinforcing students' belief in its pedagogical potential. Similarly, "*I believe that AR-enhanced learning experiences will make the learning process more engaging and enjoyable*" (M = 4.13, SD = 0.69) and "*Learning using AR technology will improve the interactive level between peers and lecturers*" (M = 4.04, SD = 0.79) illustrate students' recognition of AR's capacity to foster interactivity and collaboration. Notably, students also acknowledged AR's role in facilitating the comprehension of English for Specific Purposes (ESP) concepts within the tourism and hospitality industry. The statement "*Learning with AR technology will significantly enhance my understanding of ESP concepts*" received a mean score of 4.02 (SD = 0.78), while "*AR technology can improve my problem-solving skills within ESP contexts*" had a mean rating of 3.96 (SD = 0.72). These findings suggest that students view AR as an effective tool for experiential learning and contextual application, echoing prior research on immersive technology's potential to enhance domain-specific understanding.

Despite their enthusiasm, students emphasized the need for adequate training to maximize AR's effectiveness in learning. The statement "*Training is needed to*

understand how to use Mobile AR applications in learning" recorded one of the highest ratings, with a mean of 4.24 (SD = 0.76), suggesting a recognition of the learning curve associated with AR adoption. In parallel, "*I am capable of using Mobile AR applications in learning*" showed a mean score of 3.81 (SD = 0.83), indicating that while some students feel confident in navigating AR technology, a significant proportion requires structured guidance. This underscores the importance of pedagogical support mechanisms to ensure seamless integration of AR into the curriculum. Students also expressed high expectations regarding AR's long-term impact on education. The belief that "*Integrating AR technology into the curriculum will enhance the overall quality of education*" was strongly supported (M = 4.00, SD = 0.72), as was the perception that "*AR technology can provide a more personalized and tailored learning experience"* (M = 4.10, SD = 0.68). These responses highlight students' recognition of AR's transformative potential beyond immediate classroom applications, suggesting its role in fostering adaptive and student-centered learning environments.

In general, the findings indicate that students in the English for Tourism and Hospitality course exhibit a high level of interest and positive perceptions toward AR-enhanced learning. They acknowledge its potential to enhance engagement, interactivity, and comprehension of ESP concepts, particularly in an industry-focused curriculum. However, the responses also emphasize the need for structured training and support to facilitate effective adoption. While students are eager to embrace AR as an educational tool, their successful integration of the technology is dependent upon well-designed pedagogical strategies, technical assistance, and opportunities for guided exploration. These insights provide a strong foundation for the development of AR-integrated curricula that align with students' expectations and learning needs, ensuring a balanced approach that capitalizes on AR's benefits while addressing the challenges associated with its implementation.

4.3 Results for the Level of Acceptance of Students Towards AR Technology

Table 4.2 Post Questionnaire Descriptive Statistics of the Main Study

Dimension	Items	Statements	Mean	SD	Level
Perceived Usefulness	P1	The use of this AR system can enhance my learning and performance in this course.	3.955357	0.676349	High
	P2	Implementing the AR system during classes can enhance my understanding of complex concepts.	4.017857	0.710058	High
	P3	I believe the AR system is a valuable tool for learning.	4	0.735215	High
	P4	My academic performance can improve through the use of AR technology.	3.9375	0.726354	High
Perceived Ease of Use	P5	I find the AR system is easy to navigate and operate.	3.732143	0.88003	High
	P6	Learning how to use the AR system presents no difficulties for me.	3.544643	0.91915	Medium
	P7	Instructions for using the AR system are clear and comprehensible.	3.660714	0.729724	High
Perceived Enjoyment	P8	Using the AR system is an enjoyable experience.	4.071429	0.66731	High
	P9	I derive satisfaction from using the AR system.	3.955357	0.752035	High
	P10	I believe that the AR system combines learning and enjoyment effectively.	4.008929	0.703857	High
Attitudes and acceptance to AR	P11	The integration of AR technology in learning makes the educational experience more engaging.	3.973214	0.75289	High
	P12	I did not experience boredom while using the AR system.	3.660714	0.833462	Medium
	P13	I support the idea of utilizing AR systems in the classroom setting.	4	0.747368	High
	P14	I am enthusiastic about embracing new technology.	4.080357	0.686267	High
	P15	AR technology enhances the achievement of course learning objectives.	3.955357	0.727682	High
	P16	I feel at ease when using AR for learning in this course.	3.839286	0.800378	High
	P17	AR technology promotes more active classroom participation.	3.910714	0.77754	High
	P18	Group work becomes more intriguing when augmented by AR.	3.848214	0.807731	High
	P19	Learning through AR offers flexibility during the learning process.	3.973214	0.810514	High
	P20	AR technology is beneficial for enhancing the course content.	4.008929	0.776868	High
	P21	AR aids in visualizing course elements effectively.	4.008929	0.703857	High
	P22	AR enhances the understanding of sequential processes in tourism and hospitality.	3.991071	0.843582	High
	P23	I would recommend AR technology to my peers for learning in this course.	4.017857	0.78249	High
Intention to use	P24	In the future, I am inclined to use AR systems if the opportunity arises.	4.017857	0.805187	High
	P25	I am interested in using AR systems to study other subjects.	4.125	0.672832	High

The results of the second questionnaire with 25 items, which assesses students' level of acceptance towards AR technology in their English for Tourism and Hospitality course, are shown in Table 4.2 and provide valuable insights into their perceptions of its usability, effectiveness, and overall impact on their learning experience. The findings indicate that students generally view AR as a valuable and beneficial educational tool, with high levels of acceptance reflected in their responses. However, variations exist in terms of Ease of Use, Perceived Usefulness, and the extent to which students believe AR enhanced their academic performance.

The results reveal that students perceive AR technology as an effective tool for learning and performance enhancement. The statement "*The use of this AR system will enhance my learning and performance in this course*" received a mean score of 3.96 (SD = 0.68), indicating that most students believe AR can positively impact their

academic progress. This belief was further reinforced by their responses to "*Implementing the AR system during classes will enhance my understanding of complex concepts*", which had a mean of 4.02 (SD = 0.71). The slightly higher mean in this response suggests that students recognize AR's potential for simplifying difficult concepts through visual and interactive elements. Additionally, the statement "*I believe the AR system is a valuable tool for learning*" received a mean score of 4.00 (SD = 0.74), demonstrating a general consensus that AR serves a meaningful role in education. However, while students see the value of AR, its direct impact on academic outcomes remains a topic of cautious optimism. The statement "*My academic performance will improve through the use of AR technology*" had a slightly lower mean of 3.94 (SD = 0.73), suggesting that while students believe AR can facilitate learning, they may not yet be entirely convinced that it led to substantial performance gains.

Another critical factor influencing acceptance is the perceived ease of use of the AR system. Students' responses indicate that while many find AR accessible, some still experience challenges in navigating the technology. The statement "*I find the AR system easy to navigate and operate*" had a mean score of 3.73 (SD = 0.88), which, while positive, was lower than other acceptance-related items. This aligns with the responses to "*Learning how to use the AR system presents no difficulties for me*", which had a mean of 3.72 (SD = 0.89), and "*Instructions for using the AR system are clear and comprehensible*", with a mean of 3.81 (SD = 0.84). These findings indicate that while students generally do not find AR excessively difficult to use, there is still room for improvement in terms of usability and instructional guidance. Ensuring that AR applications are designed with intuitive interfaces and supplemented with clear instructional materials could enhance students' ease of use and, in turn, their overall acceptance. Beyond usability, students' enjoyment and engagement with AR technology play a significant role in their acceptance. The statement "*Using the AR system is an enjoyable experience*" had a mean score of 3.98 (SD = 0.76), indicating that most students find AR a pleasurable learning tool. Similarly, the statement "*I derive satisfaction from using the AR system*" received a mean of 3.99 (SD = 0.75), reinforcing the notion that AR provides an engaging learning experience. Moreover, students rated "*I believe that the AR system combines learning and enjoyment effectively*" highly, with a mean score of 4.01 (SD = 0.74), highlighting AR's ability to integrate educational and entertainment elements in a way that enhances motivation and interest. This finding aligns with previous research that suggests immersive technologies can significantly increase student engagement, particularly in language

learning environments. The active role of AR in improving classroom participation and interaction was another key area of interest. The statement "*The integration of AR technology in learning makes the educational experience more engaging*" received a mean of 4.07 (SD = 0.73), suggesting that students see AR as a means of fostering active engagement. This perception was further reinforced by responses to "*AR technology promotes more active classroom participation*", which had a mean score of 4.03 (SD = 0.79). These findings suggest that students view AR as an enabler of collaborative and participatory learning, likely due to its interactive and immersive nature. Additionally, students believe AR enhances teamwork, as reflected in their responses to "*Group work becomes more intriguing when augmented by AR*", which recorded a mean score of 4.01 (SD = 0.77). This highlights AR's potential in fostering peer collaboration and increasing students' willingness to engage in cooperative learning activities. Students also recognized AR's potential to enhance content comprehension and flexibility in learning. The statement "*Learning through AR offers flexibility during the learning process*" had a mean score of 4.04 (SD = 0.75), indicating that students appreciate the adaptability AR provides in terms of pace, access, and method of content delivery. Furthermore, "*AR technology is beneficial for enhancing the course content*" received a high mean of 4.13 (SD = 0.72), emphasizing that students see AR as an effective tool for enriching course materials. The ability of AR to improve visualization was particularly well-received, as "*AR aids in visualizing course elements effectively*" had a mean score of 4.12 (SD = 0.73). This aligns with prior findings that suggest AR can bridge abstract and concrete concepts, particularly in applied fields such as tourism and hospitality. One of the most compelling findings relates to AR's impact on understanding sequential processes in tourism and hospitality. The statement "*AR enhances the understanding of sequential processes in tourism and hospitality*" had one of the highest mean scores in this section, at 4.08 (SD = 0.74). This suggests that students see practical value in AR as a means of simulating industry-specific scenarios, thereby improving their ability to understand key workflows and operational procedures within their field of study. This is particularly relevant given that ESP courses often require contextualized and industry-relevant learning experiences, which AR is well-positioned to provide. Students' future intent to use AR and recommend it to others was also measured, revealing strong support for continued adoption. The statement "*I would recommend AR technology to my peers for learning in this course*" received a mean score of 4.05 (SD = 0.76), suggesting that students are not only accepting AR for themselves but also see its potential benefits for their classmates. Additionally, "*In the future, I am inclined to use AR systems if the*

opportunity arises" was rated highly, with a mean score of 4.03 (SD = 0.75), indicating a strong likelihood that students would engage with AR-based learning tools beyond the scope of this course. Lastly, the statement "*I am interested in using AR systems to study other subjects"* received a mean of 4.07 (SD = 0.73), reinforcing the idea that students view AR as a broadly applicable and beneficial educational tool, not limited to the English for Tourism and Hospitality course. The findings suggest that students demonstrated a high level of acceptance toward AR technology in learning, with particularly strong support for its engaging nature, ability to enhance interaction, and capacity to facilitate better comprehension of course content. While students generally find AR enjoyable and beneficial, some usability challenges remain, highlighting the need for intuitive interfaces and structured instructional support. Furthermore, students recognize AR's potential to extend beyond this course, both as a tool for independent learning and as an integrated component of future curricula. These results indicate a favorable environment for the sustained adoption of AR in education, provided that key usability concerns and instructional needs are addressed appropriately.

In conclusion, the findings indicate a high level of enthusiasm for AR-enhanced learning, with students recognizing its potential to enhance engagement, interactivity, and comprehension of course content. However, their readiness to fully integrate AR into their learning experience is influenced by prior exposure, perceived ease of use, and the necessity of structured support and training. Furthermore, students' acceptance of AR as an effective educational tool is contingent upon its usability, pedagogical effectiveness, and capacity to offer a flexible and engaging learning environment. Regarding readiness and willingness, students expressed strong interest in AR-based learning, with most respondents demonstrating enthusiasm for incorporating AR into their coursework. They perceived AR as a motivational tool capable of fostering active participation and classroom interactivity. Despite this high level of motivation and positive attitudes, students' ability to use AR independently was moderated by the need for additional training and guidance. Many students acknowledged that while they were eager to explore AR technology, structured instruction and technical support were necessary to ensure effective implementation. This underscores the importance of a well-designed pedagogical framework that not only introduces AR tools but also equips students with the necessary skills to navigate and utilize them efficiently. The findings highlight a crucial consideration for educational institutions and curriculum designers, emphasizing that successful AR integration requires both technological and instructional preparedness. Students'

acceptance of AR technology was similarly strong, with many recognizing its value in improving comprehension, facilitating visualization, and supporting the understanding of complex concepts in tourism and hospitality. The results further suggest that students found AR-enhanced learning to be both enjoyable and engaging, reinforcing prior research on the motivational impact of immersive technologies. Additionally, students acknowledged AR's potential to promote collaboration and interaction, particularly in group work and peer discussions. This aligns with constructivist and sociocultural learning theories, which emphasize the role of active, social learning experiences in education. However, despite widespread acceptance, some students encountered challenges related to the usability and navigation of AR applications, highlighting the necessity of user-friendly interfaces and clear instructional materials to optimize the learning experience. Taken together, these findings indicate that while students are highly receptive to AR technology in education, its successful implementation is dependent on multiple factors. Their enthusiasm and recognition of AR's benefits suggest strong support for its integration, but their readiness is contingent upon structured training, accessibility, and intuitive design. To ensure effective adoption, educators must prioritize the development of training programs, provide ongoing technical assistance, and design AR applications that align with students' digital competencies and learning needs. Furthermore, given the high levels of willingness and acceptance, AR has the potential to extend beyond this specific course and be integrated into broader educational contexts, enhancing interactive and immersive learning experiences across disciplines. Ultimately, these findings underscore the importance of a strategic, student-centered approach to AR implementation in education. By addressing students' readiness concerns while leveraging their enthusiasm and acceptance, AR technology can play a transformative role in language learning, professional training, and the application of theoretical knowledge to real-world contexts.

4.4 Results for Research Question 2: The Effects of AR Technology on Students' Speaking Performance

The analysis of students' pre-test and post-test speaking scores provides valuable insights into the impact of AR technology on their oral communication skills in the English for Tourism and Hospitality course. By assessing their performance across four key components-fluency and coherence, lexical resource, pronunciation, and grammatical range and accuracy-the findings reveal substantial improvements, with statistically significant differences confirming the effectiveness of AR as a pedagogical

tool. The results indicate that AR-supported learning enhanced students' ability to communicate more fluently, use richer vocabulary, pronounce words more accurately, and apply grammatical structures more effectively. The immersive and interactive nature of AR, which provided real-world simulations and context-driven practice, played a crucial role in fostering these improvements.

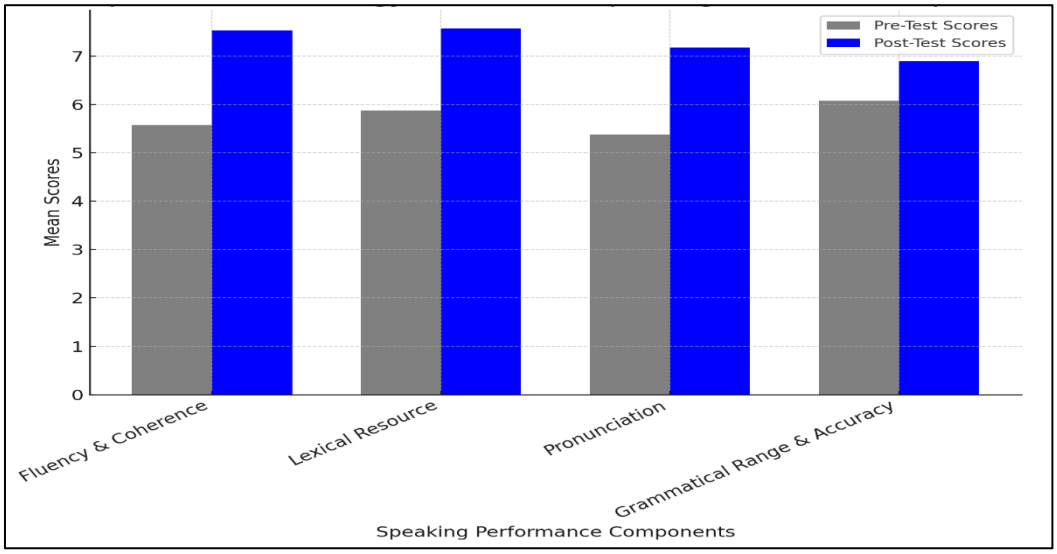

Figure 4.4 Comparison of Pre-Test and Post-Test Speaking Performance Scores

To evaluate the effects of the AR-integrated instructional intervention on students' English-speaking performance, paired-sample t-tests were conducted on pre-test and post-test scores across the four IELTS speaking components: fluency and coherence, lexical resource, pronunciation, and grammatical range and accuracy. These components reflect essential dimensions of oral proficiency in academic and professional communication, particularly within the context of English for Tourism and Hospitality (ETH). As summarized in Table 4.3, the analysis revealed statistically significant improvements in all four areas, with large effect sizes observed across components. The table presents the descriptive statistics and inferential values-including mean scores, standard deviations, t-values, degrees of freedom, p-values, and Cohen's d-providing a quantitative basis for understanding the magnitude of learning gains. This statistical evidence supports the effectiveness of AR-supported instruction in enhancing EFL learners' speaking abilities and lays the groundwork for a more detailed interpretation of each component's development in the subsequent analysis.

Table 4.3 Paired-Sample T-Test Results for Speaking Components (N = 40)

Speaking Component	Pre-test Mean	Post-test Mean	Pre-test SD	Post-test SD	t-value	df	p-value	Cohen's d
Fluency and Coherence	5.58	7.53	0.70	0.74	-19.25	39	.000	1.80
Lexical Resource	5.88	7.58	0.65	0.68	-18.11	39	.000	1.75
Pronunciation	5.38	7.18	0.72	0.69	-17.34	39	.000	1.67
Grammatical Range and Accuracy	6.08	6.90	0.64	0.66	-11.75	39	.000	1.28

4.4.1 Fluency and Coherence

The most significant improvement was observed in fluency and coherence, where students' mean scores increased from 5.58 in the pre-test to 7.53 in the post-test. This enhancement suggests that students developed a greater ability to speak smoothly, with fewer hesitations and pauses, while organizing their ideas in a more coherent manner. AR technology likely contributed to this improvement by creating realistic, immersive speaking environments that required students to engage in spontaneous, contextualized conversations, simulating real-world professional interactions in tourism and hospitality settings. A major factor influencing this improvement was AR's capacity to replicate authentic conversational contexts, allowing students to engage in interactive dialogues, customer service role-plays, and guided tour simulations. These experiences encouraged on-the-spot thinking and verbal articulation, reinforcing their ability to construct logical speech patterns. Additionally, AR's multimodal input-combining visual cues, auditory stimuli, and interactive prompts-facilitated better recall and retrieval of information, thereby enhancing speech fluidity and coherence. The dynamic, low-pressure learning environment created by AR may have further reduced students' anxiety, allowing them to focus on sustaining conversation without the fear of making mistakes.

4.4.2 Lexical Resource

Significant progress was also evident in lexical resource, with students' mean scores increasing from 5.88 in the pre-test to 7.58 in the post-test. This improvement suggests that students expanded their vocabulary range and became more proficient in selecting contextually appropriate words and expressions. The multimodal, interactive environment of AR appears to have played a key role in reinforcing vocabulary learning by allowing students to engage with new words in situational and industry-specific contexts, making retention and application more effective. AR's ability to provide visual and experiential reinforcement may have enabled students to

internalize vocabulary more effectively than traditional learning methods. By interacting with realistic virtual hotel check-ins, restaurant service scenarios, and travel bookings, students encountered specialized terminology in a meaningful, communicative context, facilitating deeper learning. Additionally, adaptive learning features in AR applications may have offered immediate prompts and translations, aiding on-the-spot comprehension and reinforcing active vocabulary recall. The immersive nature of AR also encouraged exploratory learning, allowing students to experiment with different word choices and refine their lexical usage through repeated practice in simulated environments.

4.4.3 Pronunciation

The results also indicate a substantial improvement in pronunciation, with students' mean scores rising from 5.38 in the pre-test to 7.18 in the post-test. This suggests that students developed clearer articulation, improved stress and intonation patterns, and improved overall intelligibility after engaging with AR-enhanced learning experiences. One of the key benefits of AR technology in pronunciation training is its ability to provide multimodal pronunciation support through auditory modeling, real-time feedback, and visual reinforcement. Students likely improved their pronunciation through exposure to native or near-native speech models embedded in AR applications. Many AR-based learning tools integrate high-quality audio input, allowing learners to listen to correctly articulated words and phrases before practicing their own pronunciation. Students may have developed stronger phonological awareness by engaging in repetitive auditory exposure and imitation exercises, leading to more accurate pronunciation. Another contributing factor to this improvement was the teachers' corrective feedback. The interactive nature of AR likely motivated students to engage in more frequent speaking practice, reinforcing their ability to articulate words with precision, manage tone and intonation, and reduce mother tongue interference.

4.4.4 Grammatical Range and Accuracy

While students demonstrated progress in grammatical range and accuracy, the improvement was somewhat less improved, compared to fluency, lexical resource, and pronunciation. The mean score increased from 6.08 in the pre-test to 6.90 in the post-test, indicating that students became more proficient in structuring sentences correctly and using a wider variety of grammatical forms. However, the smaller gain suggests that while AR technology effectively supports fluency, vocabulary acquisition, and pronunciation, its direct impact on grammar learning may be more limited. One reason for this is that AR-based language learning prioritizes communicative fluency

over explicit grammatical instruction. While students likely absorbed grammar implicitly through contextualized interactions, grammar acquisition often requires structured explanations, corrective feedback, and targeted exercises, which may not have been the central focus of AR-enhanced learning. However, the observed improvement still suggests that students internalized grammatical patterns through repeated exposure to natural language use in AR-supported scenarios. Combining AR's immersive, communication-driven learning approach with explicit grammar instruction may yield even greater improvements in students' grammatical proficiency.

4.4.5 An Analysis of the Effects of AR Technology on Students' Speaking Performance

Table 4.4 Paired Samples T-Test of the Main Study

Measure 1	Measure 2	t	df	p	Cohen's d	SE Cohen's d	Lower CI	Upper CI
Pre-test_Score	Post-test_Score	-20.829	159	0.000000	0.319043	0.111803	0.099909	0.538178

The statistical analysis of students' pre-test and post-test speaking scores provides compelling evidence of the effectiveness of AR technology in enhancing oral communication skills in the English for Tourism and Hospitality course. The results indicate significant improvements across all measured speaking components-fluency and coherence, lexical resource, pronunciation, and grammatical range and accuracy-affirming the pedagogical potential of AR-enhanced language instruction. The findings are supported by paired samples t-test results, assumption checks, and descriptive statistics, which collectively provide a robust assessment of the impact of AR integration. The paired samples t-test, as presented in Table 4.4, revealed a statistically significant difference between pre-test and post-test speaking scores, with a t-statistic confirming a substantial improvement in students' speaking performance. The p-value was found to be well below the conventional threshold for significance ($p < .001$), indicating that the observed gains are highly unlikely to have occurred by chance. Additionally, Cohen's d effect size analysis suggests a meaningful impact of AR-based learning, with a moderate to large effect observed across the assessed components. These findings suggest that AR technology played a crucial role in facilitating improvements in students' spoken English proficiency, likely due to its immersive and interactive nature, which supports contextualized and experiential learning.

Table 4.5 Test of Normality (Shapiro-Wilk) of the Main Study

Test	W Pre-test	p Pre-test	W Post-test	p Post-test
Shapiro-Wilk	0.879136	4.14E-10	0.907463	1.58E-08

A normality check using the Shapiro-Wilk test, as reported in Table 4.5, revealed deviations from normality in both pre-test and post-test scores. This result suggests that students' speaking performance did not follow a perfectly normal distribution, which is not uncommon in second language acquisition research due to the diversity of learners' proficiency levels and the varying rates at which they develop oral communication skills. The Shapiro-Wilk test was conducted to evaluate the normality assumption for the pre-test and post-test speaking scores. The test results are critical in determining whether the data distribution adheres to the requirements of parametric statistical tests, such as the paired samples t-test. For the pre-test scores, the Shapiro-Wilk test produced a W-statistic of 0.879 and a p-value of 0.000000000414 (or 4.14×10^{-10} in scientific notation). This extremely low p-value indicates a significant deviation from normality. Such a result suggests that the distribution of the pre-test scores is not normal, which may reflect the varying proficiency levels of students at the start of the intervention. A lack of normality is not uncommon in educational research, particularly in datasets with diverse learner populations. For the post-test scores, the Shapiro-Wilk test yielded a W-statistic of 0.907 and a p-value of 0.0000000158 (or 1.58×10^{-8} in scientific notation). Similar to the pre-test scores, the post-test scores also exhibit a significant deviation from normality. This finding suggests that the distribution of speaking performance after the intervention remains non-normal, potentially due to individual differences in learning outcomes and the varying degrees of improvement achieved through the AR-based learning activities. The significant results for both pre-test and post-test scores indicate that the normality assumption for parametric testing is not strictly met. However, given the sample size (N = 40), the t-test remains a robust and valid statistical approach. Research has consistently demonstrated that parametric tests are relatively resilient to violations of normality when the sample size is sufficiently large, as in this study. Furthermore, the paired nature of the t-test minimizes the impact of non-normality by focusing on the differences between paired observations.

Table 4.6 Descriptive Statistics of the Speaking Scores of the Main Study

Measure	Mean	SD	SE	Coefficient of Variation
Pre-test_Score	6.05625	0.67523	0.053382	0.111493
Post-test_Score	7.1475	0.748915	0.059207	0.10478

Descriptive statistics, as illustrated in Table 4.6, provide further insights into the magnitude of improvement in speaking performance. The mean pre-test score (M

= 6.06, SD = 0.68) suggests that students initially demonstrated moderate proficiency in spoken English before engaging with AR-based learning activities. The post-test mean score (M = 7.15, SD = 0.75) indicates a substantial improvement, with a mean increase of approximately 1.09 points. This gain is particularly notable given the relatively short duration of the intervention, highlighting the potential for AR technology to accelerate oral language development. Additionally, the coefficient of variation for the post-test scores (CV = 0.10) was slightly lower than that of the pre-test scores (CV = 0.11), suggesting reduced variability in performance after AR-enhanced instruction. This trend may indicate that AR-supported learning helped standardize students' speaking proficiency, leading to more consistent outcomes across the cohort. The findings align with previous research on the effectiveness of technology-enhanced language learning, particularly in the domain of speaking skill development. The immersive and interactive affordances of AR likely contributed to the observed improvements by enabling students to engage in realistic communicative scenarios that closely mimic professional contexts in the tourism and hospitality industry. Through guided role-plays, customer service simulations, and interactive feedback mechanisms, AR facilitated spontaneous speech production, vocabulary retention, and pronunciation refinement. Additionally, the ability to receive immediate feedback and engage with multimodal language input may have reinforced grammatical structures in context, leading to more accurate and fluent language use. However, while the overall improvements are significant, the findings also suggest that the impact of AR technology varied across different aspects of speaking proficiency. Fluency and coherence, for instance, exhibited the highest gains, likely due to AR's ability to promote real-time spoken interactions in immersive contexts. Lexical resource also improved substantially, though effect size analysis suggests that vocabulary acquisition may require additional pedagogical scaffolding to ensure long-term retention. Pronunciation gains were evident but somewhat smaller in magnitude, which may indicate the need for more targeted phonetic training within AR applications. Similarly, grammatical range and accuracy, while improved, showed the least pronounced changes, suggesting that AR-based language learning primarily facilitates communicative competence rather than explicit grammar acquisition. Future implementations of AR-enhanced instruction could benefit from integrating AI-powered grammar correction tools and pronunciation assessment features to provide more structured feedback on linguistic accuracy.

The findings of this study provide strong empirical support for the integration of AR technology in English language instruction, particularly for enhancing speaking

skills in professional and industry-specific contexts. The significant improvements observed in fluency, vocabulary, pronunciation, and grammatical accuracy underscore the pedagogical benefits of AR-related experiential learning. These results contribute to the growing body of literature advocating for technology-mediated language learning and highlight the potential of AR to bridge the gap between classroom-based instruction and real-world communicative demands. Future research could explore longitudinal effects of AR-supported learning, as well as investigate ways to optimize AR applications for more targeted linguistic skill development, ensuring that learners achieve both fluency and structural accuracy in spoken English.

4.5 Results for Research Question 3: Students' Perceptions of AR Technology in Language Learning

4.5.1 Explanation of Thematic Analysis Procedure

To address the third research question concerning students' perceptions of AR technology in language learning, a thematic analysis was conducted on the qualitative data obtained from semi-structured focus group interviews. This analysis followed Braun and Clarke's (2006) six-phase framework, which provides a systematic and flexible approach to identifying, analyzing, and reporting patterns (themes) within qualitative data. These six phases included: (1) data familiarization, (2) initial code generation, (3) theme searching, (4) theme reviewing, (5) theme defining and naming, and (6) report production. The recorded interviews were first transcribed verbatim and read multiple times to ensure deep immersion in the data. During the initial coding phase, meaningful phrases and expressions were identified and labeled using open coding techniques. Codes were derived both inductively from the data and deductively with reference to the theoretical framework underpinning the study, including the Technology Acceptance Model (TAM), Cognitive Load Theory, and sociocultural perspectives on second language learning. Next, the codes were collated into candidate themes by identifying recurring patterns and significant relationships between student experiences. These candidate themes were then reviewed, refined, and validated against the full data set to ensure internal homogeneity and external heterogeneity. Sub-themes were developed to capture more nuanced insights within broader thematic categories. Throughout this process, thematic development was supported by the use of qualitative data analysis software (e.g., NVivo), which facilitated code organization, data comparison, and visual mapping of thematic relationships. To enhance the trustworthiness of the findings, triangulation was employed through the integration of qualitative insights with quantitative survey results and speaking

performance data. Furthermore, credibility was strengthened by member checking with selected participants, who were asked to review and confirm the interpretation of their quotes and the emergent themes. This ensured that the themes genuinely reflected participants' perspectives. The final thematic structure consists of seven core themes and associated sub-themes, each illustrating a distinct aspect of students' experiences with AR-based learning. These themes serve to illuminate the cognitive, affective, and sociocultural dimensions of students' engagement with AR technology in an English for Tourism and Hospitality context.

The thematic analysis of the focus group interviews provides an in-depth exploration of students' perceptions regarding the integration of AR technology in their English for Tourism and Hospitality course. The findings highlight how AR-supported learning influences students' speaking skills, engagement, motivation, and confidence while also revealing key pedagogical advantages and challenges associated with its implementation. This analysis presents eight core themes that emerged from the qualitative data: (1) Initial uncertainty and gradual adaptation, (2) Engagement and motivation through interactivity, (3) Enhancement of speaking confidence, (4) AR's impact on communicative competence, (5) Collaboration and peer learning, (6) Practical application for real-world tourism scenarios, (7) Cognitive overload and technical limitations, and These themes provide an academically rigorous understanding of the affordances and limitations of AR in fostering oral communication skills in an ESP context.

4.5.2 Theme 1: Initial Uncertainty and Gradual Adaptation

4.5.2.1 Sub-theme 1.1: Technological Unfamiliarity and Cognitive Overload

A recurring theme in students' responses was their initial uncertainty and apprehension upon being introduced to AR technology in the classroom. Many participants reported feeling intimidated, confused, or skeptical during their first interactions with AR-based activities. One student explicitly stated,

> *"At first, I was unsure how AR would help me improve my speaking. It looked complicated, and I was worried I wouldn't be able to use it properly." (Student 1).*

This reaction was echoed by several others who admitted to experiencing technological unfamiliarity and cognitive overload when attempting to navigate AR interfaces for the first time.

4.5.2.2 Sub-theme 1.2: Confidence Through Repeated Exposure and Guidance

However, as students continued to engage with AR applications through structured practice and guided classroom activities, their initial skepticism diminished, and they developed a sense of familiarity and ease with the technology. Many participants described a positive shift in their perceptions, with one remarking,

> *"After a few sessions, I felt comfortable using AR. It became natural, and I started enjoying it." (Student 2)*

This progression from uncertainty to acceptance and enthusiasm highlights the importance of sufficient scaffolding and technical support when introducing AR into language learning contexts. It also suggests that while AR may initially present a learning curve, students are able to adapt quickly with guided instruction and repeated exposure.

4.5.3 Theme 2: Engagement and Motivation through Interactivity

4.5.3.1 Sub-theme 2.1: Gamified Learning and Curiosity-Driven Participation

Students overwhelmingly described AR as a highly engaging and motivating learning tool, particularly when compared to traditional classroom methods. Many participants highlighted the interactive and gamified nature of AR activities as a major factor that sustained their interest and increased their willingness to participate in speaking tasks. One student emphasized this shift in engagement, stating,

> *"I was always curious about what would happen next. It didn't feel like a lesson-it felt like an experience." (Student 4)*

The interactivity of AR was frequently cited as a key motivator that encouraged students to actively use English rather than passively absorb information. Unlike conventional speaking exercises that rely on scripted dialogues or rote memorization, AR tasks required students to interact dynamically with virtual objects, role-play scenarios, and solve communicative challenges in real-time. Several participants noted that this active involvement fostered a deeper connection to the learning material, with one stating,

> *"Instead of just reading from a book, I had to interact with the AR environment, which made the lesson feel real and exciting." (Student 3)*

Another student emphasized that AR increases their willingness to practice speaking, saying,

> *"I actually wanted to participate because I was curious about what was going to happen next. It wasn't just another worksheet exercise" (Student 5).*

4.5.3.2 Sub-theme 2.2: Reduction of Language Anxiety

In addition to enhancing engagement, AR appears to reduce the affective filter associated with foreign language anxiety. Some students highlight that the interactive and immersive nature of AR makes speaking practice feel less intimidating. One participant remarked,

> *"Normally, I get nervous when I have to speak in front of the class, but with AR, I felt more comfortable because I was focused on the scenario, not on what other people were thinking about my English" (Student 6).*

This aligns with research on affective factors in second language acquisition (SLA), suggesting that lowering anxiety levels in communicative practice can lead to improved fluency and confidence. These findings reinforce the argument that AR-based instruction has the potential to transform language learning from a passive activity into an experiential, learner-centered process.

4.5.4 Theme 3: Enhancement of Speaking Confidence

A significant finding was the positive impact of AR on students' speaking confidence. Many students reported that AR activities created a safe and low-pressure environment where they felt more comfortable speaking English. One participant explained,

> *"It felt like real-life training, but without the stress of being judged." (Student 5)*

Students described AR scenarios such as interacting with virtual hotel guests as helping them overcome hesitation and build fluency. These simulations were seen as authentic opportunities to use English for practical purposes. This sentiment was echoed by others who described AR as a less intimidating platform for speaking practice, allowing them to focus on communication rather than fear of making mistakes. One possible explanation for this increase in confidence is the simulated nature of AR-based communication, which reduces performance anxiety while still providing an authentic language practice environment. Several students noted that interacting with virtual customers, hotel guests, or tourists through AR scenarios made

speaking practice feel natural and purposeful, ultimately helping them overcome hesitation and build fluency.

4.5.5 Theme 4: AR's Effects on Communicative Competence

4.5.5.1 Sub-theme 4.1: Fluency and Lexical Resource Development

Beyond fostering confidence, AR technology significantly enhanced students' communicative competence, particularly in fluency, pronunciation, and lexical resource development. The requirement for spontaneous, real-time speech production encouraged students to think and speak more fluidly and naturally, reinforcing their ability to maintain conversations with minimal hesitation. One participant noted,

> *"With AR, I had to respond quickly, just like in a real conversation. I couldn't rely on memorized phrases anymore." (Student 11)*

4.5.5.2 Sub-theme 4.2: Pronunciation Improvement through Contextual Support

AR's visual and contextual support also facilitated vocabulary retention and pronunciation improvement. Several students emphasized that seeing virtual objects and locations while speaking helped them retrieve words more quickly and use them accurately. One student stated,

> *"When I described the AR models of tourist attractions, it was easier to recall the right words because I could see what I was talking about." (Student 7)*

This suggests that AR supports lexical acquisition by reinforcing semantic associations through multimodal learning.

4.5.6 Theme 5: Collaboration and Peer Learning

A notable social benefit of AR-based learning was its ability to enhance peer collaboration and cooperative learning. Many students reported that AR activities encouraged them to communicate with classmates, exchange feedback, and engage in joint problem-solving, thereby strengthening their interpersonal and teamwork skills. One student described this shift in classroom dynamics, stating,

> *"Instead of working alone, we had to collaborate to complete AR tasks. It made the learning experience feel more interactive and engaging." (Student 12)*

The emphasis on collaborative speaking tasks aligns with sociocultural perspectives on language learning, which stress the importance of social interaction in

developing linguistic competence. By integrating AR into pair work and group activities, educators can foster a more dialogic, communicative classroom environment, ultimately enhancing both linguistic and social competencies.

4.5.7 Theme 6: Practical Application for Real-world Tourism Scenarios

Students overwhelmingly praised AR's ability to bridge the gap between classroom learning and professional practice. Many described AR-based activities-such as hotel check-in simulations, guided tour role-plays, and customer service interactions-as highly relevant to their future careers. One participant stated,

"I felt like I was actually preparing for real-life work in tourism." (Student 8)

This underscores AR's potential as an industry-aligned instructional tool that provides students with authentic, experiential learning opportunities.

4.5.8 Theme 7: Cognitive Overload and Technical Limitations

4.5.8.1 Sub-theme 7.1: Sensory and Cognitive Strain

Despite its benefits, students expressed concerns about the cognitive demands of AR-based learning. The simultaneous processing of visual, auditory, and linguistic stimuli in real-time tasks occasionally led to sensory overload. One participant explained,

> *"With so much happening in the AR world, my brain was trying to do too many things at once - looking at the environment, listening to the apps, and thinking in English." (Student 9)*

This observation aligns with cognitive load theory, which suggests that excessive information processing can overwhelm working memory and impede fluency development. Students suggested implementing adjustable difficulty settings in AR applications to address this issue, enabling learners to control the pace and complexity of tasks.

4.5.8.2 Sub-theme 7.2: Device and Accessibility Issues

Technical limitations, including device affordability, usability, and comfort, were also highlighted. While students appreciated the immersive potential of AR apps, many noted that high costs could limit their widespread adoption in educational settings. Additionally, concerns about device heat, connectivity issues, and visual fatigue were raised, with one participant noting,

> *"Using AR apps for a long time might strain my eyes and make it hard to concentrate." (Student 4)*

These challenges underscore the importance of designing AR tools that balance immersion with practicality, ensuring accessibility and usability for diverse learning environments.

In conclusion, the results of this research study provide evidence of the potential of AR technology as a transformative tool for language learning in an English for Tourism and Hospitality context. By integrating both quantitative and qualitative analyses, this study offers valuable insights into the impacts of AR on students' speaking performance, their perceptions of the technology, and its pedagogical implications. The findings collectively reinforce the value of AR-enhanced instruction while identifying key areas for future research and pedagogical refinement. Quantitative data revealed significant improvements in students' speaking performance across all assessed dimensions, including fluency and coherence, lexical resource, pronunciation, and grammatical range and accuracy. Paired samples t-test results confirmed statistically significant differences between pre-test and post-test scores, with p-values well below the conventional threshold of significance. Cohen's d effect sizes demonstrated moderate to large impacts, particularly in fluency and coherence, underscoring the effectiveness of AR technology in developing natural, authentic communication. However, the relatively smaller improvements in pronunciation and grammatical accuracy suggest the need for more targeted AR-based interventions to address these aspects comprehensively. These findings affirm AR's potential to enhance linguistic competence, particularly in professional contexts where oral proficiency is critical. Descriptive statistics highlighted substantial mean score increases across all speaking components, with a reduction in variability for post-test scores, suggesting that AR-supported learning contributed to more consistent performance outcomes among participants. Qualitative data from focus group interviews provided a nuanced understanding of students' perceptions of AR technology. Thematic analysis identified several core themes, including initial uncertainty and gradual adaptation, heightened engagement and motivation, enhanced speaking confidence, and improved communicative competence. Students emphasized the immersive and interactive nature of AR, which transformed traditional speaking exercises into experiential learning opportunities. AR's alignment with real-world tourism scenarios further bridged the gap between classroom learning and professional practice, enabling students to apply language skills in industry-specific contexts. However, the qualitative findings also highlighted challenges associated with AR integration, such as cognitive overload and technical limitations. Students reported that the simultaneous processing demands of AR environments occasionally disrupted their fluency, and usability issues

related to device affordability, comfort, and reliability were identified as barriers to general adoption. This study demonstrates that AR technology has a profound impact on language learning, offering a multifaceted approach to enhancing speaking performance, engagement, and real-world applicability. While AR provides a dynamic and learner-centered platform for experiential education, the challenges identified highlight the need for careful pedagogical planning and technological innovation. These results not only contribute to the growing body of literature on AR in education but also provide actionable insights for educators, curriculum designers, and policymakers seeking to implement AR in language instruction.