CHAPTER 1

INTRODUCTION

This chapter discusses several important components that are the basis and direction of the research consisting of statement background, problem and research questions, research objectives, significance of the study, and scope and limitations of the Study.

A. Background

The implementation of Augmented Reality (AR) as a medium for learning English at the junior high school level (SMP) has demonstrated significant potential in enhancing student engagement in the learning process (Alzahrani, 2020). AR provides a more interactive and immersive learning experience compared to conventional methods, allowing students to access information through three-dimensional visualizations and direct interaction with digital content (Chang et al., 2020a). At SMP IT Wahdah Islamiyah Makassar, this technology has been employed as part of innovative efforts to optimize English language learning, which has often been perceived as challenging by most students. The use of AR not only assists in improving the understanding of English language concepts but also enriches the learning experience by creating a more dynamic and engaging learning environment (Rohman et al., 2024). Through interactive scenarios, students can practice English, which greatly facilitates hands-on learning and significantly improves their language skills (Rozi et al., 2021).

Furthermore, the importance of research on the application of AR as a medium for English language learning cannot be understated, particularly in the context of developing professional human resources equipped to face global challenges (Majid & Salam, 2021). AR technology not only offers an innovative

approach to learning but also cultivates 21st-century skills such as critical thinking, creativity, and problem-solving, all of which are highly relevant in today's digital era (Karacan & Akoğlu, 2021). Therefore, this study is vital for exploring the long-term impact of AR in the educational sphere, particularly in shaping a workforce that is both competent and proficient in English. Thus, this research will contribute not only to theories of language learning but also to the enhancement of educational practices that are more adaptive and responsive to modern technological advancements (Dilmen & Atalay, 2021).

The application of Augmented Reality (AR) in English language learning at the junior high school level has begun to capture the attention of educators, particularly in schools with a strong orientation toward educational innovation (Majid & Salam, 2021). AR provides a distinctive learning experience, as students can interact with virtual objects within real-world contexts, thereby enhancing their engagement and motivation in learning English (Shaumiwaty et al., 2022). At SMP IT Wahdah Islamiyah Makassar, AR has been integrated into several English language subjects to facilitate student understanding of vocabulary, grammar, and interactive dialogues (Nazeer et al., 2024). This approach offers students the opportunity to directly engage with content that was previously accessible only in textual form, thereby fostering a more comprehensive understanding of English language concepts (Rosyidah & Anugerahwati, 2024).

According to data from the Ministry of Education and Culture, the use of technology in learning, such as AR, can improve student learning outcomes by 25% compared to traditional teaching methods (Razali et al., n.d.). Additional research also indicates that students utilizing AR as a learning aid exhibit a 30-40% increase in engagement (Yantiah, n.d.). These findings align with research conducted in several schools in Makassar, where students learning with AR have shown

significant improvements in their English proficiency, particularly in understanding and using new vocabulary (Obaid et al., 2024). Specifically, at SMP IT Wahdah Islamiyah Makassar, the application of AR has been piloted in several classes with promising results, although further evaluation is required to determine its long-term effects (Datu et al., n.d.).

However, despite the implementation of AR technology, challenges persist in certain classes. Based on observations at SMP IT Wahdah Islamiyah Makassar, the average English learning scores of students remain below the established mastery standard, which is set at 80. The average student's scores range between 70 to 75, indicating a gap in learning achievement (Che Dalim et al., 2020). One factor contributing to the students' lower performance is the lack of effective interaction with the technology or an inadequate alignment of its application within the classroom (Sarkar et al., 2020). This suggests that although AR holds potential to enhance learning outcomes, suboptimal implementation may hinder the achievement of educational objectives, necessitating a more structured and adaptive approach to address this issue (Fransson et al., 2020).

The application of Augmented Reality (AR) as a medium for English language learning at SMP IT Wahdah Islamiyah Makassar is ideally expected to have a significant impact on students' learning achievements. AR technology is anticipated to increase student motivation to learn English, due to its interactive and visual nature, which aids students in grasping abstract materials more effectively (Che Dalim et al., 2020). Within this context, the use of AR should serve as a tool to facilitate active student engagement, enrich the learning experience, and promote improved learning outcomes (Shaumiwaty et al., 2022). However, field observations indicate that the implementation of AR has not fully met these expectations (Syarifuddin, n.d.). At SMP IT Wahdah Islamiyah, although students'

express interest in the use of AR, their learning outcomes still fall below the required mastery standard, with average scores ranging between 70 and 75, while the minimum threshold is set at 80. Additionally, students' perceptions of AR usage tend to vary; some students find it helpful, whereas others report difficulties in adapting to this technology within the context of language learning (Datu et al., n.d.).

While previous studies have extensively examined the role of Augmented Reality (AR) in English language learning, most have been conducted in technology-friendly environments with fewer restrictions on digital device usage. This study, however, focuses on the implementation of AR in an Islamic junior high school that enforces strict limitations on mobile device usage in classrooms. This unique context provides a novel perspective on how AR can be adapted and effectively utilized even in settings where technology access is limited. Additionally, while prior research primarily evaluates AR's impact through quantitative learning outcomes, this study integrates a qualitative approach to explore students' perceptions and experiences, offering a more comprehensive understanding of AR's effectiveness beyond test scores.

The challenges associated with the implementation of Augmented Reality (AR) as a medium for learning English at SMP IT Wahdah Islamiyah Makassar may have significant consequences if not promptly addressed. Firstly, the use of AR, which is intended to enhance students' English learning outcomes, has yet to yield optimal results. Should this issue persist, the gap between expectations and on-ground reality will likely widen, potentially leading to decreased student motivation and failure to meet the desired achievement standards. Secondly, the varied student perceptions of AR usage present a critical issue. Some students experience confusion and difficulty adapting to this technology, which diminishes their

engagement in learning. If this situation is not swiftly resolved, students' confidence in the effectiveness of technology in language learning could decrease, impeding further innovation in the integration of educational technology.

To address these challenges, there is a need for novelty in research that can provide more effective solutions. One approach could be the development of an AR-based learning model that is more adaptive to students' needs and easier to use (Boa Sorte & Kim, 2023). Additionally, it is crucial to advance research that not only focuses on the technical aspects of AR but also delves into how this technology can be optimized to enhance more specific English language skills, such as speaking, listening, and grammar comprehension (Zhou, 2023a). This novel concept also involves gaining a deeper understanding of students' perceptions of the technology, as well as how their experiences with AR can be better integrated into learning strategies to improve future learning outcomes.

The uniqueness of the novelty concept in this research lies in its innovative approach, which not only emphasizes the technical aspects of Augmented Reality (AR) but also explores the impact of this technology on more specific English language skills, such as speaking, listening, and grammar comprehension. According to Dörnyei (2009), innovation in language learning greatly depends on how technology can facilitate real-world interaction and stimulate students' intrinsic motivation. This new approach is further supported by Hwang et al. (2021), who stress that the proper integration of technology in learning can provide a more engaging learning environment and enhance student involvement (Marrahi-Gomez & Belda-Medina, 2024). Furthermore, this research contributes new insights into how students' perceptions of AR can be harnessed to design learning strategies that are more adaptive and responsive to their needs. Therefore, the novelty of this research not only broadens the understanding of AR implementation in education

but also offers concrete solutions to language skill issues that have been overlooked in previous studies.

The scope of this study will specifically be limited to the implementation of Augmented Reality (AR) technology as a medium for learning English at the junior high school level, with a particular focus on SMP IT Wahdah Islamiyah Makassar. This research aims to investigate students' experiences in using AR for learning English, paying close attention to how this technology affects specific skills such as vocabulary enhancement, speaking ability, and grammar comprehension (Rohman et al., 2024b). Additionally, the study will explore students' perceptions of AR as a learning tool, including the challenges and potential benefits they encounter throughout the learning process. Therefore, the scope of this research encompasses various aspects of learning outcomes derived from the use of AR in English language education (Wedyan et al., 2022). The title of the research is "The Exploration of Junior High School Students' Experiences with Augmented Reality (AR) for English Learning: A Case Study at SMP IT Wahdah Islamiyah Makassar."

Moreover, this research will focus on addressing the issues that arise in the implementation of AR as a medium for learning English in the school. Considering the existing gap between the expectations and the reality of using this technology, the research will identify the factors that hinder the effectiveness of AR and seek solutions that can be implemented to improve students' learning experiences (Chen et al., 2021). The aim of this study is to contribute to optimizing the use of AR technology to better suit students' needs while also providing practical guidance for teachers to effectively utilize this technology. Consequently, this study is expected to offer innovative solutions to the challenges encountered in English language learning through AR at SMP IT Wahdah Islamiyah Makassar (Che Dalim et al., 2020).

B. Problem Statement & Research Questions

The issues arising from the application of Augmented Reality (AR) as a medium for learning English at SMP IT Wahdah Islamiyah Makassar highlight the need for further investigation. Although AR technology has considerable potential to increase student engagement and motivation, the outcomes observed in practice have not met expectations (J. Lee, 2022). While some students show great interest in using AR, others face difficulties adapting to this technology (Wedyan et al., 2022). These challenges affect their learning achievements, which remain below the established standard of mastery, indicating the need for an in-depth investigation into the factors affecting the effectiveness of AR in English language learning (Marrahi-Gomez & Belda-Medina, 2024). Furthermore, this research is critical to understanding how students integrate their learning experiences with technology and their perceptions of the benefits of AR in enhancing language skills.

To address these issues, the research questions posed in this study are as follows:

1. How does the use of Augmented Reality (AR) affect English learning outcomes among students at SMP IT Wahdah Islamiyah Makassar?

2. What are the experiences and perceptions of SMP IT Wahdah Islamiyah Makassar students regarding the use of Augmented Reality (AR) in English language learning?

C. Research Objectives

The primary objective of this study is to explore how the use of Augmented Reality (AR) affects English language learning outcomes among junior high school students at SMP IT Wahdah Islamiyah Makassar. This research aims to assess the extent to which AR technology can improve students' learning outcomes, particularly in English language skills such as vocabulary comprehension, speaking

ability, and grammar (Zhou, 2023). By understanding the direct impact of AR usage in the context of language learning, this study is expected to provide valid empirical data on the effectiveness of AR as an innovative learning medium that can enhance students' academic performance in English (Majid & Salam, 2021).

Furthermore, this study aims to explore the experiences and perceptions of students at SMP IT Wahdah Islamiyah Makassar regarding the use of AR in English language learning. It will delve into how students perceive the impact of AR technology on their learning process, whether it helps to improve their motivation and engagement, as well as the challenges they may encounter when using AR (Wedyan et al., 2022). Therefore, this study will provide a more comprehensive view of students' acceptance of this technology and how their learning experiences can be optimized through the integration of AR in English language education (Belda-Medina & Marrahi-Gomez, 2023).

D. Significance of Study

Theoretical Significance: This study offers a significant contribution to the development of English language learning theory, particularly in the context of integrating Augmented Reality (AR) technology. By exploring junior high school students' experiences in using AR, this research aims to enhance the understanding of how immersive technologies like AR can effectively support language learning. It is expected to provide new insights into how technology can be utilized to address challenges in language learning, such as lack of motivation, low engagement, and difficulties in understanding abstract concepts (Majid & Salam, 2021). In this way, the study enriches the literature related to the use of technology in language education and strengthens theories surrounding technology-based learning (Ebadi & Ashrafabadi, 2022). Additionally, from a theoretical perspective, this study seeks to expand the conceptualization of language skills—such as speaking, listening, and

grammar comprehension—within the context of AR-supported learning (J. Lee, 2022). The findings of this study are expected to deepen the understanding of how students' interactions with interactive and visual digital content can enrich their learning experiences and how AR can be more broadly integrated into language learning theories.

Practical Significance: This research provides direct benefits for teachers and educational institutions, particularly at SMP IT Wahdah Islamiyah Makassar. Teachers can utilize the findings of this study to optimize the use of AR in their classrooms, focusing on instructional strategies that can enhance student motivation and learning outcomes (Wedyan et al., 2022). The research also provides guidance for teachers on how to overcome challenges in implementing this technology, enabling AR to be used more effectively in English language learning. Consequently, the study offers practical solutions for more innovative and effective English language teaching through AR technology (Marrahi-Gomez & Belda-Medina, 2024).

E. Scope and Limitations of the Study

This research falls under the discipline of applied linguistics, with a primary focus on English language teaching. As part of applied linguistics, this study emphasizes the practical aspects of language use within the context of education, particularly how Augmented Reality (AR) technology can contribute to English language learning for junior high school students. Within this discipline, the study highlights the application of language theories in the learning process and how new technologies, such as AR, can serve as tools that support students' success in mastering language skills (Majid & Salam, 2021).

This research focuses on the application of Augmented Reality (AR) in English learning at SMP IT Wahdah Islamiyah Makassar, using the ARLOOPA

application as the main media. The study aims to explore students' experiences in utilizing AR to improve vocabulary, grammar, and speaking skills in a more interactive learning environment. With a quasi-experimental approach, this study measures the impact of the use of ARLOOPA on student motivation and learning outcomes through pre-test and post-test methods. The scope of this study is limited to the use of ARLOOPA without comparing it with other AR applications, as well as only involving students in those schools, so the results of this study may not be generalized to the broader educational context, this study is also limited to the implementation of Augmented Reality (AR) in teaching the topic of *Likes and Dislikes* in English language learning. This topic was selected as encompasses multiple linguistic components, including vocabulary development, grammar structures (such as the use of gerunds and infinitives), reading comprehension, and speaking skills.

However, this study has some limitations that need to be noted. First, because it only uses ARLOOPA, the effectiveness of this app is not compared to other AR technologies that may offer different features. Second, this study only focuses on student experience, so it does not explore the teacher's perspective in the integration of AR in learning. Third, this study was conducted in a limited period, so it has not been able to measure the long-term impact on learning retention.

CHAPTER II

LITERATURE REVIEW AND PREVIOUS STUDIES

In this chapter, an in-depth discussion presented on the literature review and the theoretical framework underlying the research. The chapter is organized into four main sections that form the foundation for understanding the key components of this study. It comprises: the theoretical framework, followed by a presentation of findings from previous studies related to this research, and subsequently, the theoretical framework and research hypotheses are discussed.

A. Theoretical Framework

1. English Language Learning Technology in the Merdeka Curriculum in Junior High Schools

The technology for English language learning plays a pivotal role in supporting the implementation of the Merdeka Curriculum at SMP IT Wahdah Islamiyah Makassar. This curriculum emphasizes student-centered learning, which provides teachers with the flexibility to choose teaching methods and media that are relevant and contextual (Mursid et al., 2023). Technology serves as an effective tool for achieving these objectives, as it provides a more interactive and engaging learning environment that comprehensively supports English language acquisition (Satria & Arief, n.d.). For instance, the use of online applications and platforms such as Learning Management Systems (LMS), language learning software, and augmented reality (AR) offers a richer learning experience and encourages both independent and collaborative learning among students (Elisa Ayu Ningsih et al., 2024). These tools provide a more immersive experience that helps students grasp complex language concepts (Judijanto et al., 2024). Additionally, these platforms support more personalized learning, aligning with the flexibility required in the Merdeka Curriculum (Mandalina Nasution et al., 2023).

Additionally, the integration of technology into English language learning under the Merdeka Curriculum at SMP IT Wahdah Islamiyah Makassar fosters the development of students' digital literacy competencies. Students not only learn various aspects of the English language, such as vocabulary, grammar, and speaking skills, but also become familiar with various digital platforms that support continuous learning (Iffa Kharimah et al., 2023). Technology enables students to access learning materials flexibly, interact with content through simulations or educational games, and engage in adaptive exercises suited to their level of ability and learning needs (Razali et al., n.d.). This aligns with the vision of the Merdeka Curriculum, which aims for student-centered learning that provides opportunities for differentiated instruction based on the interests and needs of each student (Wayan & Anggayana, 2024).

Moreover, the use of English language learning technology within the Merdeka Curriculum context provides teachers at SMP IT Wahdah Islamiyah Makassar the opportunity to become innovative facilitators of learning who are responsive to the advancements of the era. By leveraging technology, teachers can design lessons that not only focus on cognitive aspects but also develop 21st-century skills, such as critical thinking, collaboration, creativity, and digital literacy (Razali et al., n.d.). Furthermore, technology enables teachers to conduct real-time assessments, allowing for quick and targeted feedback, which supports more effective and efficient learning (Asrianti & Rosadi, 2024). Hence, technology plays a strategic role in optimizing the implementation of the Merdeka Curriculum at SMP IT Wahdah Islamiyah Makassar, creating English language learning experiences that are relevant, contextual, and in line with the needs of students in the digital age (Anwar et al., n.d.)

2. Background of Technology Use in English Language Learning

The background of technology use in English language learning stems from the need to create a more effective, interactive, and relevant learning process in line with contemporary developments. Advances in information and communication technology have brought significant changes to various aspects of life, including education (Nur HAFIFAH & Harry SULISTYO, n.d.). Technology allows English learning to extend beyond the confines of the classroom and conventional teaching materials, making it accessible through a variety of digital platforms, such as language learning applications, interactive software, and educational websites (Deerajviset, 2022). This provides opportunities for learners to access English language materials more flexibly and in diverse formats, catering to their individual learning styles and needs.

Furthermore, technology enriches the English language learning environment by offering features that support language skills, including listening, speaking, reading, and writing. The use of audio-visual applications, game-based learning programs (gamification), and software based on augmented reality (AR) and virtual reality (VR) can facilitate a more immersive and enjoyable learning experience (Ordóñez Procel et al., 2024). Additionally, technology enables more responsive and adaptive learning, allowing students to learn at their own pace and according to their individual capabilities (Aisa, n.d.). This application of technology also fosters more intensive collaboration and interaction between teachers and students, as well as among students, thereby creating a more dynamic language learning ecosystem (Punar Özçelik et al., 2022).

Equally important, the use of technology in English language learning aligns with efforts to enhance 21st-century skills, such as digital literacy, critical thinking, creativity, and communication. Technology opens opportunities for teachers to

develop innovative and contextual teaching methods while providing faster and more specific feedback on students' learning progress (Bereczki & Kárpáti, 2021). On the other hand, students can leverage technology to independently and continuously develop their language skills (Feyza & Seyda, 2023). Therefore, integrating technology into English language learning not only supports the achievement of language learning goals but also prepares students to face increasingly complex global challenges that require strong cross-disciplinary competencies (Johannesen & Øgrim, 2020).

3. What is Augmented Reality?

Augmented Reality (AR) is a technology that combines the real world with digital elements, creating an interactive experience that integrates virtual objects into the user's physical environment. This technology operates by displaying digital information or objects through devices such as smartphones, tablets, or AR glasses, projecting images, sounds, and other digital effects directly into the real world (Zhan et al., 2020). Unlike Virtual Reality (VR), which completely replaces the user's environment with a digital world, AR enhances and complements the user's perception of the real world by adding layers of relevant visual, audio, or interactive data (Feyza & Seyda, 2023).

In the context of education, AR has significant potential to support the learning process. This technology can be used to make learning materials more engaging and interactive, thereby increasing student motivation and involvement (X. Huang et al., 2021). AR allows the visualization of abstract concepts to become more concrete, making it easier for students to understand the material being taught. For example, in English language learning, AR can be used to display 3D images or interactive videos that enrich vocabulary or contextual language use, assist students in understanding cultural nuances, and reinforce speaking skills through

conversation simulations (Razali et al., n.d.).Thus, AR offers opportunities for more holistic learning, where students can actively participate and develop their language skills in a more enjoyable and meaningful way (Palamar et al., n.d.).

Furthermore, the use of AR in learning can be tailored to meet individual student needs, supporting differentiated and adaptive learning. Since AR technology allows direct access to a variety of information sources and interactive experiences, students can learn independently and at their own pace and learning style. This makes AR a flexible and effective tool for supporting personalized learning (Hashim et al., 2022). In addition, AR fosters the development of 21st-century skills, such as digital literacy, collaboration, and creativity, which are essential in an increasingly connected and technology-based world (Sinyagovskaya, n.d.). Therefore, the application of AR in educational contexts, particularly in English language learning, can create rich, dynamic, and relevant learning experiences that cater to the needs of modern learners.

In the realm of Augmented Reality (AR)-based learning, there are various types and applications of AR that can be utilized to support the teaching and learning process. Some commonly used types of AR in the educational context include marker-based AR, location-based AR, and projection-based AR. Marker-based AR employs specific visual cues or images scanned by a device to generate digital content (Zuo et al., 2023). Meanwhile, location-based AR leverages GPS data to display information relevant to the user's location (Muršić et al., 2021). Projection-based AR allows digital objects to be projected onto real surfaces, providing a more interactive and immersive experience (Tanuja Nair et al., 2024).

In this research, the AR applications utilized Is ARLOOPA. ARLOOPA is an AR platform that enables users to create and interact with various 3D objects and animations, which can be applied within the context of English language learning.

Through this application, students can visualize words or phrases in animated forms, aiding their comprehension of new vocabulary (Karacan & Akoğlu, 2021). This method is effective in language learning as it helps students creatively associate vocabulary with visual contexts (Perdana et al., 2021). Vocabulary Builder AR, as the name suggests, is an application specifically designed to enrich students' vocabulary through interactive images and animations, significantly enhancing vocabulary comprehension and retention (Carreon & Smith, 2022).

In addition to the three aforementioned applications, there are several other AR applications frequently used in language education, such as HP Reveal, Blippar, and Metaverse Studio. Each of these applications offers unique features that can be tailored to specific learning objectives, including educational games, 3D object visualizations, and collaborative activities. By leveraging these types of AR, the learning process becomes more effective, engaging, and supports the holistic development of English language competencies (Punar Özçelik et al., 2022). The combination of various AR applications provides teachers with the flexibility to design diverse and contextual learning experiences, aligned with students' needs and curriculum goals (Tesolin, 2020).

4. The importance of Augmented Reality (AR) in Modern Education Era

The importance of Augmented Reality (AR) in modern education lies in its ability to create more dynamic, interactive, and immersive learning environments (Xu, 2023). AR technology provides learning experiences that go beyond traditional text or static images by integrating visual, auditory, and animated elements projected directly into the real world (Perdana et al., 2021). This gives students the opportunity to engage in contextual and visual learning, which enhances their understanding of concepts in a more comprehensive manner (Wedyan et al., 2022b). For example, in English language learning, students can

both see and hear the pronunciation of words in relevant contexts, enriching their learning process and facilitating quicker and more effective material retention (Chang et al., 2020)

Furthermore, the implementation of Augmented Reality (AR) in education facilitates personalized learning, which is a key component of modern education (Mukhopadhyay Scholar et al., n.d.). Each student has different learning styles and needs, and AR technology allows for the customization of learning materials according to their pace and interests (Sabbah et al., 2023). With AR, students can directly interact with learning content and receive instant feedback, which enhances their motivation and fosters independence in learning (Janardhana et al., n.d.). Moreover, AR encourages student engagement in active learning through hands-on activities and simulations, helping them develop critical thinking, problem-solving, and collaboration skills (Cubukcu & Üniversitesi, n.d.). Consequently, AR technology supports the transformation toward more student-centered teaching methods, promoting deeper learning engagement (Prof. (Dr.) Jubraj Khamari, Dr. Pranay Pandey & Dr. Harish Kumar Yadav, 2020).

In the context of modern education, which is increasingly driven by technological advancements, AR emerges as a highly relevant and effective tool to prepare students for future challenges. The application of AR in learning can bridge the gap between theory and practice, facilitate learning that is more relevant to real-world situations, and equip students with essential digital skills for the globalized era (Ковальчук et al., 2022). Moreover, AR enables teachers to develop more creative and innovative teaching strategies, as well as to provide various alternatives for more interactive learning assessments (Al-Ansi et al., 2023). Therefore, the significance of AR technology in modern education is not only as a teaching aid but also as a catalyst for creating learning experiences that are more

meaningful, efficient, and aligned with the needs of an ever-evolving world (González-salamanca et al., 2020)

5.   The Role of AR in Enhancing English Language Skills

The role of Augmented Reality (AR) in enhancing English language skills is highly significant, as this technology provides a contextual, visual, and interactive approach to learning. AR offers learning experiences that closely mirror real-world situations, thereby helping students understand and use English more authentically (Chen et al., 2021). Through the visualization of 3D objects, animations, and simulated communication scenarios, AR facilitates the integrated learning of various language skills, including listening, speaking, reading, and writing. For instance, AR applications can be used to present conversations involving virtual characters, allowing students to practice speaking within specific contexts, such as shopping, discussing topics, or introducing themselves, which enhances their fluency and confidence in using English (Yudintseva, 2023).

Additionally, AR contributes to improving vocabulary acquisition and cultural understanding of the English language more effectively. The use of images and animations in AR allows students to associate new words with realistic visual objects, making it easier for them to comprehend and remember vocabulary in its proper context of use (Ebadi & Ashrafabadi, 2022). Moreover, by providing cultural simulations through virtual situations that reflect the daily lives of native speakers, students can grasp language nuances, idiomatic expressions, and appropriate communication etiquette in line with the culture of English speakers (Wedyan et al., 2022). Therefore, AR not only teaches the technical aspects of the language but also enhances students' cultural awareness and pragmatic skills for effective communication (Khoshnevisan, n.d.).

AR technology makes English language learning more engaging and enjoyable, thereby enhancing students' motivation and interest in learning. Through an interactive learning approach, students can actively participate in language learning activities, such as playing educational games, solving puzzles, or engaging in simulated conversations. This approach encourages full student involvement in the learning process, which, in turn, accelerates the development of their language skills (Johannesen & Øgrim, 2020). Moreover, the immediate and adaptive feedback provided by AR applications offers students the opportunity to correct directly and continuously improve their language abilities (Ginting et al., 2024). In other words, AR has great potential to create a more effective, enjoyable, and student-centered English learning environment, helping students to become more proficient in actively and communicatively using the English language (Ordóñez Procel et al., 2024).

6. AR-Based Learning Experiences at the Junior High School Level

AR-based learning experiences at the junior high school level have shown positive impacts on increasing student interest and skills (Muršić et al., 2021). At this stage of cognitive development, junior high school students need a creative and interactive learning approach, where AR plays a crucial role in meeting these needs (Aravantinos et al., 2024). Students can learn English through engaging visual and kinesthetic experiences, such as observing 3D objects, interacting with digital content, or participating in specially designed virtual adventures (Mónica Anjo Câmara Olim, n.d.). This learning approach makes students more enthusiastic and actively engaged in the learning process, transforming them from passive recipients of information into active participants in their own learning.

In addition to providing engaging learning experiences, AR-based learning also helps junior high school students develop English language skills holistically.

For example, using AR in English language learning enables students to practice pronouncing new vocabulary by listening to the correct pronunciation from virtual characters or visualizing the words they are learning (Xu, 2023b). Furthermore, students can use AR to participate in conversation scenarios tailored to real-life situations, which helps them understand how to apply vocabulary, phrases, and sentence structures in meaningful contexts (Burudi et al., 2024). The involvement of students in real-world, context-based activities strengthens their understanding of language concepts and enhances their overall communication abilities (X. Huang et al., 2021).

Moreover, AR-based learning experiences encourage independent and collaborative learning skills among junior high school students. Students can use AR applications independently to explore additional learning materials outside of the classroom, enabling continuous and flexible learning (Hassan, 2023). AR also facilitates collaboration among students through group activities that require interaction with digital content, such as educational games or group task simulations (Rojabi et al., 2023). Consequently, AR-based learning not only enhances students' English language skills but also builds other essential skills such as teamwork, creativity, and problem-solving (Ahmed Chikurteva & Karastoyanov Sofia, 2023). These learning experiences prepare junior high school students to face the challenges of 21st-century learning, which demands strong communication and collaboration skills in an increasingly digital and global environment.

7. Previous Case Studies on the Use of AR in Language Learning

Numerous previous case studies have highlighted the effectiveness of Augmented Reality (AR) in language learning, particularly in enhancing motivation, understanding of material, and language skills (Karacan & Akoğlu, 2021a). One relevant study found that students learning English with the aid of AR

applications were more enthusiastic and actively involved in the learning process compared to those using conventional methods (Wu et al., 2017). The study revealed that the use of AR, which presents 3D visual objects, sounds, and interactive animations, helps students to better comprehend and retain new vocabulary (X. Huang et al., 2021b). AR also provides students with opportunities to practice language skills in situations closely resembling real-world contexts, ultimately improving their speaking skills significantly (Chang et al., 2020c).

Another case study explored the use of AR in the context of learning English grammar and sentence structure. The findings indicated that students who used AR applications to learn grammar demonstrated a better understanding of abstract concepts, such as tenses or prepositions, because they were able to see visual examples and direct illustrations that reinforced the grammatical rules being taught. For instance, when learning prepositions of place (in, on, at), students could observe animations showing the actual positioning of objects, making it easier for them to understand the differences in prepositional use across various contexts (Nijat et al., n.d.). The study also noted that AR provides an adaptive learning experience, where students can interact with materials at their own pace and according to their needs (Burudi et al., 2024).

Beyond English language learning, case studies on the use of AR in other foreign language education contexts have also shown positive outcomes. For example, research on learning Spanish with the help of AR found that students found it easier to learn pronunciation and contextual word use through AR-based conversation simulations and educational games (Domaz, n.d.). Students engaged in interactive activities, such as speaking with virtual characters or completing language challenges through games, which strengthened their listening and speaking skills (J. Lee, 2022). Overall, these past case studies confirm that AR is

not just an appealing learning tool but also has a positive impact on language skills, learning motivation, and student engagement in effective and contextual language learning (Karacan & Akoğlu, 2021a).

8.   Perceptions of the Use of AR in Language Learning

Perceptions of the use of Augmented Reality (AR) in language learning refer to the views, attitudes, and subjective experiences of students and teachers regarding the effectiveness, benefits, and challenges of applying this technology in the context of language education (Benita et al., 2021a). Generally, students' perceptions of AR in language learning tend to be positive, mainly because this technology creates a more engaging, interactive, and real-world-like learning environment (Chen et al., 2021). Students often feel more motivated to learn and find it easier to understand language materials when AR is used, as the visualization and direct interaction with digital content help explain concepts that were previously difficult to grasp in an abstract manner (Y. Huang et al., 2020).

On the other hand, teachers' perceptions also play a crucial role in the implementation of AR in language learning. Teachers with positive perceptions of this technology tend to be more enthusiastic about integrating AR into their teaching methods and more creative in designing innovative and contextual learning materials. They view AR as a tool that can support more differentiated and responsive learning tailored to students' needs (Rahimi & Tafazoli, 2022). Additionally, teachers see AR to enhance students' digital literacy skills and equip them with 21st-century skills necessary to compete in a globalized era (Valtonen et al., 2021). However, teachers may hold negative perceptions if they feel less skilled or lack adequate access to technology, making training and technical support vital for improving acceptance of AR (Huertas-Abril, 2021).

Nevertheless, perceptions regarding the challenges of using AR in language learning vary among both students and teachers. Some students might feel burdened using technological devices or find it difficult to navigate complex AR applications (Perifanou et al., 2023). Meanwhile, some teachers might struggle with designing effective learning activities using AR or fully integrating the technology into the curriculum (Belda-Medina & Calvo-Ferrer, 2022). These perceptions indicate that while AR has substantial potential to enhance language learning, its successful use greatly depends on how the technology is understood, accessed, and optimally utilized by all parties involved in the learning process. Therefore, efforts to overcome barriers and foster positive perceptions of AR will have a significant impact on its successful implementation in language education.

B. Previous Studies

The following five articles are relevant with applying Augmented Reality (AR) in English language learning, with a focus on the technical aspects of AR and its impact on learning:

1. Jose Belda-Medina and Victor Marrahi-Gomez (2023) – This article explores the impact of AR on vocabulary acquisition and student motivation. The results indicate that while AR increases interest and motivation, there is no significant difference in vocabulary achievement between students using AR and traditional methods.

2. Leong et al. (2023) – This study evaluates the use of AR filters to enhance speaking fluency in English language learning. Findings show that AR increases students' confidence in speaking; however, further research is needed to assess its long-term effects.

3. Belda-Medina and Marrahi-Gomez (2023) – This study discusses how AR influences students' motivation in language learning, though it finds no

significant differences in grammar learning outcomes. This suggests a need for further research in this area.

4. Wong and Looi (2022) – This research focusses on context-based vocabulary learning using AR. The findings show that AR helps students learn vocabulary better when it is relevant to their environment, improving the transfer of knowledge to real-world situations.

5. Fan et al. (2020) – This article reviews the use of AR in language learning at various educational levels. While AR enhances student engagement, the study points out limitations in exploring how AR can be used to improve specific language skills such as grammar and speaking abilities.

    The research titled "The Exploration of Junior High School Students' Experiences with Augmented Reality (AR) for English Learning, shares similarities with previous studies in its focus on the use of AR technology in English language learning, particularly in enhancing student motivation and vocabulary mastery. Like the studies by Belda-Medina (2023) and Leong et al. (2023), the research at SMP IT Wahdah Islamiyah also highlights how AR can boost student engagement in the learning process. However, the difference lies in the scope and aspects of language skills being studied.

    Most previous studies on AR in language learning focus on its effectiveness in vocabulary acquisition, grammar comprehension, and pronunciation training, with limited emphasis on students' subjective experiences and engagement levels. Furthermore, research on AR has predominantly taken place in educational institutions that already embrace technology as a core part of instruction. This study diverges from the existing literature by analyzing AR integration in an Islamic school setting with stricter policies on mobile technology use. The findings from this study provide practical

insights into how AR can be leveraged as a scaffolding tool, not only for improving learning outcomes but also for increasing students' confidence and motivation in language acquisition.

C. Conceptual Framework

The integration of technology in language learning has revolutionized educational methodologies, providing innovative approaches to enhance student engagement and comprehension. Among these advancements, Augmented Reality (AR) has emerged as a powerful tool that bridges the gap between digital and physical learning environments. By incorporating interactive, game-based elements and multimodal content, AR facilitates immersive learning experiences that align with cognitive and motivational theories. Within the framework of this study, the conceptual model is structured around three key components: input, process, and output.

1. Input: The Role of Augmented Reality (AR) in Enhancing English Language Skills

Augmented Reality (AR) plays a vital role in enhancing students' English language skills by providing an interactive and contextual learning experience. AR technology enables students to participate in learning activities that blend real-world elements with digital objects, making the learning process more engaging and meaningful (Greener, 2022).

The Theory of Gamification and Motivation posits that incorporating game elements into non-game environments, such as education, can enhance student engagement and motivation (Ahmed Chikurteva & Karastoyanov Sofia, 2023). One relevant motivational theory is Deci & Ryan's Self-Determination Theory, which emphasizes that engaging learning experiences can stimulate intrinsic motivation (Voigt, n.d.). This aligns with the use of Augmented Reality (AR)

technology, which often integrates game-like elements such as quests, challenges, or rewards (Al-Ansi et al., 2023). These features have the potential to motivate students and enhance their participation in English language learning through interactive and enjoyable experiences (Alptekin & Temmen, 2020).

Another supporting theory is Paivio's Dual Coding Theory, which asserts that information is easier to comprehend and retain when presented in both visual and verbal forms (Zhou, 2023b). The use of AR, which combines 3D images, animations, text, and sound, aids students in better understanding and memorizing English vocabulary and structures (AISSA Rayene & Tayeb MAA Biskra Chairperson Benzida Yasmina MAB Biskra Examiner Rezig Betka Nadia MCB Biskra Supervisor, n.d.). Through these multimodal presentations, AR can facilitate a deeper and more lasting comprehension of language concepts (Hassan, 2023)

By leveraging these theories, educators can utilize AR technology to create more dynamic and motivating learning environments, particularly in the context of English language acquisition. The integration of gamification elements and dual coding strategies within AR can lead to improved student engagement and learning outcomes. In the context of the experimental class, the input is focused on the application of AR tools that are tailored to the content of English language learning. AR enables students to actively learn by exploring vocabulary, sentence structure, and communicative situations through 3D visualizations, conversation simulations, and other interactive activities (Che Dalim et al., 2020). This learning concept aims to optimize the student learning process by providing opportunities for them to directly interact with English language content, allowing them not only to receive information passively but also to engage in student-centered learning

(Zuo et al., 2023) Within this framework, AR serves as an innovative learning medium that facilitates in-depth and holistic English language comprehension (X. Huang et al., 2021).

2. Process: Steps in Learning English Using Augmented Reality (AR)

The process of learning English with AR involves several structured steps. The first step is the selection of relevant learning materials and AR applications that align with the English topics to be studied. Teachers must ensure that the application supports learning that focuses on language skills such as listening, speaking, reading, and writing (Chang et al., 2020). Subsequently, students are given access to use AR devices, such as smartphones or tablets, to scan images or marker codes that have been prepared. Through these devices, students can interact with digital objects, animations, or learning scenarios that correspond to the English materials (K. Lee, 2021).

The second step involves conducting learning activities that utilize AR features to support language comprehension. During these activities, students can work individually or in groups to complete AR-based tasks, such as playing educational games, practicing conversations with virtual characters, or exploring interactive stories presented in 3D format (Zuo et al., 2023). The teacher acts as a facilitator, providing direction, support, and feedback throughout the activities (Karacan & Akoğlu, 2021). At the end of the learning process, students reflect on their experiences using AR and discuss their understanding of the materials they have learned, thereby reinforcing language skills effectively (Benita et al., 2021).

3. Output: The Impact of Learning Using Augmented Reality (AR)The intended impact of learning using AR is to enhance learning motivation, student engagement, and comprehensive English language skills. Students who learn through AR are expected to achieve a better understanding of vocabulary, grammar, and

communication skills, as well as the ability to apply English in various real-world contexts (Chang et al., 2020). Moreover, the use of AR is expected to improve students' self-directed learning and critical thinking skills, as they are directly involved in exploring materials and solving problems throughout the learning process (Salem, 2022). Ultimately, this output is aimed at creating a more interactive, effective, and digital-era-appropriate English language learning environment that meets the needs of students (Song et al., 2024).
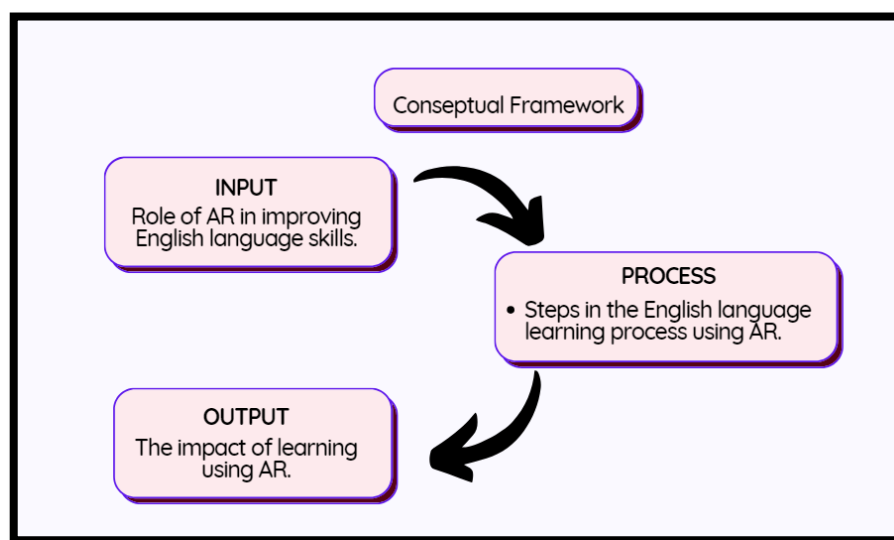

Figure 1. Visualization of Research the Use of Augmented Reality (AR) in English Language Learning

The research flow diagram on the application of Augmented Reality (AR) in English language learning highlights three main points:

1. Input: The role of AR in enhancing English language skills by providing an interactive and visual learning environment, aligning with the constructivism and multimodal learning theories.

2. Process: Steps of learning English with AR, which include material selection, application usage, and interactive activities that holistically support language skills.

3. Output: Desired impact, which includes improved motivation, student engagement, and enhanced English language skills using AR.

D. Hypothesis

The research hypotheses are structured to assess both the quantitative effects of AR on student achievement and the qualitative aspects of motivation and engagement. Through these hypotheses, this study seeks to determine whether AR serves as an effective pedagogical tool in improving English proficiency and fostering a more engaging learning atmosphere.

1. Research Hypothesis:

   a. Null Hypothesis (H_0): There is no significant effect of using Augmented Reality (AR) on the English learning outcomes of students at SMP IT Wahdah Islamiyah Makassar.

   b. Positive Alternative Hypothesis (H1): The use of Augmented Reality (AR) in English language learning has a positive effect on the English learning outcomes of students at SMP IT Wahdah Islamiyah Makassar.

2. Formulation of Hypotheses

   a. H0 (Null Hypothesis): There is no significant effect of using Augmented Reality (AR) on the English learning outcomes of students at SMP IT Wahdah Islamiyah Makassar.

   b. H1 (Positive Alternative Hypothesis): The use of Augmented Reality (AR) has a significant and positive effect on the English learning outcomes of students at SMP IT Wahdah Islamiyah Makassar.

CHAPTER III

RESEARCH METHODOLOGY

This study uses a mixed-methods approach, incorporating both quantitative and qualitative methods, with a case study design to explore students' experiences regarding the use of Augmented Reality (AR) in English language learning at SMP IT Wahdah Islamiyah Makassar. The research variables include the independent variable, which is the use of AR in English learning, and the dependent variables, which are English learning outcomes, as well as students' experiences and perceptions.

The study population comprises students of SMP IT Wahdah Islamiyah Makassar, with a purposive sampling technique employed to ensure participants are relevant to the research objectives. The research instruments include questionnaires to measure learning outcomes and students' perceptions, as well as structured observations and interviews to collect qualitative data on students' learning experiences. The data collection procedure is sequential: starting with the implementation of AR in the experimental class, followed by questionnaire distribution, pretest-posttest, and student interviews.

The data analysis procedure involves descriptive statistical analysis for quantitative data and thematic analysis for qualitative data. These analyses are combined to provide a comprehensive view of the effects and experiences of using AR in English language learning. Consequently, the overall research methodology is designed to yield holistic findings on the effectiveness and experiences of using AR in a junior high school English language learning environment.

A. Research Method

This study employs a quasi-experimental method with pretest-posttest control group design. Students are divided into two groups: an experimental group, which will receive English language instruction with the support of AR, and a control group, which will receive conventional instruction without AR. Prior to the intervention, both groups will undergo a pretest to assess their initial English language achievement (Amiri et al., 2023). Following a period of AR intervention, both groups administered a posttest to measure the impact of AR use on their English learning outcomes (Çetinkaya Özdemir & Akyol, 2021). Data analysis conducted using statistical tests to identify any differences in achievement between the experimental and control groups (Amrullah & Enawar, 2022).

To address the second research question, "What are the experiences and perceptions of students at SMP IT Wahdah Islamiyah Makassar regarding the use of Augmented Reality (AR) in English language learning, a qualitative approach with a case study design is employed. This case study focuses on an in-depth exploration of students' experiences and perceptions of AR-based learning. Data collection can be carried out through structured or semi-structured interviews, and open-ended questionnaires to delve into students' views on the effectiveness, motivation, and challenges they experience when using AR. Qualitative data analysis thematic, identifying patterns in perceptions and experiences to provide a rich understanding of how AR influences the learning process from the students' perspective.

To integrate both research designs, mixed-method approach is applied. By combining quantitative and qualitative methods, this study aims to provide a more comprehensive overview of the impact of AR use on English learning achievement (from a quantitative perspective) and to explore students' experiences and

perceptions of AR (from a qualitative perspective). This approach enables data triangulation, thereby enhancing the validity of the results and providing meaningful contributions to the development of AR-based English language learning at the junior high school level.

B. Research Location and Timeline

The Research conducted at SMP IT Wahdah Islamiyah Makassar, located in Makassar City, South Sulawesi. This school was chosen due to its availability of technological facilities that support the implementation of Augmented Reality (AR) in English learning and its relevance to the research context, which targets junior high school students. SMP IT Wahdah Islamiyah Makassar is an educational institution committed to innovative learning, which is expected to provide a representative overview of AR use in the context of English language learning.

The field data collection is planned for November 2024. This timeline is selected to ensure that AR-based learning devices and materials are prepared, and that data collection can be optimally conducted during active teaching and learning activities. Data collection will include observations of the learning process, distribution of questionnaires, interviews with students, and the collection of pre- and post-test results related to AR usage in English learning. The planned timeline is designed to yield accurate and comprehensive results in line with the research objectives.

C. Population and Sample

The population involved in this research consists of 7th-grade students at SMP IT Wahdah Islamiyah Makassar. From this population, two classes selected to participate in data collection: one class serve as the experimental group receiving AR-based English instruction, while the other act as the control group receiving conventional English instruction without AR. The selection of these two classes

aims to provide comparative data relevant to evaluating the impact of AR use on English learning achievement.

The sampling technique used is purposive sampling. This technique is chosen as it allows the researcher to determine the sample based on specific considerations relevant to the research objectives selecting classes with homogeneous characteristics in terms of English language proficiency and access to learning technology. Purposive sampling enables the research to focus on subjects who can provide in-depth data and meet the research criteria, ensuring that the results obtained accurately address the research questions concerning the impact and experience of AR use in English language learning. Therefore, this technique is considered appropriate to ensure the validity and effectiveness of the field data collection process.

D. Data Collection Techniques

The primary data collection technique is the use of written tests as the main instrument. These tests will measure students' English language achievement before and after the AR-based learning intervention. A pretest administered to both the experimental and control groups to assess students' initial English proficiency before the intervention, and a posttest conducted after the AR-based instruction. By comparing pretest and posttest results from both groups, the researcher can identify score differences and determine the effect of AR use on students' English learning achievement. The test is designed to cover language skills targeted in the learning process, such as vocabulary, grammar, speaking, and reading comprehension.

For the second research question, the data collection techniques employed will include interviews and open-ended questionnaires. In-depth interviews conducted with selection of students from the experimental group to explore their experiences with AR-based English learning in a personal and detailed manner. The

interviews aim to gain a deeper understanding of students' perceptions, motivation, and challenges during AR use. Interview questions structured around relevant aspects of AR-based language learning, such as ease of use, perceived benefits, and impact on their English skills.

Alongside interviews, an open-ended questionnaire distributed to all students in the experimental group as an additional instrument to collect data on their perceptions and experiences with AR. Open-ended questionnaires allow students to provide free and subjective responses regarding their experiences, enabling the researcher to capture a variety of perspectives and thoughts on AR-based learning. The responses collected through the questionnaire analyzed thematically to identify common patterns in perceptions and experiences among students, providing additional insights to complement the data obtained from the interviews.

To maintain the validity and reliability of the data, a triangulation technique employed by combining the results from various data collection instruments. Data from written tests compared with classroom observation results to examine the alignment between learning achievement scores and the learning process. Similarly, the results from interviews and open-ended questionnaires are linked with field notes to ensure that the data collected is consistent and provides a holistic view of the students' experiences and perceptions. This triangulation enhances the validity of the research findings and provides a solid foundation for further analysis.

Consequently, the data collection techniques used in this study are carefully designed to address both research questions with a quantitative and qualitative approach. Through a combination of written tests, interviews, open-ended questionnaires, this research aims to provide accurate and comprehensive results on

the impact of AR use on English learning achievement, as well as a rich depiction of students' experiences and perceptions in the learning context.

E. Research Instruments

The research instruments used in this research are designed to collect data relevant to the research objectives and questions. Considering that this study uses a mixed-method approach, the chosen instruments encompass both quantitative and qualitative data collection tools. Quantitative instruments are utilized to measure students' English learning achievement through written tests, while qualitative instruments, such as interviews and open-ended questionnaires, are used to explore students' experiences and perceptions related to the use of AR in learning.

The primary instrument is an English learning achievement test, consisting of a pretest and posttest. The test is developed based on the learning material covered, focusing on language skills including vocabulary, grammar, speaking, and reading. The pretest is administered before the AR-based instruction to assess students' baseline abilities, while the posttest is conducted after the learning sessions to measure the impact of the AR intervention. This instrument is designed to provide quantitative data on the extent of improvement in students' learning achievements after using AR compared to those who learn without it.

Qualitative instruments such as in-depth interviews and open-ended questionnaires are employed. The in-depth interviews are conducted to obtain more detailed information on students' personal experiences while interacting with AR technology during the learning process (Delucchi, 2014). The interview questions are developed based on aspects such as the ease of AR use, the level of student engagement in learning, and the impact of AR on their motivation and language skills. In addition, open-ended questionnaires provide students with the opportunity

to express their views and perceptions in writing, enabling the researcher to gather a wider range of responses and perspectives from all participants.

The use of various instruments is expected to yield valid and reliable data, as well as produce comprehensive research results.

F. Data Analysis Techniques

The data analysis technique to be used is inferential statistical analysis, aimed at comparing the pretest and posttest results of the experimental and control groups (Alethea & Davidses, 2020). A relevant statistical test for this analysis is the t-test, specifically either a paired sample t-test or an independent sample t-test, depending on the data distribution and homogeneity of variance between the two groups. The purpose of the t-test is to determine whether there is a significant difference in English learning achievement between students who learn using AR (experimental group) and those who learn through conventional methods (control group). If the data does not follow a normal distribution, non-parametric analysis, such as the Mann-Whitney U test, may be employed.

Additionally, the quantitative data analysis will include the calculation of the effect size to determine the extent of the influence of AR use on students' English learning achievement. The effect size provides information on the practical impact or strength of the intervention, allowing the researcher to assess whether the use of AR has a substantial effect or only a minor effect on learning outcomes. This calculation is important to ensure that any differences found are not only statistically significant but also meaningful within the context of learning(Knief & Forstmeier, n.d.).

1. The Impact of Augmented Reality (AR) on English Learning Ability

a. Normality Test

Normality tests are used to determine whether the sample comes from a normally distributed population or not(Alptekin & Temmen, 2020). For this normality test using the Kolmogorov-Smirnov test with test criteria, H_0 is accepted if sig > 0.05 and H_0 is rejected if sig < 0.05, done with: H_0 ´Research sample comes from a normally distributed population. H_1 ´ the research sample comes from a population that is not normally distributed.

b. Homogeneity Test

The data homogeneity test is carried out after it is known that the data is normally distributed(Rafael & Maynooth, 2024). This homogeneity test uses the Levene Test at the 5% or 0.05 significance level, with SPSS 30.0.0.0 (127) version with homogeneity test steps as follows:

H_0: the research sample has a homogeneous variance.

H_1 ´the research sample has a variance that is not homogeneous.

c. Hypothesis Test

If the data from the pretest and posttest are normally distributed and homogeneous, the hypothesis will be tested using the SPSS program and analyzed using Independent Sample T-tests statistics with a significant level of 5%. Independent Sample T-tests is a statistical test that aims to compare the average of two unpaired samples (AlGerafi et al., 2023)

1. The Students' Perception and Experiences of Augmented Reality (AR) on English Learning Ability

a. The Students' Perception of Augmented Reality (AR) on English Learning Ability

In this study, the data collected from the **open-ended questionnaire** were analyzed using **thematic analysis** to identify patterns and themes within students' responses regarding their perceptions of using Augmented Reality (AR) in English language learning. Thematic analysis involves systematically coding the data, grouping similar responses, and identifying key themes that emerge (Knief & Forstmeier, n.d.). The process began with familiarization with the data, followed by initial coding, where relevant words, phrases, or patterns were identified. Next, these codes were categorized into broader themes that aligned with the study's research objectives, particularly focusing on Ease of Use, Learning Usefulness, Technology Features & Engagement, and Achievement of Learning Outcomes. To enhance reliability, the responses were analyzed iteratively, ensuring that all relevant insights were captured while minimizing researcher bias.

Furthermore, content analysis was employed to quantify recurring patterns in the open-ended responses, providing a more structured interpretation of qualitative data. Responses were classified based on frequency and consistency, ensuring that common perspectives were given appropriate emphasis. Direct quotations from students were incorporated to support key findings and provide richer insights into their experiences with AR. The triangulation technique was also applied by comparing questionnaire responses with interview data, ensuring a comprehensive understanding of student perceptions(Rafael & Maynooth, 2024).

The data analysis approaches qualitative with a thematic approach. Data obtained from interviews and open-ended questionnaires analyzed through a coding process, where students' responses categorized based on themes or categories relevant to the research question. In this study, the coding process in thematic analysis was carried out systematically through three main stages: open coding,

axial coding, and selective coding, with deductive and inductive approaches to ensure the validity of the analysis results.

b. The Students' Experiences of Augmented Reality (AR) on English Learning Ability

Open coding used to identify the main themes that emerged from students' responses to their experience in using Augmented Reality (AR) in English language learning(Schmidt, 2010). Once the initial themes were found, axial coding was conducted by grouping related themes to form more structured categories, such as learning motivation, material comprehension, technical challenges, and student engagement in learning. The final stage was selective coding, where the main categories that were most relevant to the research objectives were selected to structure the final interpretation of the data obtained. To enhance the validity of the results, direct quotes from student interviews were used as empirical evidence supporting the research findings.

With this approach, the qualitative data analysis in this study can describe in depth how students experience and respond to the use of AR in English learning. This analysis aims to uncover how students Experience in using AR in English language learning and how the technology influences their learning process. Through this analysis, the researcher gained a richer understanding of students' perspectives and the factors that support or hinder the use of AR in learning.

To maintain the validity and reliability of qualitative data, a data triangulation technique used by combining the results of interviews and questionnaires. Triangulation is important to ensure that the findings are consistent and credible(Kuhail et al., 2022). Data generated from various sources compared and confirmed to strengthen the research conclusions.

Thus, the combination of quantitative and qualitative data analysis allows this study to provide in-depth and comprehensive answers to both research questions. Inferential statistical analysis provides a quantitative picture of the impact of AR use on English learning achievements, while thematic qualitative analysis offers deeper insights into students' experiences and perceptions regarding the use of the technology. The results of this analysis are expected to make a meaningful contribution to the development of AR-based English language learning at the junior high school level.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter outlines the results and discussions on the research carried out. As part of the results section, particular attention has been paid to the data analysis outcomes in respect to learning achievements as well as how such results compare against set research goals. Moreover, the respondents' experiences as well as their perceptions will be hierarchically ranked providing additional knowledge about their perspective and comprehension of the issue being analyzed. The discussion of this chapter will incorporate the findings alongside existing literature as well as consider the consequences of the research results in relation to the discipline and its practice. Therefore, this chapter is expected to contribute relatively greatly towards advancement in knowledge in this field of study.

A. Research Results

This study was carried out on November 14, in SMP IT Wahdah Islamiyah Makassar. The study seeks to determine the effect of Augmented Reality (AR) on students' learning outcomes in the English Language subject. The research design used was quasi-experimental involving two groups, namely a control class and an experimental class. During the experiment, the experimental class was taught through learning media, which was AR, while the control class was taught with conventional methods. Data analysis was done qualitatively by descriptive in nature with the aim to report the data, and quantitatively with the aim to test the hypothesis on the effect of AR on students' learning outcomes.

The experiments were carried out through tests which aimed at measuring student achievement in this study. The difference in learning outcomes between the experimental and control classes was analyzed using the independent sample t-test for significant differences between the two groups. This model allows the analysis

results to show the relationship that exists between the independent variable (AR use) to the dependent variable (learning outcomes).

For inferential analysis, decisions are rendered depending on the level of significance (p value). For example, if the significance is greater than point zero five, the null hypothesis (H0) is accepted due to the lack of significant difference. On the other hand, if the significance is less than or equal to point zero five, then H0 is rejected, and a significant difference is determined. This process offers a solid statistical base which aids in answering research questions in relation to the efficiency of the AR-based learning system to the studied outcome of the students' learning achievement.

1. **The Impact of Augmented Reality (AR) on English Language Learning Outcomes Analysis**

a. Descriptive statistical analysis

Descriptive statistical analysis is the first step in the data analysis process which aims to provide a thorough understanding of the characteristics of the data(Strielkowski et al., 2024). Through the application of descriptive statistical techniques, researchers can analyze the distribution, mean, and variation of data, as well as detect patterns or anomalies that may exist. This descriptive analysis process was carried out using SPSS software version 30.0.0.0 (127), which then produced the following calculation results:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre Test Eksperimen	32	44	96	71.38	10.948
Post Test Eksperimen	32	75	98	85.66	4.797
Pre Test Kontrol	32	40	93	67.91	11.235
Post Test Kontrol	32	50	91	71.47	9.329
Valid N (listwise)	32				

Table 4.1 Descriptive Statistics by using SPSS

The descriptive analysis provided evidence for an increase of the mean score of the experimental group post treatment. Prior to the treatment, the average pre-test score of the experimental group was 71.38 with a standard deviation of 10.948, which suggested a moderate range in variation of the students' initial scores. After the treatment, which emphasized learning with augmented reality (AR), the average post-test scores drastically increased to 85.66, with a subsequent lower standard deviation of 4.797. This lower standard deviation signifies that the students in the experimental group have begun achieving more consistent learning outcomes.
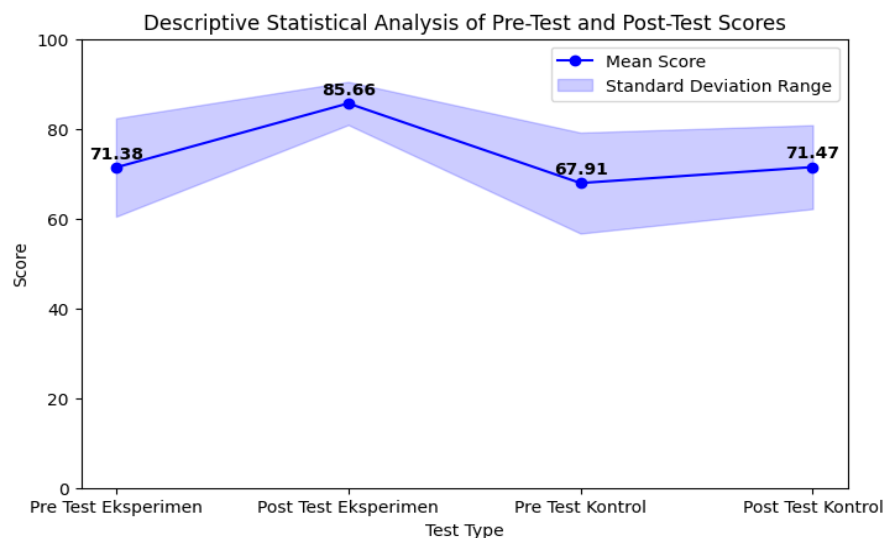

Figure 4.1 Descriptive Statistical Analysis both class

In the control group, the mean also increased from the pre-test score of 67.91 to the post-test score of 71.47. However, the difference remains marginal when compared to that of the experimental group. The standard deviation of the control group remains high, at 11.235 and 9.329 for the pre and post test scores respectively. This suggests that the distribution of scores remains more varied than those of the experimental group. Thus, it can be derived that utilizing traditional learning ways on the control group did not create a constructive improvement on learning outcomes or consistency.

Overall, the level of effectiveness of the use of augmented reality technology can be measured from the change in posttest means of the experimental and control groups. A larger improvement in the experimental group relative to the control group indicates that AR-based learning not only increased students' mean scores but also reduced the heterogeneity in students' learning outcomes. This corroborates the argument of employing modern technology in classroom instruction to enhance students' interest and comprehension of the content taught.

Inferential statistics are used to test hypotheses and make generalizable conclusions from sample data to a wider population, thus providing a scientific basis for decision making(Alcivar et al., 2024). In the context of this research, inferential statistics serve to evaluate the effectiveness of using augmented reality (AR) in learning by comparing student learning outcomes in experimental and control groups. Inferential analysis such as t-test or analysis of variance (ANOVA) allows researchers to determine whether the observed mean difference between the two groups is statistically significant or simply occurs by chance(Willits et al., n.d.). Considering the sample size, data distribution, and confidence level used, the results of the inferential analysis provide strong evidence to support or reject the proposed hypothesis. This process ensures that the conclusions drawn are not only relevant for the sample under study but can also be relied upon to describe patterns or trends in the larger population.

b. Normality Test

The normality test is carried out to ensure that the data has a normal distribution, which is one of the important assumptions in various statistical analyses(Onu et al., 2024). Given that the data size in this study was less than 50, the Shapiro-Wilk method was used as a more suitable approach. The test was conducted with a significant level of 5% (0.05).

The basis for decision making in this test is as follows: if the P-value ≤ 0.05, the data is considered not normally distributed, while if the P-value > 0.05, the data is declared normally distributed. Understanding the results of this normality test is important to determine the most appropriate further statistical methods, both parametric and non-parametric, in research analysis.

The results of the normality test using the Shapiro-Wilk method show that the data on student learning outcomes in the pre-test and post-test, both in the experimental and control groups, mostly have a normal distribution. This is based on the significance value (Sig.) for each group. In the experimental group, the significance value of the pre-test was 0.114 and the post-test was 0.193, both of which were greater than 0.05. This indicates that the data in the experimental group is normally distributed for both conditions. This condition strengthens the validity of the normality assumption, which is important for further parametric statistical analysis.

Meanwhile, in the control group, the Shapiro-Wilk test results also showed that the data were normally distributed. The significance value of the control group's pre-test was 0.172, and the post-test was 0.550, both also greater than 0.05. This finding is consistent with the experimental group results, showing that the data distribution does not deviate significantly from the normal distribution. Thus, the data on student learning outcomes in the control group also met the assumption of normality, allowing the application of parametric tests in the subsequent analysis.

Tests of Normality

	Kelas	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Hasil Belajar Siswa	PreEks	.160	32	.036	.946	32	.114
	PostEks	.164	32	.028	.954	32	.193
	PreKon	.145	32	.084	.953	32	.172
	PostKon	.125	32	.200[*]	.972	32	.550

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4.2 Test of Normality result

Overall, the normality test showed that the data from all groups met the normal distribution criteria based on the Shapiro-Wilk significance value (> 0.05). The validity of this normality assumption allows researchers to use parametric statistical methods in further analysis, such as independent t-test or analysis of variance (ANOVA), to test hypotheses regarding the effectiveness of using augmented reality (AR) in learning. These results provide a solid basis for accurate and relevant statistical analysis of the research data.

c. Paired Sample T-Test

The *Paired Samples T-Test* test is used to compare two means of the same group, measured at two different conditions or times, with the aim of determining whether there is a significant difference(Cavinato et al., 2021). In this study, this test was applied to analyze changes in student learning outcomes between pre-test and post-test in experimental and control groups. The test results showed a significant average difference, which was indicated by a *p-value* smaller than the significance level of 0.05. In the experimental group, the larger mean difference indicates the effectiveness of the augmented reality (AR)-based learning treatment. In contrast, the control group also showed a significant difference, but with a smaller mean, reflecting the impact of traditional learning that is not as great as AR technology. This test provides empirical evidence to support the effectiveness of

Paired Samples Test

| | | Paired Differences | | | | | | | Significance | |
| | | | | | 95% Confidence Interval of the Difference | | | | | |
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	One-Sided p	Two-Sided p
Pair 1	Pre Test Eksperimen - Post Test Eksperimen	-14.281	8.596	1.520	-17.380	-11.182	-9.399	31	<.001	<.001
Pair 2	Pre Test Kontrol - Post Test Kontrol	-3.563	5.645	.998	-5.598	-1.527	-3.570	31	<.001	.001

innovative learning methods in improving student learning outcomes.

Table 4.3 Paired Sample Test

The results of the normality test using the Shapiro-Wilk method show that the data on student learning outcomes in the pre-test and post-test, both in the experimental and control groups, mostly have a normal distribution(Fajri et al., 2021). This is based on the significance value (Sig.) for each group. In the experimental group, the significance value of the pre-test was 0.114 and the post-test was 0.193, both of which were greater than 0.05. This indicates that the data in the experimental group is normally distributed for both conditions. This condition strengthens the validity of the normality assumption, which is important for further parametric statistical analysis.

Meanwhile, in the control group, the Shapiro-Wilk test results also showed that the data were normally distributed. The significance value of the control group's pre-test was 0.172, and the post-test was 0.550, both also greater than 0.05. This finding is consistent with the experimental group results, showing that the data distribution does not deviate significantly from the normal distribution. Thus, the data on student learning outcomes in the control group also met the assumption of normality, allowing the application of parametric tests in the subsequent analysis.

Overall, the normality test showed that the data from all groups met the normal distribution criteria based on the Shapiro-Wilk significance value (> 0.05). The validity of this normality assumption allows researchers to use parametric statistical methods in further analysis, such as independent t-test or analysis of variance (ANOVA), to test hypotheses regarding the effectiveness of using augmented reality (AR) in learning. These results provide a solid basis for accurate and relevant statistical analysis of the research data.

d. Homogeneity Test

Homogeneity test is conducted to determine whether the data analyzed have the same variance or are homogeneous(Daniel Liao et al., 2023). This test uses a significant level of 5% (0.05) as a reference in decision making. The basis for decision making on the homogeneity test is as follows: if the P-value $\leq$ 0.05, the data is considered not to have a homogeneous variance, while if the P-value > 0.05, the data is considered to have a homogeneous variance. This test is very important to ensure that the assumption of homogeneity is met, so that further statistical

Test of Homogeneity of Variance

		Levene Statistic	df1	df2	Sig.
Hasil Belajar Siswa	Based on Mean	11.839	1	62	.001
	Based on Median	11.452	1	62	.001
	Based on Median and with adjusted df	11.452	1	49.770	.001
	Based on trimmed mean	11.989	1	62	<.001

analysis can be carried out with the appropriate method(Widaman & Revelle, 2023). The following are the results obtained from the test.

Table 4.4 Test of Homogeneity Variance

The results of the variance homogeneity test using the Levene method show that the student learning outcomes data do not meet the assumption of homogeneity. This can be seen from the significance value (Sig.) for all calculation approaches, both based on the mean, median, median with adjusted df, and trimmed mean, which are all below the significance level of 0.05 (p = 0.001 or <0.001). These values indicate that there are significant differences in variance between the tested data groups, so the variance between groups cannot be considered homogeneous.

This inhomogeneity of variance has important implications in the selection of subsequent statistical analysis methods(Rudolph et al., 2023). The assumption of homogeneity is one of the main requirements in parametric analysis such as ANOVA or independent t-test. When this assumption is not met, researchers should

consider using alternative methods such as non-parametric analysis or parametric procedures that can overcome variance inhomogeneity, such as the Welch test or data transformation. This step is necessary to ensure that the results of the analysis remain valid and can be interpreted accurately.

Overall, the results of this homogeneity test underscore the need for caution in the selection of statistical techniques used for data analysis. Inhomogeneity of variance indicates that there are different characteristics in the distribution of data between groups, which may be influenced by the treatment or other variables in the study. It also indicates the importance of considering the nature of the data in depth before drawing conclusions, to ensure that the analysis is conducted in accordance with applicable assumptions.

e.   Hypothesis Test/Independent Sample T-Test

Data analysis in this study aims to compare student learning outcomes between control class and experimental class using independent sample t-test(Waziana et al., 2024). Hypothesis testing is formulated as follows: null hypothesis (H0) $\mu_1 \leq \mu_2$, which states that student learning outcomes in the experimental class are equal to or lower than the control class, and alternative hypothesis (H1) $\mu_1 > \mu_2$, which states that student learning outcomes in the experimental class are better than the control class. In this case, μ_1 represents the learning outcomes of the experimental class, while μ_2 represents the learning outcomes of the control class. To determine whether there is an effect of using augmented reality (AR) on learning outcomes, a comparison of two averages was conducted with the number of control class subjects as many as 32 students. This test aims to determine whether the observed average difference is

statistically significant, so that it can provide strong evidence regarding the effectiveness of AR-based learning compared to conventional methods.

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
						Significance		Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
		F	Sig.	t	df	One-Sided p	Two-Sided p			Lower	Upper
Hasil Belajar Siswa	Equal variances assumed	11.839	.001	7.651	62	<.001	<.001	14.188	1.854	10.481	17.894
	Equal variances not assumed			7.651	46.319	<.001	<.001	14.188	1.854	10.456	17.919

Table 4.5 Independent Sample Test

The results of the *Independent Samples T-Test* test showed a significant difference in the average student learning outcomes between the experimental and control classes. Based on *Levene's Test for Equality of Variances*, the significance value is 0.001, which is smaller than 0.05. This indicates that the assumption of homogeneous variance is not met, so the analysis is continued using the "Equal variances not assumed" line. The *t-value* of 7.651 with a degree of freedom (df) of 46.319 and a *p-value* (two-sided) <0.001 indicates that the difference in average student learning outcomes between the two groups is statistically significant.

The mean difference between the experimental and control classes is 14.188 with a standard error of 1.854. The 95% confidence interval for this mean difference is in the range of 10.456 to 17.919, which does not include zero. This further strengthens the evidence that the use of augmented reality (AR) in learning has a significant impact on student learning outcomes in the experimental class compared to conventional learning methods in the control class. This result underscores that AR technology is capable of significantly improving the quality of learning(Kuhail et al., 2022).

Overall, this analysis shows that the implementation of augmented reality has a noticeable influence in improving student learning outcomes. The significant increase in learning outcomes in the experimental class compared to the control

class supports the hypothesis that innovative learning methods such as AR are more effective than traditional methods. Thus, these findings provide practical implications for education to consider the adoption of AR technology as a learning approach that can improve students' understanding and engagement in the learning process.

f. Hypothesis Based on Research Findings

Based on the results of statistical analysis using Independent Sample T-Test, there is a significant difference between student learning outcomes in the experimental class (using Augmented Reality/AR) and the control class (conventional method), with a significance value (p-value) <0.001 and an average difference of 14.188. The 95% confidence interval (10.456 - 17.919) also indicates that this difference did not occur by chance. Thus, the null hypothesis (H_0) stating that there is no significant effect of using AR on student learning outcomes is rejected, while the alternative hypothesis (H_1) is accepted. This result indicates that the use of AR has a positive and significant influence in improving students' English learning outcomes at SMP IT Wahdah Islamiyah Makassar compared to conventional learning methods.

2. Student Perceptions and Experiences in Learning English with Augmented Reality (AR)

a. Student Perceptions in Learning English with Augmented Reality

To understand the effectiveness of AR in improving the quality of learning, student perceptions were analyzed based on Thematic Findings of Student Experience with AR, below:

Dimension	Key findings	Percentage of Students Who Feel the Benefits	Advice and Recommendations
Ease of Use	Most students find AR easy to use, but there are technical obstacles such as bugs and slow loading.	85%	Fix bugs, speed up loading, and improve camera quality.
Learning Usefulness	AR helps with vocabulary comprehension and speaking, but some students feel neutral about its benefits.	75%	Use AR in various aspects of learning, not just vocabulary.
Technology Features & Engagement	The features of 3D drawing, animation, and live interaction are most preferred. Some students suggested more character variety.	80%	Add more interactive characters and animations.
Achievement of English Learning Outcomes	AR meningkatkan pemahaman kosakata dan berbicara, tetapi beberapa siswa tidak merasakan perbedaan signifikan.	70%	Use AR in various aspects of learning, not just vocabulary.

Table 4.6 Thematic Findings of Student Experience with AR

Based on the results of the questionnaire analysis, most students feel that the use of Augmented Reality (AR) in English learning is quite easy and helps them in understanding the material, especially in the aspects of vocabulary and speaking. About 85% of students find AR easy to use, although some experience technical obstacles such as bugs and slow loading. In addition, 75% of students admit that AR provides benefits in learning, although some feel that the impact is not much different compared to traditional methods. This shows that AR has great potential to increase student engagement in learning English, but it still needs optimization to be more effective and more widely applicable.

In terms of features and engagement, 80% of students said they really enjoyed the 3D images, animations, and direct interactions offered by AR. The visual and interactive uniqueness of AR makes it more interesting than book-based learning. However, some students suggested that AR be further developed by adding more diverse characters and animations. In terms of learning outcomes, 70% of students felt that AR helped them in understanding vocabulary and speaking, but the rest did not feel a significant change compared to conventional methods. Therefore, additional strategies, such as the use of AR in various learning activities

and broader integration into the curriculum, are needed to maximize its impact on students' English skills.

b. Student Experiences in Learning English with Augmented Reality

To understand students' experience of the use of Augmented Reality (AR) in English learning, the results of the interview were summarized in a table based on five main aspects: Experience (students' experience in using AR), Helpfulness (the extent to which AR helps to understand the material), Motivation (the impact of AR on learning motivation), Challenges (obstacles faced during the use of AR), and Suggestions (input to increase the effectiveness of AR in learning). The presentation in the form of this table aims to provide a clearer and more structured picture of the students' experience in using AR as a learning medium.

Respondent	Experience	Helpfulness	Motivation	Challenges	Suggestions
1	Exciting, engaging, helps focus and understand better.	Helps understand lessons with teacher's guidance.	Yes, interesting and funny visuals.	Internet issues, app crashes, quota problems.	Provide internet quota assistance for students.
2	Fun, exciting, interactive learning through AR.	Very helpful in learning 'like and dislike' concepts.	Yes, AR makes learning fun and engaging.	Loading takes too long, network issues.	Add voice features and reduce loading time.
3	Wonderful, helps in English by describing objects.	Helps in describing objects in English.	Yes, fun and realistic images motivate.	Frequent lagging and long loading time.	Include descriptions for displayed objects.
4	Good, but needs more detailed information on objects.	Helps in visualizing objects and their details.	Interesting because it allows interaction with objects.	Slow loading or difficulty selecting images.	Add habitat info and sounds for animals.
5	Very helpful and exciting, suitable for learning.	Helps in recognizing and naming objects in English.	Yes, characters make learning exciting.	Network delays, long login time.	Improve character realism and add more options.
6	Fun, many kinds of interesting elements.	Helps in expressing and showing objects.	Yes, motivated by interactive AR elements.	Camera issues, sometimes lags.	Improve image filters and object reproduction.
7	Fun, increases knowledge, entertaining.	Ordinary, but helps improve vocabulary.	Neutral, not too influential.	Confusion at first, then easy to use.	Enhance image quality and increase character variety.
8	Fun and engaging learning experience.	Helps express preferences in English.	Yes, excited by new learning experience.	Lags when moving images on screen.	Make the app free and add better objects.
9	Good experience, very helpful in learning English.	Helps in playing and interacting with 3D objects.	Yes, AR makes learning exciting and engaging.	Slow internet causes delays in using AR.	Make characters more realistic.

| 10 | Happy to see real-like objects through AR. | Helps express preferences through real-like visuals. | Yes, motivated by realistic object representation. | Lag issues, especially with loading screen. | Reduce lag and improve app smoothness. |

Table 4.7 The Interview Result

Based on the results of the interviews, most of students had a fun and interactive experience when using AR in English learning. They felt that AR helped improve focus and understanding, especially in recognizing and describing objects in English. In addition, many students feel more motivated because of the interesting visuals, interactive features, and the opportunity to see objects in 3D in a realistic way. However, there are also some students who feel that the impact of AR on their learning is ordinary, although they still enjoy the experience of using it. This shows that AR has great potential in supporting experiential learning, but it has not had the same effect on all students.

On the other hand, the main challenges faced by students are technical issues, such as slow internet connection, lagging applications, and long loading times. Some students also suggested improving features, such as adding sounds to animals, providing more detailed descriptions of images, and increasing the choice of characters to make it more interesting. In addition, accessibility is still an obstacle for some students, especially for those with limited internet quota. Therefore, for AR to be more effective in learning, there needs to be an improvement in application performance, the addition of supporting features, and efforts to ensure better accessibility for all students.

B. Discussion

The discussion in this study aims to critically analyze the findings related to the two research questions concerning students' learning outcome (Student Ability), students' perceptions and experiences in using Augmented Reality (AR) in English language learning. By integrating both qualitative and quantitative data, this section

examines how students perceive the usability, usefulness, and effectiveness of AR in enhancing their learning outcomes, as well as their direct experiences, including benefits and challenges encountered during its implementation. The discussion also contextualizes these findings within established learning theories and previous research, allowing for a comprehensive evaluation of the extent to which AR contributes to improving student engagement and comprehension. Furthermore, this analysis highlights key patterns, differences, and potential implications of integrating AR into classroom instruction, providing insights into how this technology can be optimized for future educational applications.

1. The Impact of Augmented Reality (AR) on English Language Learning Ability

The results showed that the use of Augmented Reality (AR) significantly improved students' English learning outcomes(Babajide Tolulope Familoni & Nneamaka Chisom Onyebuchi, 2024). In the experimental class, the mean post-test score increased from 71.38 to 85.66 with a decrease in standard deviation from 10.948 to 4.797. This reflected a consistent improvement in learning outcomes among students. In contrast, the control class using the conventional method only showed an average increase from 67.91 to 71.47, with score variability remaining high. An independent t-test showed a significant difference ($p < 0.001$) between the two classes, confirming that the use of AR effectively improved learning outcomes over the traditional method.

Theoretically, these findings align with **Dual Coding Theory** (Paivio), which emphasizes that the combination of visual and verbal elements improves comprehension and retention. AR provides 3D visualizations and interactive experiences that make it easier for students to understand abstract concepts, such as vocabulary and sentence structure. In addition, these findings support **Self-**

Determination Theory, which states that engaging and immersive learning experiences can increase students' intrinsic motivation. This research is also in line with previous studies, such as Majid & Salam (2021), which show that innovative technologies such as AR can significantly increase student engagement.

The results of this study confirm the importance of technology integration such as AR in learning to improve learning outcomes and student engagement, especially in facing the challenges of 21st century learning. The use of AR not only improves students' understanding academically but also trains their digital literacy(Wedyan et al., 2022d). The practical implication is the need for training for teachers to optimize this technology as well as curriculum adjustment to support technology-based learning approaches. Thus, this research makes a strategic contribution in strengthening educational innovation to shape a more digital and academically competent generation(Alenezi, 2023).

There is a difference in the level of increase in the pre-test to post-test score between this study and the study by Babajide & Onyebuchi (2024). In their study, the control class that used the conventional method still experienced a slight increase in score (from 67.91 to 71.47), but the experimental class score increased more drastically with a smaller standard deviation, indicating an even distribution of learning outcomes among students. On the contrary, in this study, the difference between the pre-test and post-test does not only depend on the use of AR, but also on other factors such as the duration of AR use, student characteristics, and the level of readiness of technological infrastructure in schools. This difference can be explained by the research of Huang et al. (2020), who found that the effectiveness of AR depends heavily on the duration and method of its integration into the curriculum, as well as research by Liu et al. (2017) which shows that the

improvement in post-test scores in technology-based learning can differ depending on how often students interact with the technology.

Despite the differences, this study is in line with Wedyan et al. (2022) and Alenezi (2023), who emphasize that AR has a significant positive impact on improving learning outcomes, but its effectiveness can vary depending on the method of implementation and the readiness of the technology used in learning.

2. **Student Perceptions and Experiences in Learning English with ugmented Reality**

a. Student Perceptions in Learning English with Augmented Reality

The results of the questionnaire analysis show that most students have a positive perception of the use of Augmented Reality (AR) in English learning. Students feel that AR facilitates vocabulary comprehension and increases engagement in learning. This is in line with Constructivist Learning Theory (Piaget, 1950), which emphasizes that learning is more effective when students actively participate in real and interactive learning experiences. AR, with its visual and interactive features, allows students to build a deeper understanding because they can see and interact directly with virtual objects, compared to just reading from textbooks (Karacan & Akoğlu, 2021).

The Ease-of-Use dimension shows that most students feel that AR is easy to use, although some experience technical obstacles such as long loading times and unstable internet connections. This finding supports the research of Alzahrani (2020), which states that the successful implementation of AR in education depends heavily on ease of access and the availability of adequate technological infrastructure. In addition, in the Learning Usefulness dimension, many students revealed that AR helped them understand the material faster than conventional methods. This is in line with research by Majid & Salam (2021) which found that

the use of AR in language learning improves students' understanding of concepts and engagement, especially in the aspect of vocabulary enrichment.

The Technology Features & Engagement dimension also shows that students really like the 3D visual features, animations, and direct interactions provided by AR. Dual Coding Theory (Paivio, 1971) explains that the combination of verbal and visual information can improve students' understanding and memory of the material being studied. Thus, the interactive features of AR help students connect English words with more concrete visual representations, accelerating their learning process (Tsai Taiwan & Tsai, n.d.). However, although student engagement is increasing, there are still challenges in the use of AR that need to be overcome, such as technical glitches and lack of feature variety.

From the Achievement of English Learning Outcomes dimension, most students feel that AR helps them improve speaking skills and enrich vocabulary, but some students state that the impact is not much different from traditional methods. This shows that although AR can improve certain aspects of English language learning, its effectiveness still depends on how this technology is integrated with appropriate teaching strategies. Hwang et al. (2021) found that AR is more effective when combined with task-based learning methods, in which students not only use technology, but are also active in speaking and interacting using the target language.

b. Student Experiences in Learning English with Augmented Reality

The results of the interviews showed that most students had a positive experience using AR to learn English. They felt that AR created a more interactive and enjoyable learning environment, which helped them understand the material better. This finding is in line with the theory of Experiential Learning (Kolb, 1984), which emphasizes that direct experience can increase students' understanding and

involvement in the learning process. Students who use AR can see and interact with virtual objects, which makes them feel more emotionally and cognitively involved in learning. One student stated:

> "I feel more focused when learning with AR because I can see objects directly, as opposed to just reading a book."

This statement shows that the sensory experience provided by AR helps students focus and understand concepts more quickly.

In the Helpfulness dimension, most students stated that AR helped them understand English concepts, especially in recognizing new objects and vocabulary. One student said:

> "I find it easier to memorize new words because I can see the image directly in AR."

This finding is supported by the Multimedia Learning theory (Mayer, 2005), which states that the combination of images and text can improve students' memory and understanding. A study by Cheng & Tsai (2020) also found that the use of AR in language learning can improve student vocabulary retention better than traditional methods. However, some students in the interview stated that AR did not have much effect on grammar, which shows that its effectiveness may be more limited to the visual aspects of learning.

In the motivation dimension, almost all students stated that AR increased their interest in learning English. The interesting visuals and high interactivity made them more eager to learn. One student revealed:

> "I am more enthusiastic about learning because AR makes me feel like I'm playing while learning."

This statement is in line with the Self-Determination theory (Deci & Ryan, 1985), which emphasizes that intrinsic motivation increases when learning feels enjoyable and relevant to students. A study by Ibáñez & Delgado-Kloos (2018) also found that AR can increase students' motivation in technology-based learning, especially when used in an interesting and challenging context. However, some students feel that

their motivation remains the same because they are more accustomed to learning with conventional methods.

Although the students' experience was generally positive, there were some challenges faced in the use of AR. The main issues raised by students were technical limitations, such as long loading times, lag when using the application, and unstable internet connections. One student complained:

> "I like using AR, but often the application is slow, or it takes a long time to load images."

This finding is in line with the research of Wang et al. (2021), which shows that technical constraints are often the main obstacles to the implementation of AR in learning. Another challenge is that some students take time to adapt to new technology, although once they get used to it, they feel more comfortable using it. Therefore, to increase the effectiveness of AR, there needs to be more responsive technology development and better training for students and teachers.

Several previous studies have investigated the effectiveness of Augmented Reality (AR) in language learning, primarily focusing on students' academic performance through test results. For instance, research by Huang et al. (2020) and Liu et al. (2017) demonstrated that AR-assisted learning significantly improved students' vocabulary acquisition and comprehension skills. However, these studies often relied solely on quantitative assessments, such as pre-test and post-test scores, without considering students' perceptions, motivation, or engagement in learning.

In contrast, this study not only examines the impact of AR on students' learning outcomes but also explores their subjective experiences, perceptions, and engagement when using AR in the classroom. By integrating qualitative methods, such as open-ended questionnaires and interviews, this research provides a more holistic understanding of how AR influences both cognitive and affective aspects of learning. This distinction highlights the unique contribution of the present study, which bridges the gap in prior research by capturing students' personal experiences alongside their academic performance.

To illustrate the key differences between this study and previous research, the following table summarizes the focus and methodological approaches used:

Aspect	Previous Studies	This Study
Focus	Effectiveness of AR in improving test scores	Effectiveness of AR + students' subjective experiences
Methodology	Quantitative (pre-test and post-test)	Mixed method (pre-test & post-test + interviews & questionnaires)
Student Engagement	Not examined in depth	Explored through qualitative data
Motivation & Perception	Often overlooked	Analyzed as key variables
Challenges in AR Usage	Rarely discussed	Identified and addressed through student feedback

Table 4.8 Comparison with Previous Studies

The table clearly demonstrates that while previous studies have established the positive impact of AR on language learning, they often overlook the experiential aspects that influence students' learning processes. By incorporating students' voices through qualitative data, this research provides deeper insights into the strengths and limitations of AR in real classroom settings. This comprehensive approach not only validates the effectiveness of AR in improving learning outcomes but also emphasizes the importance of user experience in sustaining engagement and motivation.

Thus, the findings of this study offer a more nuanced perspective, advocating for a learner-centered approach in AR-based education. Future research should consider integrating both quantitative and qualitative analyses to gain a holistic understanding of AR's role in language learning.

The results of the questionnaire and interviews show that students in general have positive perceptions and experiences in using Augmented Reality (AR) to learn English, especially in understanding vocabulary and engagement in learning. The results of the questionnaire confirm that most students find AR easy to use and

help them understand vocabulary better, although some face technical challenges such as slow loading and unstable internet connections.

From the perspective of the learning experience, students showed enthusiasm for the use of AR, stating that this technology increased their motivation and made learning feel like an interactive game, as reflected in the results of the questionnaires and interviews.

Despite these challenges, both in terms of student perception and experience, AR has proven to be an effective and engaging learning tool, especially when integrated with a well-structured teaching strategy. Conducting this research at SMP IT Wahdah Islamiyah Makassar presented a unique challenge. On one hand, the school administration welcomed innovation in teaching methods. On the other hand, the institution had strict regulations regarding smartphone use in school settings, making the integration of AR somewhat challenging. Negotiations were required to ensure that the research could be conducted without contradicting school policies. The school administration permitted AR usage under teacher supervision, ensuring that technology served as a learning tool rather than a distraction. This experience underscores the importance of institutional adaptability when implementing digital learning tools, this research investigates how AR can still be effectively integrated into English language learning despite such limitations. The findings suggest that AR can be a valuable tool even in restrictive settings, provided that appropriate scaffolding and structured implementation strategies are in place

CHAPTER V

CONCLUSION AND SUGGESTION

This chapter presents the conclusion and recommendations derived from the findings and analysis discussed in the previous chapters. The conclusions encapsulate the core insights gained from the research, aligning with the objectives and research questions formulated at the outset. Furthermore, this chapter offers practical and theoretical recommendations intended to address the identified gaps and to contribute to the body of knowledge within the research domain. By synthesizing the results, this chapter not only highlights the implications of the study but also outlines potential pathways for future research and actionable strategies for stakeholders. This final chapter serves as a culmination of the study, emphasizing its significance and utility while offering constructive perspectives for application and further exploration.

A. Conclusion

This research journey began with a curiosity about how Augmented Reality (AR) could enhance students' English learning experiences. Initially, the research focused on investigating AR's effectiveness in engaging students and improving their learning outcomes. However, as the study progressed, new insights emerged. It became evident that while AR provided significant benefits in engagement and motivation, its effectiveness varied based on technical constraints, user familiarity, and integration within the school's curriculum. The more the Researcher explored AR's application in the classroom, the more the more the Researcher realized the need for improvement in terms of instructional design, user accessibility, and infrastructure support. These reflections highlight the dynamic nature of research, where initial assumptions evolve as new discoveries unfold.

This conclusion summarizes the key findings of this study, determine whether AR could enhance students' English proficiency. However, as the research progressed, it became evident that the impact of AR extends far beyond quantitative measures of achievement. Learning is not solely about outcomes; it is also about how students engage with knowledge, how motivated they feel, and how supported they are throughout the process.

1.   The Impact of Augmented Reality (AR) on English Learning Outcomes

The findings of this study affirm that technology, when applied effectively, can significantly enhance learning experiences. The notable improvement in post-test scores among students using AR suggests that this tool aids comprehension and retention, particularly in vocabulary acquisition. However, education is not just about numerical gains; it is about creating meaningful learning experiences. While AR has demonstrated its potential to improve learning outcomes, this study also underscores that technology alone is not a universal solution. The success of any educational innovation depends not only on the tool itself but also on how it is integrated into the curriculum, the pedagogical strategies employed, and the level of support teachers provide.

2.   Students' Experiences and Perceptions of Using AR in English Learning

Beyond academic performance, this study explored students' personal experiences with AR. Many students expressed enthusiasm for AR's interactive and visual features, which made learning more engaging and enjoyable. However, it is equally important to acknowledge the perspectives of students who found AR less impactful. Some struggled with technical issues, while others felt that AR alone did not dramatically change their understanding of English. This highlights a crucial reality: no single technology can universally transform learning for all students.

Effective education requires not just the presence of innovative tools but also thoughtful integration that aligns with students' diverse needs and learning styles.

This brings us to an important insight—AR is not a one-size-fits-all solution. While it was beneficial for many, others may need different forms of support or alternative instructional approaches. The real challenge lies not only in integrating AR into classrooms but also in ensuring that its use aligns with students' varied learning preferences. This study emphasizes the need for a balanced approach—one that embraces educational innovation while remaining responsive to the real challenges faced by both students and teachers. However, this study has some weaknesses that need to be considered. The sample coverage is limited to only one school, so the results cannot be generalized to a wider context. In addition, the relatively short duration of the study does not allow evaluation of the long-term impact of AR implementation in learning. Some students also faced technical difficulties in operating the AR application, which could potentially affect learning outcomes. External factors such as the readiness of technological infrastructure and teachers' ability to utilize AR have not been the main focus of this study, thus opening up opportunities for more in-depth follow-up research related to the optimization of AR implementation in various educational contexts(Domaz, n.d.).

B. Suggestions

Based on the findings of this study, several recommendations can be made to enhance the effectiveness and implementation of Augmented Reality (AR) in English language learning. While AR has proven to significantly improve learning outcomes, engagement, and motivation, certain challenges, such as technical limitations and integration with teaching strategies, need to be addressed for optimal use. The following suggestions are directed toward teachers, students, and developers to refine AR-based learning approaches, ensuring better accessibility,

usability, and pedagogical alignment. Additionally, future research directions are proposed to further explore the long-term impact of AR on English language proficiency and learning retention.

The novelty of this study lies in its focus on how AR can be adapted for use in an environment where technological access is not as open as in conventional schools. Unlike previous research that primarily examines AR's effectiveness in well-equipped classrooms, this study demonstrates that AR can be implemented successfully even with technological limitations. By highlighting students' perceptions and learning experiences, this research provides deeper insights into how AR affects motivation and engagement. Moreover, by conducting this study in an Islamic school, this research also sheds light on how AR can align with values-based education models, ensuring that technological advancements support—not contradict—the institution's pedagogical framework

1. Suggestions for Teacher

Teachers are advised to broaden their knowledge of Augmented Reality (AR) technology by attending relevant training or workshops. With a better understanding of AR, teachers can design creative and innovative learning strategies to increase student engagement. In addition, teachers need to ensure that the use of AR is integrated with clear learning objectives, so that this technology is not just an additional tool, but also as the main means to improve students' understanding of the material. Teachers are also expected to provide adequate assistance to students who may experience technical difficulties in using AR.

Given the promising yet complex nature of AR in education, I strongly recommend that teachers receive proper training on integrating AR into their lesson plans. While students found AR engagement, they also faced difficulties due to technical limitations. To maximize its effectiveness, schools must ensure stable

internet access and provide alternative instructional strategies when technical issues arise. Future research should explore a more structured AR integration model that accommodates varying levels of digital literacy among students and teachers.

2. Suggestions for Students

Students are expected to be more proactive in utilizing AR technology to support their learning. Students can try to explore AR features outside of study hours to deepen their understanding of the material taught in class. In addition, students also need to develop digital literacy skills to optimally utilize this technology. An open attitude towards technological innovations such as AR will help students not only improve learning outcomes but also prepare them for the challenges of the ever-evolving digital era.

3.Suggestions for Curriculum Developers

Curriculum developers are advised to include technologies such as AR as part of the technology-based learning approach in the national curriculum. AR implementation guidelines should include integration strategies in various basic competencies and learning achievement indicators. In addition, the curriculum should be designed to provide flexibility for teachers and students in using this technology, accompanied by the provision of technical guidance and training for educators. Curriculum developers also need to ensure that supporting technological facilities, such as AR devices and internet access, are available in schools to maximize the benefits of this innovation.

While this research focused on a single institution, the insights gained can be valuable for teachers in other schools. For educators interested in implementing AR, a phased approach is advisable starting with simple AR applications that align with existing lesson plans. Additionally, collaboration among teachers, IT specialists, and school administrators can foster a more sustainable adoption of AR

in language learning. Schools may also consider adopting policies that allow controlled and purposeful use of technology in classrooms, ensuring that digital tools support rather than hinder the learning process.

4.Suggestions for Future Researchers

Future researchers are advised to expand the scope of research related to the use of AR, both in the context of other subjects and at various levels of education, to evaluate the effectiveness of this technology more comprehensively. Long-term research is needed to determine the impact of AR on learning in a sustainable manner, including aspects of motivation and 21st century skills. In addition, studies that examine the effectiveness of various AR applications, technical constraints, and educational infrastructure readiness will be important contributions to optimize the implementation of this technology in education. Researchers can also explore how AR can support inclusive learning for students with special needs.

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