ETERNAL Volume 12 Number 2 (2025)
P-ISSN 2477-4766; E-ISSN 2580-5347
DOI:https://doi.org/10.24252/Eternal.V112.2025.A3

The Cutting-Edge of English Learning: Augmented Reality in Classroom Insights

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ARTICLE INFO

History:

Submitted: May 26, 2025

Revised: October 27, 2025

Accepted: June 6, 2025

Available online: June 6, 2025

How to Cite:

Izzah, N., Latifa, A., & Nur, R. (2025). The The Cutting-Edge of English Learning: Augmented Reality in Classroom Insights. ETERNAL (English, Teaching, Learning, and Research Journal), 11(02). https://doi.org/10.24252/Eternal.V112.2025.A3

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Published by:

English Education Department, Faculty of Tarbiyah and Teacher Training, UIN Alauddin Makassar

ABSTRACT

This study aims to recount the perceptions and experiences of students on integrating Augmented Reality (AR) in Learning English for Junior High School. This study is quantitative in nature by using 32 seventh grade students as treatment through AR-based learning tools. The dimensions are based on the 1-5 Likert scale-based questionnaire of ease of use, learning usefulness, technological features, and learning outcomes. Data was analyzed descriptively to describe the pattern of students' experiences and perceptions of AR technology. The results showed that AR had a positive impact on student motivation, engagement, and understanding. 77% of the students were found to be in the medium learning experience category, and 17% were found in the high category, showing that AR managed to produce significant learning experience. AR interactive functions allow students to learn better complex concepts visually and interactively; that said, AR applications in mastering complex information is still in the process of development. A limitation in the present study includes limited coverage of the population, with most studies having used quantitative approaches that did not give in-depth insight into students' experiences. Day, future studies should include a broader population as well as applying qualitative approach to get a holistic understanding. This study argues that AR is more than a technological development, it is a pedagogical strategy that can enhance the quality of English learning. The results can play a crucial role for educators, curriculum developers and policy decision makers for preparing learning strategies suitable for the needs of students in the digital age.

Keywords: Augmented reality, student experience, student perception, English language learning, technological innovation.

INTRODUCTION

English education has started to face a radical change, especially in Augmented Reality (AR) usage in the classroom, With the advances of technology (Hasbi & Yunus, 2021). AR

provides an interactive and immersive learning experience for students, enabling them to directly interact with the subject matter. AR has the potential to increase student motivation and engagement in the instructional process, with up to 70% more interest reported by students as students can see and experience concepts(Alptekin & Temmen, 2020). As a result, applying AR technology to English affairs is not only a breakthrough, but also an urgent necessity in promoting the effectiveness of teaching and learning in this exist digital age.

In the last five years, numerous papers have been published on the effects of AR in the context of English as a second language. Research by Akçayır and Akçayır (2017) found that 30% of students' vocabulary comprehension was higher with AR than traditional methods. However, even with numerous studies emphasizing the positive impact most educators remain wary regarding understanding the applicability of AR in the already established curriculum.Therefore, the goal of this research is to fill this gap by offering valuable findings about the implementation of AR into English language learning.

Although AR has a lot to offer, there are also certain hurdles that come up during learning. According to statistics from the International Society for Technology in Education (ISTE) 60% of teachers do not believe they have enough information to teach new technologies like AR (ISTE, 2021). This inability leads to a decreased effectiveness of learning and engagement of the students which can adversely affect learning outcome(Tanuja Nair et al., 2024). However, if these issues remain unaddressed, there is a potential of these promising technological advancements serving sub-optimally and hindering the advancement of English education in future(Tesolin, 2020).

However, this gap in the literature is that there is a lack of literature on AR integration with the students 'social and emotional context during English language learning. Previous studies, including that of Huang et al. (2020) provide a limited perspective on the use of AR as they are highly technical and do not consider other factors affecting student engagement. Such a gap leaves a need to fill as a holistic understanding of AR's effectiveness in education hasn't been reached. Zheng et al. (2021) also found that AR can increase students' learning material understanding process and can also help them learn new vocabulary. By adopting more interactive and engaging way of learning, the results are aligned with Kamaruzaman and Ahmad (2022), which indicate that AR can enhance the learning outcomes of a student by that way. On the other hand, Alfandi (2023) mentions that AR technology is an advantageous solution that leads to helping students comprehend complex English concepts using a clearer visual perspective. Moreover, Li & Ma (2024) demonstrated that the application of AR in English

learning was significantly able to enhance mechanical memory and develop learning acceleration. Together, these findings substantiate that AR is more than an innovative technology, but also a pedagogical method that can transform how students acquire English in a more effective and efficient manner.

What is novel about this research is the integration of AR technology within the students' social and emotional world. Understanding how these factors work together, this research could provide practitioners with actionable insights for how educators can improve student engagement with the use of AR. Therefore, the findings of this research are expected to greatly contribute to the advancement of more effective and engaging methods of teaching English.

This study will answer research questions on how AR can aid in English language acquisition and the effect of AR on students' motivation and engagement in the learning process. We hope that by addressing these questions this research can offer useful information to instructional designers and curriculum visionaries on how to exploit new technologies in improving teaching and learning processes.

This study aims to explore how the use of Augmented Reality (AR) in English language learning influences students' engagement and learning experiences, particularly when social and emotional factors are considered in the design of learning activities. Data are collected from different classes that implement AR as part of their teaching approach to gain an in-depth understanding of its impact on students.

RESEARCH METHOD

A quantitative approach was selected as it provides a means to measure and analyze data quantitatively, thus most likely offering a better overview of AR impact in an educational setting. The present study seeks to investigate the effectiveness of AR, used in class, on students' motivation and understanding of content. The adoption of a standardized instrument is significant towards the development of developing new and enhanced quality learning methods and may aid for technology-based pedagogy (Chang et al., 2020).

The participants in this study were 32 seventh-grade students from Wahdah Islamiyah IT Junior High School in the 2024/2025 academic year. Seventh-grade students were selected because they are in the early stages of learning a foreign language and tend to be more receptive to new and innovative learning methods. This study aims to gain deep insights into their experiences of using Augmented Reality (AR) as a learning tool (Johnson & Christensen, 2017).

Data on students' experience in using AR was collected using a questionnaire. This is a 26 question multi-dimensional questionnaire. To specificity, the questionnaire questions using

the Likert scale of 1-5, where 1 indicates that students disagree about their experience while 5 indicates that they agree. The questionnaire not only is a tool for data collection but also serves as a metric to measure the effectiveness of AR usage in the context of English language learning. Therefore, this instrument is anticipated to elicit complete and pertinent data for subsequent investigation (Dillman et al., 2014).

The data collection procedure was carried out through distributing questionnaires using Google Forms, which made it easy for students to fill out questionnaires online. After the students received the treatment of using AR in English learning, they were asked to fill out a questionnaire containing 26 questions. Each question was designed with a Likert scale, where students could give a rating from 1 (strongly disagree) to 5 (strongly agree).

This data collection process was conducted within one week to ensure all students had an equal opportunity to respond. With this approach, it is expected that the data obtained will be accurate, relevant, and representative of students' experiences in using AR in learning (Fowler, 2014). Data analysis in this study used descriptive statistical analysis techniques. Descriptive analysis is carried out to describe and communicate raw data in the form of percentage tables and statistical summaries accompanied by scientific comments / opinions from the author (Sudarmilah et al., 2020). From the processing of raw data, the percentage of each variable can be known, then proceed with categorization. The descriptive analysis used is quantitative descriptive analysis.

RESULTS AND DISCUSSION

Based on data regarding student experience obtained through distributing questionnaires to students of SMP IT Wahdah Islamiyah with a total of 32 validated data. Then this data can then be processed using descriptive statistical analysis through Microsoft Excel.

Table 1. *Descriptive Statistical analysis by Microsoft Excel*

No	Year	Category
1.	Mean	6,4
2.	Standard Error	0,2
3.	Median	6,4
4.	Mode	6
5.	Standard Deviation	1,2
6.	Sample Variance	2,1
7.	Kurtosis	0
8.	Skewness	-0,2
9.	Range	4,6
10.	Minimum	4,1
11.	Maximum	8,7
12.	Sum	205
	Count	32

Furthermore, it is categorized in the following table:

Table 2. *the Result and categories*

Category	Interval	Frequency	Percentage
Low	X <1,93	3	5%
Medium	1,93 ≤ X < 3,37	42	77%
High	3,37 ≤ X	9	17%

As mentioned in the descriptive data presented earlier, the learning outcomes of students after using AR indicate constructive and normally distributed outcomes with a mean and median of 6.4. Thus, since the mode = 6 this means, most of the students have their learning experience at this level. This signifies a variance in students' learning experience but within suitable reach, as represented via; A maximum value of8.7 and an amazing high-quality of 4.1 resulting in a variety of values (range) of 4.6. The small standard deviation of 1.2 suggests the data is normal, meaning students have a reasonable consistency in their learning experience (that's a good thing).

Most of the students (77%) were in the medium category in terms of their learning experience of students, a subcategory of students learning experience that was classified into three groups-low, medium, high. This means that utilization of AR in learning has given most of the students a relatively big experience. The highest category was 17% of students, which indicates that AR technology is a great learning opportunity for them. But there are 5% of students still in the low category, which still signals that some students cannot enjoy the maximal benefits from the AR technology. In summary, these data indicated that the implementation of AR has a positive impact on students' English learning experience, whereas still there remains a lot of potential towards an equitable experience across students.

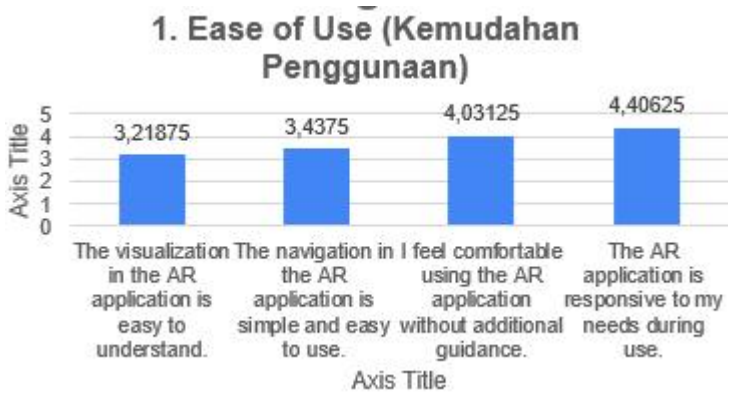


Figure 1. *The Ease of Use aspect*

According to the graph of the usage experience of the AR app, this app usage experience is good. The score for visualization part of the app which is simple to understand is pretty good but still needs to be improved, average score was 3.22. In addition, the indication of the app's

easy and user-friendly navigation got average score 3.44 only the orientation and use of features were perceived as easier-related aspects. Users were also comfortable using the app without extra instructions pendence in the app use. The app's re ving that the app was capable of meeti ered a fair amount of continuity even ation to increase the usability.

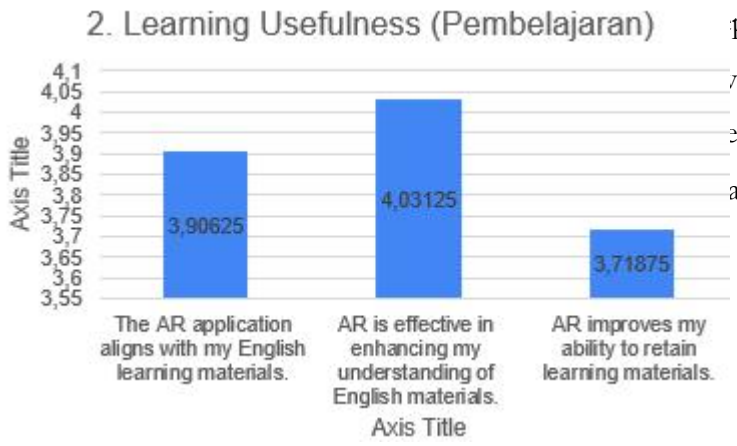


Figure 2. *the Learning Usefulness Aspect*

Learning Usefulness, because this app has made several contributions to students' learning based on the use of AR apps. As for the app suitability on English learning materials, the mean score of 3.91 shows that the majority of the students strongly agree that the app is suitable for their English learning materials. The aspect in which the app is most effective is improving the understanding of English materials, with the highest mean score of 4.03, indicating that the applications are very helpful for students to understand the material better. On the item asking whether the app helped them remember things they had learned, however, the mean score dropped to 3.72. Thus, although the app is a positive addition to one's grasp of the material, the extent to which app usage triggers retention, or the ability to remember the material needs some work. In general, the AR app offers improvements to facilitate the learning process, optimally in the aspect of better understanding of students, yet it requires enhancement in the aspect of student memory on the learned material.

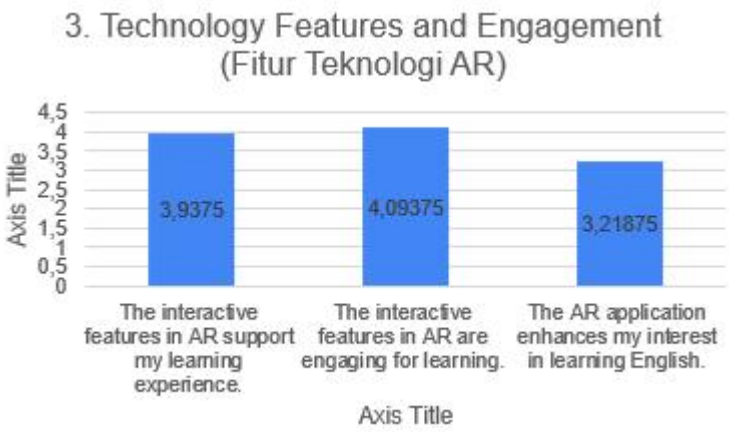


Figure 3. *Then Technology Features and Engagement*

It is understood from the "Technology Features and Engagement" diagram that demonstrating better AR technology features in the learning process based on AR technology will also have a positive impact on students' learning experience. On the supportive role of interactive features to the learning experience, the average score of 3.94 means that most students think that this feature contributes well to the supportive aspect of their learning process. The findings on the attractiveness of the interactive features for learning got the highest average score of 4.09, indicating the features can develop a challenging and fun learning process for students. Nonetheless, the average score reduced to 3.22 according to the students' interest to learn English through AR apps. This means that while the interactive features do contribute to higher involvement in students, their effect on the native will of students to learn English still needs improvement. The overall benefits that these AR technology features provide in the context of creating an engaging learning environment is evident, although they need some further optimization to elevate students' overall interest in learning.

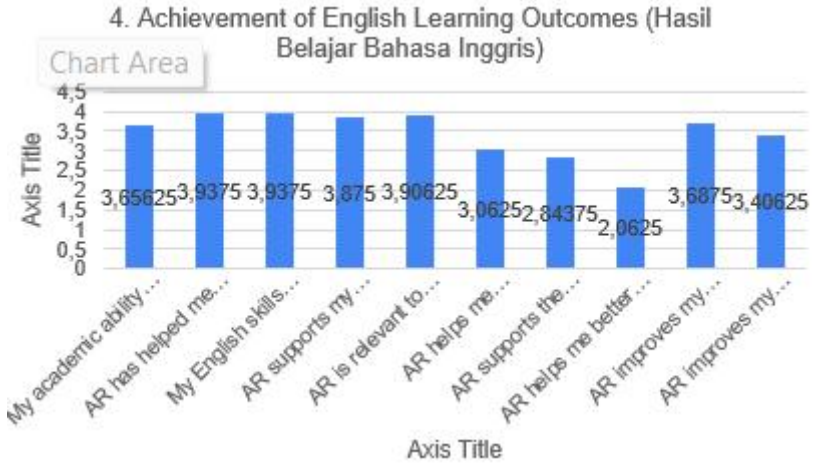


Figure 4. *Achievement of English Learning Outcomes aspect*

The positive impact of the application is obtained, as evidenced by the graph of Achievement of English Learning Outcomes after the use of the AR application, which indicates the average increase in each aspect, with the research results being significant in some respects rather than others. In terms of improving general academic ability, the average score is 3.66 which indicates a good contribution. AR's support for students' English proficiency had a mean score of 3.94, indicating very positive contributions to improving English skills. The item on

relevance of app content to students' learning needs scored 3.91, which verifies that the app's content was appropriate to their needs. However, in terms of AR's facilitation in specific comprehension, the scores dropped from 3.06 to 2.06, suggesting difficulties in the app's ability to assist students in their understanding of higher-level content. However, the app once again demonstrated a positive effect on overall learning ability (3.69 vs. 3.40). Overall, it was determined that the AR app was relevant and useful in promoting the learning of the English language in the context of the constraints applied, while still needing considerable work to be more effective in teaching more in-depth or complex materials.

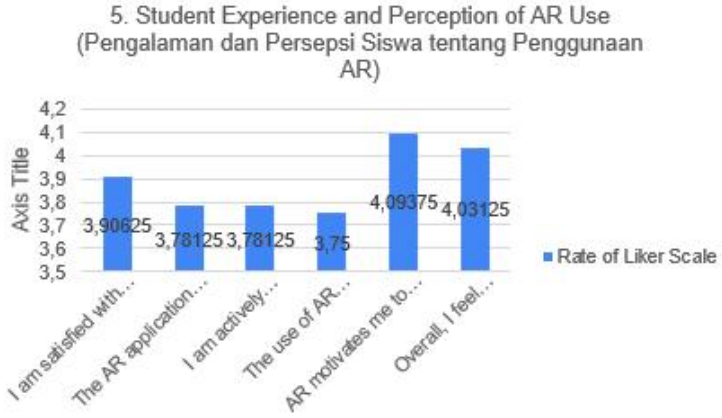


Figure 5. *Student Experience and perception of AR Use*

One observation from the graph "Student Experience and Perception of AR Use" is that students generally have positive experiences and perceptions of their experience with AR applications. The average score for student satisfaction with the AR application was 3.91, which means most students were satisfied with the application performance. In terms of student engagement in the use of AR, a lower score of 3.78 was obtained indicating that the level of active participation is still good enough, yet it can be enhanced even further. The application of AR as a learning motivation tool was shown to increase perception with a score of 4.09, which is strong enough to indicate that this application works very well in increasing student interest and motivation. Meanwhile, the average perception in terms of 'Using AR experience' was 4.03, signifying that most students believed the app provided a valuable and effective learning experience. In essence, the AR app was able to build conducive experience overall and had potential of heightening student motivation, yet possibly a greater impact could have been observed out on the active facet with the edge of optimization.

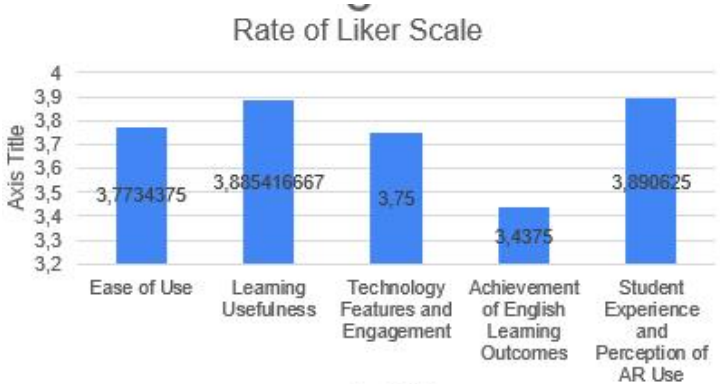


Figure 6. *Result of all aspects*

In the graph in question that illustrates the overall aspects following the use of the AR application, the positive influence of this application on the use of English can be deduced. The perception and experience of students' use of AR has the highest score, an average of 3.89, which means that students are satisfied and have good experience while using the application. At 3.77 and 3.88 respectively, the scores for ease of use and learning benefits were also high, indicating that the app has an intuitive interface and is relevant to learning needs. The only exception on this regard was on the technology and engagement features aspect with a lower score of 3.75, but still with a fairly good acceptance of the interactive features. The app's support in the learning process is high, but the improvement of learning outcomes still can be optimized, as the item showed the lowest score of 3.44. In general, the AR app was rated as effective in providing a positive learning experience, but further development on certain aspects of the app would enhance the overall learning impact.

Discussion

By demonstrating the effective use of Augmented Reality (AR) technology in English language learning, this research contributes towards creating impactful learning experiences that facilitate improved learning outcomes for students, using interaction and visualization to promote active learning, engagement, motivation, and better understanding of English language learning material. While generally, students are positive and satisfied with their experience of using AR, what proved to have potential for help is mentioned as (learning portions of complex materials) that need to refocus necessary further studies. The greatest issue is the lack of teachers with the know-how of making the best out of this technology, thus training, both technical and pedagogical, is therefore necessary to ensure the effective integration of AR education (Ah Nur, 2021).

Moreover, there is a need to support students in fully exploring AR features, especially in overcoming learning barriers like anxiety and low confidence. AR cannot replace the need for inspiring and skilled teachers but combined with the careful and thought-out learning design

involving collaboration and consideration of students social and emotional needs, it could change the social norms of English learning (Nikou et al., 2024)

Insights into students' experiences and perceptions regarding Augmented Reality (AR) technology use in English language learning are vital for teachers, students, and other stakeholders (Chang et al., 2020). This finding highlights the importance of sufficient technology mastery for teachers for AR to be incorporated in the learning experience for students. Training in the implementation of Augmented Reality features is required if we want to maximize its utility, and this training should include its technical and pedagogical aspects. Teachers Should Use AR in the Classroom Teachers must also create learning strategies that address the social and emotional needs of students such as using AR to provide more consistent student engagement via a project-based task or collaborative actions. Therefore, AR is not just a learning tool, but also a medium to make significant and in-depth learning experiences for students (Voigt, n.d.)

For education policy makers and other educational actors, these findings help ground the justification for promoting the production of policies to support and integrate technology into the educational processes. Building sufficient technological infrastructure, offering regular training for teachers, and developing new curricula that are going to integrate improvements like that of AR is one of the strategic steps that need to be taken as well (Tesolin, 2020). Moreover, ensuring equitable access to this technology, for students in areas or regions with limited facilities, should be our top priority. Or, to the point, AR will only work when there — in addition to technical support — are policies to support it that are built on sustainability and equity. AR will be an innovation that can improve the quality of English learning, and the impact can be long term in improving students' competencies in the digital era, with the synergy of teachers, students, and education actors (Perdana et al., 2021).

The results of this significant study have a theoretical effect on the English language teaching and learning on its own field of science, especially in the field of Augmented Reality (AR) technology (Johri, n.d.) It in particular underlines a technology-based approach to teaching and the need for combination of visual elements, interaction and the emotional involvement of students in the learning process. AR in education, in general, has provided a new theoretical ground considering how technology can act as a tool to promote active learning, increase motivation and challenge dynamic interpretation of language structures and turn it to teachable concepts among students in schools. Moreover, the results confirm the value of student engagement theory which emphasizes the role of cognitive, emotional and social components to

reach the most beneficial outcomes in the learning process. This study, therefore, contributed towards the theoretical frameworks understanding on digital learning era (Feyza & Seyda, 2023).

At the junior high school level, the theoretical impact of this research contributes to the development of English learning methods that are more relevant to the needs of early learners in learning a foreign language(Lee et al., 2022). With an approach that focuses on students' interaction with learning materials through AR technology, this research broadens the horizons of how technology can be used to improve information retention, enrich learning experiences, and support the development of students' communication skills. In general, the findings provide a foundation for the development of theories that support personalized learning, where AR technology can be tailored to the individual needs of students to support better learning outcomes. In addition, this research opens opportunities for further exploration of the integration of AR in the junior high school English education curriculum, which can serve as a reference for the development of technology-based education policies in the future (Kamal et al., 2021).

CONCLUSION

Overall, students' experiences and perceptions of AR in the learning of English were positive. Students reported boosted motivation, engagement and understanding of concepts and students generally liked the AR. AR provides an enhanced and easier to understand experience that traditional puzzles do not provide. Moreover, students reported that AR enabled a more dynamic and immersive learning experience, yet the effectiveness of AR in inducing learning to be more complex content remained in need of further development. AR allows to evoke student interest and engagement, making it a valuable addition to the development of English learning at the junior high school level, which in turn greatly improves the quality of learning.

There are several limitations to this study that warrant discussion. First, the study was only a small population, seventh grade students from one school, so the findings are not generalizable beyond the specific context. Moreover, this study employed more quantifying methodologies because the data were collected through questionnaires and did not qualitatively examine students' experiences in depth by interviews or field observation. This constraint might limit a more nuanced perspective of how AR impacts learning, and particularly from the learners' standpoint.

To address the study limitations, future studies can be carried out by including a broader population and including schools from diverse regions with various backgrounds.

Moreover, qualitative methods such as interviews or case studies can add depth and nuance to our understanding of students' experience. Consequently, future research which combines quantitative and qualitative data can present a well-rounded picture on the effect of AR in general on English language learning, from both the academic, social, and emotional perspectives.

This suggests that future studies should place more emphasis on the combination of AR with collaborative learning and personalized learning. According to a review, much more needs to be researched on how AR can serve students with different learning styles and those who require unique learning aids, such as students with learning disabilities. Moreover, future studies can explore the effect of AR on enhancing certain language skills, such as speaking and writing, and assess the long-lasting effects of AR usage on students' success in learning (Akçayır, 2017). Hopefully with a more comprehensive and original way, upcoming studies will contribute even further to the expansion of educational technology as well as the quality of learning of the English language.

ACKNOWLEDGMENTS

This research was successfully completed with invaluable guidance, support, and encouragement from various individuals and institutions.

The researchers would like to express their deepest gratitude to Dr. Ammang Latifa, M.Pd. and Dr. Rafi'ah Nur, M.Pd., as the supervisors, for their continuous guidance, insightful feedback, and patience throughout every stage of this study. Their expertise and constructive suggestions have been essential in refining both the academic and practical aspects of this research.

The authors also extend sincere appreciation to Universitas Muhammadiyah Parepare, for providing the academic environment, resources, and institutional support that made this research possible. Special thanks are also given to the English Education Department, whose encouragement and facilities were crucial in implementing the study.

Gratitude is further conveyed to the students and teachers of SMP IT Wahdah Islamiyah Makassar, who enthusiastically participated in the study and contributed valuable insights to the data collection process.

Finally, heartfelt thanks to all family members, colleagues, and friends who have been a constant source of motivation and prayers during the entire research journey.

May this work serve as a meaningful contribution to the development of English learning innovation through the integration of Augmented Reality (AR) in the digital era.

ETHICAL STATEMENT

This study was conducted in accordance with the ethical principles for research involving human participants and complied with the institutional research guidelines of Universitas Muhammadiyah Parepare as well as internationally recognized ethical standards, including the principles of the Declaration of Helsinki. Prior to data collection, all participants and the school administration were informed about the objectives, procedures, voluntary nature of participation, confidentiality of the collected data, and the intended use of the research findings. Since the participants were junior high school students, permission was obtained from the school authorities, and informed consent was secured in accordance with institutional and school regulations before participants completed the questionnaires.

Participants' identities were kept anonymous throughout the study, and all collected data were treated confidentially and used solely for academic and research purposes. No personally identifiable or sensitive information was collected. Participants were informed that their participation was voluntary and that they could withdraw from the study at any stage without any academic or personal consequences.

The authors declare that this research was conducted with honesty, transparency, and academic integrity. The study received ethical clearance in accordance with the institutional research procedures of Universitas Muhammadiyah Parepare prior to the commencement of data collection.

CRediT AUTHORSHIP CONTRIBUTION STATEMENT

First Author: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Visualization, Writing – Original Draft, Correspondence.

Second Author: Supervision, Validation, Methodology, Writing – Review & Editing, Data Interpretation.

Third Author: Supervision, Project Administration, Resources, Methodological Review, Writing – Review & Editing.

All authors have read and approved the final version of the manuscript. All authors contributed substantially to the interpretation of findings, discussion of results, and refinement of the final manuscript.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this article. The authors have no known competing financial interests, institutional affiliations, or

personal relationships that could have influenced the design, implementation, analysis, interpretation, or reporting of this study. The findings and conclusions presented in this article are based solely on the empirical evidence collected during the research.

DATA AVAILABILITY

The data supporting the findings of this study are available from the corresponding author upon reasonable request. To protect the privacy of the student participants and maintain confidentiality, the complete raw datasets are not publicly available. Anonymized datasets, research instruments, including the questionnaire, coding procedures, and supplementary materials related to the analysis, may be provided for academic and non-commercial research purposes upon reasonable request to the corresponding author, subject to institutional ethical considerations.

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