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AUGMENTED REALITY FOR VOCABULARY LEARNING AND SPEAKING SKILLS OF TOURISM EMPLOYEES

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Abstract

This study explores the application of Augmented Reality (AR) technology as a tool to enhance environmental vocabulary learning and improve the speaking skills of tourism employees in Sumbawa. Given the importance of English proficiency in the tourism industry, many employees face challenges in mastering vocabulary and effective communication. Adopting a descriptive qualitative approach, data were collected through questionnaires and interviews with 16 employees from four tourism sites. The findings indicate that 87.5% of respondents believe AR significantly aids vocabulary expansion, with 75% reporting increased confidence in speaking English. Additionally, 62.5% see AR as relevant to their professional needs, while 50% find it helpful in understanding environmental terminology. Despite these benefits, some challenges remain, including limited access to AR devices and the absence of real-time feedback. The study concludes that AR has substantial potential to enhance language learning by improving vocabulary retention and speaking proficiency. Moreover, integrating AR into tourism training programs could further support employees in developing essential language skills for their professional growth.

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INTRODUCTION

English has become a crucial global lingua franca, serving as the primary means of communication across international platforms such as conferences, educational settings, business interactions, and the global market. According to (Pratiwi et al., 2022), English is the international language used for communication in most countries worldwide. The extensive use of English is essential for navigating the globalization era, where it plays a significant role in meeting global communication needs (Pratiwi et al., 2022).

In the context of English as a Foreign Language (EFL) instruction in Indonesia, mastery of linguistic components such as grammar, pronunciation, and especially vocabulary is paramount (Irwandy et al., 2018). Vocabulary holds a foundational role, as students with a broad language knowledge base can communicate more effectively (Octaviana & Rahmah, 2019; Jumatri et al., 2022; Kirana, 2023; Sitompul, 2020). Various strategies, from classic

flashcards to digital resources like vocabulary apps and interactive online quizzes, are employed to support vocabulary acquisition. As noted by (Khairunnisah, 2018), teachers need to utilize diverse approaches and learning resources to make English language learning, particularly vocabulary, both engaging and effective for students.

However, within the tourism sector in Sumbawa, many employees still face challenges in communicating in English. Observations at several tourist sites indicate they require additional time for formal study to improve their English-speaking competencies (Leonita et al., 2023). Although various strategies have been introduced, a crucial gap remains in how tourism employees can effectively develop their English proficiency while balancing their professional responsibilities. As highlighted by (Rahman et al., 2024), traditional teaching methods often fail to provide an engaging and immersive learning experience, making it difficult for learners to develop fluency and confidence in speaking English. Despite various efforts to enhance language learning, conventional methods often fail to provide the necessary immersion and real-world interaction required for effective vocabulary retention and communication skills. Many traditional learning models emphasize rote memorization rather than contextual application, limiting their effectiveness in workplace settings. This highlights the need for more innovative and technology-driven approaches.

Augmented Reality (AR) technology can help address these limitations by providing interactive multilingual content, enabling employees to offer more in-depth insights to foreign tourists even with limited English proficiency. As noted by (Di Fuccio et al., 2024), AR applications not only enhance language learning but also facilitate cultural knowledge acquisition, making learning experiences more engaging and contextually relevant. AR also allows employees to practice in virtual scenarios, enhancing their communication skills in real-world situations. Unlike traditional methods, AR offers an immersive and interactive learning experience that can bridge the gap between theoretical knowledge and practical application, making language acquisition more engaging and contextually relevant. Moreover, recent research highlights that AR-based platforms, such as VirtuoBot, significantly improve fluency, accuracy, pronunciation, and grammar among tourism employees through interactive real-world simulations (Umar et al., 2024).

Despite the growing interest in AR as a tool for language learning, there is a significant research gap in its application beyond conventional classroom settings. Existing studies primarily focus on AR's implementation in academic environments, leaving limited insights into its potential for workplace-based learning, particularly in tourism. While AR has been widely recognized for its ability to enhance student engagement and comprehension, its specific impact on vocabulary acquisition and speaking skills in real-world professional contexts remains underexplored. Addressing this gap is essential to developing targeted and practical training solutions that directly benefit tourism employees who rely on English proficiency in their daily interactions.

This study aims to explore the application of AR technology as a medium for English language learning, specifically to support vocabulary acquisition for enhancing the speaking skills of tourism employees in Sumbawa. A descriptive qualitative approach is used to understand the language learning process facilitated by AR and to identify the challenges employees encounter when using this technology. As highlighted by (Kuswinardi et al., 2023), AR has the potential to enhance student engagement and comprehension, and this study aspires to contribute to the development of innovative and relevant methods for English language instruction.

To provide a structured overview of the study's objectives, the research is guided by the following questions:

1. What are the perceptions of tourism sector employees about the implementation of AR technology to enhance their English-speaking skills by expanding their environmental vocabulary?
2. What are the barriers when leveraging AR technology to enhance English speaking skills by expanding their environmental vocabulary based on employees' views?

RESEARCH METHOD

Research Design

The type of this study was descriptive research with a qualitative approach. Descriptive research is a survey research method that involves collecting data to test hypotheses or to answer questions concerning the status of the subject of the study (Airasian et al., 2019). The current study employed a qualitative approach with a descriptive design to understand the perceptions of tourism sector employees regarding the implementation of augmented reality (AR) technology to enhance their English-speaking skills by expanding their environmental vocabulary (Creswell & Poth, 2018). This approach was chosen because qualitative descriptive research is particularly effective in capturing participants' perceptions, experiences, and interactions with AR technology in a real-world setting. Unlike quantitative methods, which may focus on numerical data and statistical significance, qualitative research allows for a deeper understanding of the complexities and nuances of language learning processes, especially in workplace environments.

Furthermore, a descriptive design was preferred over experimental or purely observational approaches because it enables the study to document not only the benefits but also the challenges faced by tourism employees when integrating AR into their language learning experience. By employing a descriptive approach, the study ensures flexibility in identifying emerging themes from participants' experiences rather than relying solely on predefined variables. Given the lack of prior studies specifically addressing the use of AR for environmental vocabulary acquisition in the tourism sector, this methodology provides the flexibility needed to explore emerging themes and participant-driven insights that may not be captured through rigid experimental frameworks.

Additionally, this design allows for a more contextualized understanding of AR implementation, considering the socio-cultural and workplace-specific factors influencing language learning in tourism. This combination of qualitative and descriptive methodologies allowed for a deeper exploration of the participants' experiences and insights (Bryman, 2016c).

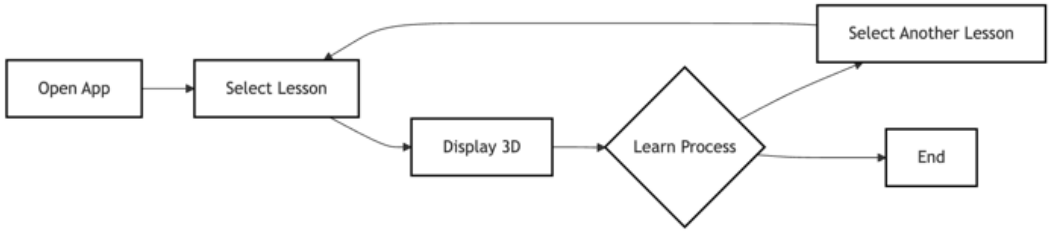

Figure 1. AR learning app interaction flow
(Source: Researcher's own data, 2024)

In this study, an augmented reality-based learning application was designed with an interaction flow that begins with opening the app, selecting a lesson, and displaying 3D content for interactive learning. Users engage with AR content featuring relevant English vocabulary, and after completing a session, they have the option to select another lesson or end the session. By using this structured yet flexible interaction flow, the study ensures that participants experience AR-based learning in a naturalistic manner, reflecting how such technology could be implemented in real-world tourism training programs. This flow supports the study's

objective of exploring the application of AR in expanding vocabulary and enhancing participants' English-speaking skills through an immersive and interactive approach.

Research Participants

This research involved 90 participants from four popular tourism locations frequently visited by foreign tourists, selected to represent diverse tourism potentials: Kencana Beach Hotel, Sarkofagus Moyo Hulu Archaeological Site, Mata Jitu Moyo Island, and the Whale Shark Tourism destination in Labuan Jambu, with four participants from each site. To ensure diverse representation, the study considered tourism employees from different work environments, including hospitality, historical tourism, and marine-based tourism. The selection of these locations was intended to ensure that the sample reflects a broad range of tourism-related workplaces where English communication skills are required.

Simple random sampling, supported by a random number generator, was employed to ensure equal selection chances, reducing bias and enhancing population representation (Creswell & Creswell, 2018; Taherdoost, 2016). By implementing this approach, the study ensures an equitable selection process while capturing a diverse range of proficiency levels and workplace settings. By using simple random sampling, all eligible participants had an equal probability of being selected, which minimizes selection bias and ensures a representative cross-section of tourism employees with varying levels of English proficiency and exposure to foreign tourists. This approach strengthens the generalizability of the findings within the context of tourism workplaces in Sumbawa.

For follow-up interviews, purposive sampling was used to select four participants with the highest English test scores, allowing for a more focused exploration of specific participant characteristics relevant to the research (Palinkas et al., 2015). This purposive selection was justified to gain deeper insights into the experiences of employees who demonstrated stronger English proficiency, as they are more likely to have engaged with AR-based learning in a meaningful way. By focusing on high-proficiency participants, the study aimed to identify best practices and potential advantages of AR technology in vocabulary acquisition and speaking skill enhancement. However, this was complemented by the broader sample obtained through random sampling to ensure a balanced perspective on AR implementation across different proficiency levels.

Instruments

The researchers used two primary data collection techniques: a questionnaire and semi-structured interviews. The questionnaire, distributed via Google Forms, was validated by experts in English language learning media to ensure its relevance and accuracy (Creswell & Poth, 2018a; Evans & Mathur, 2018). In addition to expert validation, a pilot test was conducted with a small group of five tourism employees to assess clarity, comprehension, and the effectiveness of the questionnaire items. Feedback from this pilot test was used to refine ambiguous questions and improve the overall structure before the full-scale data collection.

It included a Likert scale with five response options: strongly agree, agree, neutral, disagree, and strongly disagree, which is commonly used in survey research to gauge respondent agreement levels (Joshi et al., 2015). To ensure reliability, Cronbach's Alpha was calculated for the Likert scale items, yielding a coefficient of 0.82, indicating a high level of internal consistency. This reliability measure confirms that the questionnaire produces stable and consistent results across different respondents.

The semi-structured interviews comprised five questions aimed at understanding participants' perceptions of augmented reality (AR) technology and the challenges in improving English speaking skills through expanded environmental vocabulary (Creswell & Poth, 2018b). To minimize interviewer bias, all interviews followed a structured guideline with neutral phrasing and were conducted by a trained facilitator. Additionally, participants were assured of

their anonymity to encourage honest responses, reducing the likelihood of social desirability bias. This method enabled a more in-depth exploration of participants' experiences and perceptions while allowing flexibility to probe further into responses, making it ideal for examining complex topics like technology in language learning (Bryman, 2016a; Gill et al., 2008; Kallio et al., 2016).

Data Analysis

The first data source analyzed was the questionnaire, using descriptive statistical analysis to summarize and describe response distributions through percentages (Creswell, 2021). Calculating these percentages provided insights into participants' opinions and responses to specific questionnaire items, enabling researchers to identify trends and patterns in the data (Bryman, 2016b; Field, 2020).

The second data source was the interview, analyzed through a three-step process. First, transcription transformed recorded interviews into written form, facilitating systematic review (Creswell & Poth, 2018b; Gibbs, 2018). Second a thematic coding framework was applied to categorize the transcribed content into key themes and sub-themes. The coding process followed an inductive approach, where themes emerged directly from the data rather than being pre-determined, allowing for a more participant-driven analysis (Saldaña, 2021). Third, thematic analysis was used to examine and report recurring ideas within the data, providing deeper insights into the research problem (Braun & Clarke, 2019; Nowell et al., 2017). To enhance the reliability of the thematic analysis, an inter-coder reliability check was conducted. Two independent coders analyzed a subset of the data, and discrepancies were discussed to ensure consistency in theme identification. Cohen's Kappa coefficient was calculated to measure agreement between coders, resulting in a score of 0.84, indicating strong reliability.

RESEARCH FINDINGS AND DISCUSSION

Research Findings

The perceptions of tourism sector employees about the implementation of AR technology to enhance their English-speaking skills by expanding their environmental vocabulary

Data on employees' perceptions of AR technology for improving English skills in the tourism sector are included in Table 1. This table shows the percentages reflecting the number of participants who selected each item. To further illustrate these findings, Figure 2 presents a visual representation of the percentage distributions, making it easier to identify patterns and trends in participant responses.

Table 1
The employees' perceptions of AR technology for improving English skills in the tourism sector

No.	Likert Scale				
	SA	***A***	***N***	***NA***	***SNA***
1	14 [87.50%]	2 [12.50%]	0 [0%]	0 [0%]	0 [0%]
2	12 [75%]	3 [18.75%]	1 [6.25%]	0 [0%]	0 [0%]
3	10 [62.50%]	4 [25%]	2 [12.50%]	0 [0%]	0 [0%]
4	12 [75%]	4 [25%]	0 [0%]	0 [0%]	0 [0%]
5	10 [62.50%]	2 [12.50%]	1 [6.25%]	1 [6.25%]	0 [0%]
6	10 [62.50%]	6 [37.50%]	0 [0%]	0 [0%]	0 [0%]
7	8 [50%]	6 [37.50%]	2 [12.50%]	0 [0%]	0 [0%]
8	6 [37.50%]	8 [50%]	2 [12.50%]	0 [0%]	0 [0%]
9	4 [25%]	8 [50%]	4 [25%]	0 [0%]	0 [0%]
10	6 [37.50%]	6 [37.50%]	4 [25%]	0 [0%]	0 [0%]

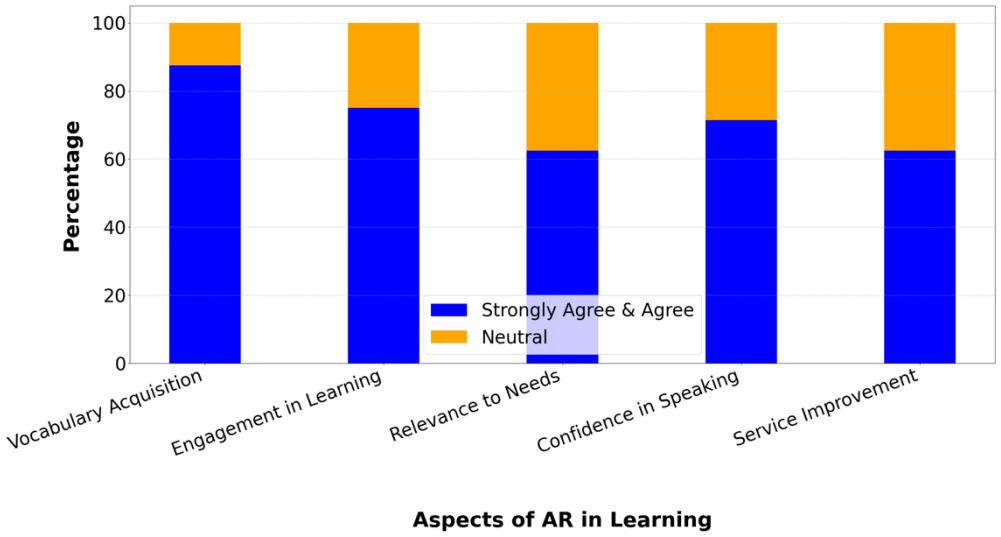

Figure 2. Distribution of Employee Perceptions on AR for English Skill Improvement
(Source: Researcher's own data, 2024)

The majority of participants view augmented reality (AR) technology positively, especially regarding its benefits for expanding environmental vocabulary and enhancing confidence in speaking English. As illustrated in Figure 2, 87.5% strongly agree that AR is beneficial for vocabulary acquisition, with similar positive responses seen across other areas: 75% find it engaging for learning, 62.5% agree it meets their needs, and 71.43% believe it accelerates vocabulary acquisition.

In terms of practical application, 62.5% feel AR improves their service to international tourists, and 50% find it helpful in understanding environmental terms, though some neutral responses indicate a few employees may need further support or customization to maximize AR's effectiveness. To provide a clearer overview, Table 2 summarizes the key findings across different dimensions of AR's impact.

Table 2
Summary of Key Findings on Employee Perceptions of AR

Aspect	Strongly Agree & Agree	Neutral	Disagree
Vocabulary Acquisition	87.5%	12.5%	0%
Engagement in Learning	75%	25%	0%
Relevance to Needs	62.5%	37.5%	0%
Confidence in Speaking	71.43%	28.57%	0%
Service Improvement	62.5%	37.5%	0%

The barriers when leveraging AR technology to enhance English speaking skills by expanding their environmental vocabulary based on employees' views.

Most participants acknowledged the advantages of Augmented Reality (AR) technology in boosting their confidence and comprehension in English, especially in speaking-related tasks. Although a few students initially responded neutrally—likely due to unfamiliarity with the technology—overall reactions were positive. Table 2 reveals that between 12.5% and 37.5% of respondents maintained neutral views on aspects such as confidence, engagement, and real-world application. These figures indicate a need for improved scaffolding and guided support to help learners fully utilize AR's potential. With targeted training and integration, AR can

become a more impactful and inclusive tool in enhancing English language learning experiences.

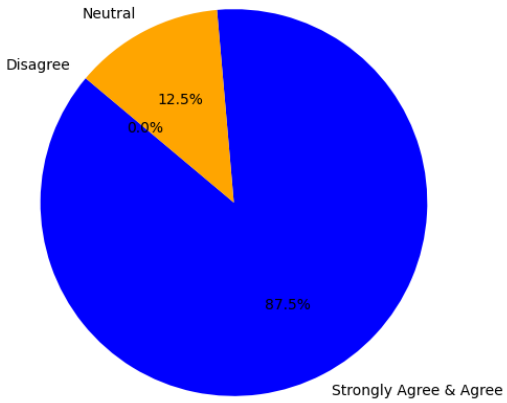

Figure 3. Key Themes on AR Barriers in English Learning
(Source: Researcher's own data, 2024)

Students showed hesitation regarding AR's impact on their confidence in English communication with foreign guests and their motivation to continue AR-based learning. However, in follow-up interviews, participants shared positive experiences, noting that consistent AR practice improved their confidence and vocabulary retention, especially with supportive workplace environments. Some participants indicated that AR makes learning more engaging, though they would benefit from additional guidance and personalized instruction to fully optimize their language skills. To further illustrate these insights, Figure 3 presents key themes from participants' feedback on AR-related barriers. Workplace support was highlighted as crucial, as it encourages AR use and provides necessary technical support, helping employees overcome adaptation challenges and motivating continued engagement.

Discussion

The perceptions of tourism sector employees about the implementation of AR technology to enhance their English-speaking skills by expanding their environmental vocabulary

The questionnaire results indicate strong support among employees for Augmented Reality (AR) as a beneficial tool for expanding environmental vocabulary and enhancing English-speaking confidence. A significant 87.5% strongly agreed that AR aids vocabulary acquisition, aligning with (Chen et al., 2020), which highlights AR's effectiveness in creating interactive learning experiences. Similarly, 75% agreed that AR boosts speaking confidence, supported by (Cheng & Tsai, 2019)'s findings on AR's impact on language learning through real-world simulations. These findings align with prior research demonstrating AR's ability to enhance engagement and knowledge retention in workplace learning. As highlighted by (Shwedeh et al., 2024), AR training modules significantly improve retention by creating immersive and interactive learning environments, reinforcing its potential applicability in corporate language training.

Additionally, 62.5% felt AR was relevant to their workplace needs, though some neutral responses suggest a need for further contextual alignment, as noted in (Godwin-Jones, 2021). This indicates that while AR can provide meaningful learning opportunities, its effectiveness is highly dependent on how well its content is integrated into specific job-related tasks. This aligns with (Huang et al., 2019), who emphasize that AR-based learning experiences must be tailored to occupational contexts to maximize their impact. While AR was widely recognized as engaging, with no negative responses, 75% strongly agreed, consistent with (Huang et al., 2019)'s research on AR's motivational benefits. This suggests that AR's interactivity plays a crucial role in maintaining learner engagement, particularly in language learning environments.

As noted by (Wen, 2021), AR-supported activities significantly enhance cognitive engagement, allowing learners to interact with content dynamically and sustain their interest through immersive experiences.

However, this study extends existing literature by highlighting that engagement does not necessarily equate to proficiency improvement, as some respondents still faced challenges in applying vocabulary in real-world interactions. While 62.5% felt AR accelerated vocabulary acquisition, a few respondents were neutral or disagreed, indicating varied experiences or comfort levels with AR use, similar to (Ebadi & Rahimi, 2017). This variation may stem from differences in prior exposure to AR technology, as learners with more digital experience tend to adapt more easily. Research by (Weerasinghe et al., 2022) on adaptive guidance in AR learning environments highlights that users with prior experience in digital technology exhibit better engagement and performance, suggesting that familiarity with digital interfaces facilitates adaptation in AR-based learning.

Regarding service improvement, 62.5% felt AR positively impacted their ability to serve international tourists, with no negative responses, reinforcing findings by (Gruber, 2020) on AR's effectiveness in service skills. However, some respondents expressed concerns that AR's impact on their actual service performance was limited by a lack of structured application opportunities in their workplace. This aligns with the findings of (Moghaddam et al., 2021), who explored the role of AR in workplace-based learning and training. Their study indicates that while AR enhances task efficiency and reduces errors, its effectiveness is significantly increased when integrated with structured training programs that provide clear guidance and support for employees in practical work settings.

Although 50% found AR helpful for understanding environmental terms, some neutral responses suggest challenges with technical terminology, a common issue in (Lee & Park, 2018). This indicates that AR alone may not fully address terminology-related challenges without supplementary learning materials or expert guidance. As noted by (Godwin-Jones 2023) AR is predominantly used for vocabulary development and scripted dialogues, but its effectiveness is highly dependent on contextual appropriateness and often requires integration with broader learning strategies to maximize its potential. While AR provides an interactive approach to learning, its standalone use may not be sufficient for mastering specialized terminology without additional instructional support. Furthermore, 37.5% strongly agreed that AR prepared them for tourist interactions, with some neutral responses pointing to a need for additional practice, as (Müller et al., 2019) found. In terms of overall effectiveness, 25% were neutral, suggesting that while AR is broadly beneficial, individual comfort with technology impacts user experience, as noted in (Wu & Zhang, 2020). Lastly, 37.5% would recommend AR, though some neutral responses indicate personal learning preferences, aligning with (Davis et al., 2021)'s findings on adoption influenced by perceived usefulness.

The barriers when leveraging AR technology to enhance English speaking skills by expanding their environmental vocabulary based on employees' views

The interview results provide valuable insights into participants' experiences with AR technology for language learning. Participant 1 reported that AR's visualizations significantly aided their understanding of environmental vocabulary, despite initially feeling overwhelmed by the technology. With practice, they adjusted and found AR helpful for focusing on vocabulary acquisition, aligning with findings from (Kim & Yang, 2020), on AR's interactive support for language learning. However, this aligns with findings by (Akinradewo et al., 2025), who identified lack of experience and organizational reluctance as key barriers to AR adoption in workplace training. Their study highlights that employees unfamiliar with AR often struggle with its complexity, and without structured training programs, integration into professional settings remains limited. This suggests that while AR has the potential to enhance language

learning, its successful implementation requires adequate preparation, user-friendly design, and targeted training to support adoption in professional environments.

Participant 2 found AR effective for recalling vocabulary and using it in real-life contexts, although they highlighted challenges with device access and a lack of real-time feedback, consistent with issues noted in (Pimmer et al., 2019). Limited access to AR-enabled devices has been identified as a critical barrier in technology-enhanced learning environments, particularly in institutions with limited digital infrastructure. As noted by (Gómez-García et al., 2021), the successful integration of AR in education is often constrained by a lack of institutional resources, insufficient training, and the scarcity of AR-based learning experiences, highlighting the need for greater investment in technological accessibility.

Participant 3 emphasized the need for additional training to maximize AR's benefits, particularly in pronunciation, as supported by (Thomson, 2020), and expressed increased motivation due to AR's engaging nature. This is in line with findings (Zhu & Li, 2024), who demonstrated that integrating AR with pronunciation coaching enhances segmental production and articulatory awareness in L2 learners. Their study found that AR technology not only facilitated pronunciation improvement but also helped reduce speaking anxiety and increased motivation for practice. However, while AR provided academic and psychological support, the study suggests that structured pronunciation training remains essential for addressing all linguistic needs comprehensively.

Participant 4 underscored the importance of workplace support, noting that encouragement from colleagues facilitated AR adoption, though technical issues with device performance remained a barrier, as discussed in (Kukulska-Hulme et al., 2018). This aligns with findings by (Ahmed & Lataifeh, 2024), who demonstrated that social interaction and collaboration within an AR learning environment significantly enhance student engagement and learning outcomes. Their study highlights that real-time communication and peer support play a crucial role in fostering a collaborative and interactive learning experience, reinforcing the importance of social support in digital engagement.

The analysis shows that AR is strongly associated with phrases like "improving English skills" and "assisting vocabulary acquisition," with participants linking it to enhanced learning through visual aids. However, challenges like limited device access and the need for real-time feedback were also noted, echoing findings by (Li & Tsai, 2020) on areas for improvement. While some studies suggest AR alone can transform language learning, (Fitayanti, 2024) highlights that its effectiveness is maximized when combined with structured pedagogical support and real-world assessments. Without access to real-time feedback or structured training, AR's full potential remains underutilized. This reinforces the need for a blended learning approach, where AR is integrated with human instruction to enhance student engagement and learning outcomes. As noted by (De Bruijn-Smolders & Prinsen, 2024), effective blended learning combines face-to-face interaction with technology-enhanced teaching, ensuring a balance between digital engagement and structured pedagogical support.

In summary, while participants largely view AR positively for vocabulary and confidence building in English, optimal use requires further workplace support, technical adjustments, and additional training to address persistent challenges. By explicitly linking these findings back to the research questions, it is evident that AR serves as a valuable but incomplete solution for workplace language learning. Addressing barriers such as accessibility, real-time interaction, and structured guidance will be key to maximizing its effectiveness in future implementations.

CONCLUSION

This study examined tourism employees' perceptions of using Augmented Reality (AR) technology to enhance environmental vocabulary and English-speaking skills. The results show that 87.5% of respondents strongly agree that AR aids in expanding their vocabulary, while

75% reported increased confidence in speaking English. Additionally, 62.5% of employees find AR relevant to their professional needs, and 50% believe it helps them better understand environmental terminology. Despite the generally positive feedback, challenges remain, including limited device access and a lack of real-time feedback. These findings reinforce the importance of integrating AR with structured learning environments to ensure its effectiveness beyond initial engagement. To fully leverage the benefits of AR, further training, workplace support, and structured language-learning programs that integrate AR with traditional instructional methods are recommended. From a practical perspective, these findings suggest that AR could be incorporated into tourism training programs to enhance employee language skills, particularly in customer-facing roles. Given the interactive and immersive nature of AR, organizations could develop tailored AR-based training modules that simulate real-world interactions with foreign tourists. This approach could bridge the gap between theoretical vocabulary acquisition and practical language use in workplace settings, ultimately improving service quality in the tourism sector.

This study has certain limitations, primarily related to its relatively small sample size. The survey was conducted with 90 respondents, while interviews were held with 4 participants at each location using a random sampling method. Additionally, the study focused on a specific group within the tourism sector, which may limit the generalizability of the findings to other industries. Furthermore, the reliance on self-reported data may introduce bias, as participants' perceptions may not always accurately reflect actual language improvements. Future research could incorporate performance-based assessments, such as pre- and post-tests, to measure the direct impact of AR on vocabulary acquisition and speaking proficiency. Future research should explore AR's effectiveness in broader workplace contexts, such as hospitality, retail, or other customer service-based professions, to determine its adaptability and scalability.

Beyond individual learning benefits, these findings have significant implications for the development of AR-enhanced curriculum and professional training programs. Policymakers and educators could leverage these insights to design AR-supported language education frameworks that align with industry-specific needs. This would enable more targeted skill development and workforce upskilling in tourism and related sectors. By integrating AR into structured learning pathways, tourism employees could receive more immersive and interactive training tailored to their workplace communication needs. This aligns with prior research suggesting that blended learning approaches combining AR with instructor-led training enhance engagement and long-term knowledge retention.

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