CHAPTER II
LITERATURE REVIEW

A. Theoretical Framework

1. Augmented Reality (AR) in Education

An augmented reality can be described as "a live, direct or indirect view of a physical, real-world environment whose elements are augmented by computer-generated sensory input such as sound, video, graphics, or CPS data," according to Koch (2016) (p. 124). It is the procedure for fusing real-time, digital data with digital data from the outside world. With augmented reality (AR), for instance, students could point a smartphone at a street scene in a metropolis and get feedback about what they are seeing in both English and their local tongue. Through interaction with the actual and virtual worlds, augmented reality (AR) also enables pupils to learn new things. According to Boettcher's (2007) findings, interactive learning assignments increase student engagement and duration of study. By encouraging students to use all five senses while learning, augmented reality (AR) can improve language acquisition by making it more engaging and dynamic. As a result, it can both diversify instruction and raise student participation. Students' learning results can be enhanced by

this type of engagement (Chen & Wang, 2015; Solak & Cakır, 2015; Wen, 2021).

Hidayat (2021) highlights AR's effectiveness in subjects requiring visualization, such as science and language learning. For English language instruction, AR can improve vocabulary acquisition, pronunciation, and reading comprehension. The interactive 3D models, animations, and real-world overlays offer immersive ways for students to engage with language content, catering to diverse learning styles (Snelson & Hsu, 2019).

A few studies have also shown that augmented reality is effective when used in conjunction with language training. Augmented reality (AR) has shown to be a helpful tool that could enable the development of innovative materials for second-language instruction as well as immersive educational technology, claim Larchen Costuchen et al. (2021). Adding immersive augmented reality (AR) experiences into a user's cozy physical environment improved a sample group of twenty first century college students trying to learn a second language's performance on the vocabulary retrieval exam, which was the most groundbreaking finding of this study. Chen et al. (2022) also found that students showed a strong desire to learn through contextualized AR enhanced learning. Higher

levels of motivation for proactive learning, self efficacy, and learning value were demonstrated by skilled learners.

Furthermore, as augmented reality (AR) can be a useful tool in English instruction, the study centers on its application to vocabulary development. But just the pre-test, post-test, and observation checklist used throughout the observation, assessment, and reflection phases are covered in this work. Ultimately, instructional activities ought to align with both the present requirements and the needs of the students (Kirmizi and Komec, 2019). Compared to utilizing printed flashcards for vocabulary learning, augmented reality (AR) offers a variety of engaging visual media that might enhance instructional tactics. This is why it was chosen for this study. Vasilevski & Birt (2020) went on to say that educators should take into account the fact that pupils learn best while utilizing virtual media as opposed to reading or listening.

2. AR in Language Learning

Augmented Reality (AR) is a real-time depiction that enables users to interact with the real environment in a more enhanced fashion using computer-generated visuals, sounds, or videos (Zhang, 2018). Because mobile touch screen applications can present children with new chances for language acquisition, their usage as an auxiliary tool in language teaching and learning is crucial (Mozaffari &

Hamidi, 2023). (Booton et al., 2021). Teaching foreign languages is challenging, though, and requires useful techniques to keep students from getting bored. By combining virtual and real-world settings, augmented reality (AR) can offer an enhanced learning context that can improve children's language learning experiences. Berland et al. (2013) carried out research on augmented reality collaborative modelling. According to the authors, using augmented reality (AR) tools may improve students' perceptions of their own efficacy and self, which may have a direct effect on students' performance. The authors also outlined the drawbacks of augmented reality (AR) tools, pointing out that students' familiarity with real world environments and their prior knowledge may influence the AR environment.

The use of Augmented Reality (AR) in English language learning can be applied through various teaching techniques and strategies that emphasize interactive and contextual learning experiences. One commonly used strategy is contextual learning, which involves presenting 3D virtual objects that are relevant to vocabulary or material so that students can connect language with real visual representations. For example, learning the word "apple" by displaying a 3D model of an apple in the classroom. In addition, game-based learning strategies

utilize AR to create educational games that involve object searches or interactive quizzes so that students learn while playing with higher motivation. Another technique is collaborative learning, where students work in groups to explore AR objects, discuss vocabulary, or complete project based tasks together. AR also supports discovery learning, as students can independently explore virtual objects, observe details, and relate them to the linguistic knowledge being studied. Previous research shows that this strategy effectively increases student motivation, engagement, and understanding because AR provides more realistic, immersive, and meaningful learning than conventional methods (Ibáñez & Delgado-Kloos, 2018; Akçayır & Akçayır, 2017).

Nevertheless, the aforementioned studies have frequently overlooked how AR technologies can benefit children and how they were incorporated into teaching and learning in favor of concentrating on the advantages and restrictions of AR applications. This study will methodically investigate the impact of augmented reality (AR) on language acquisition and the ways in which AR tools might be integrated with language learning, drawing upon the application of AR in prior research.

3. Theories of Learning and AR

According to Van Krevelen and Johnson (2010), augmented reality (AR) can be utilized as a teaching tool that enables students to engage with virtual items in both virtual and real-world settings with ease. Additionally, new forms of teaching and learning will result from students adopting AR as a teaching tool. Instead of learning as only memorizing facts, augmented reality (AR) can assist students in immersing themselves in the features of the course material.

Yuen, Yaoyuneyong, and Johnson (2011) suggested that augmented reality could offer students a new kind of educational resource. Benefits of using AR in the classroom include: 1) Interaction: visual and auditory stimuli can spark schoolchildren's curiosity and boost their willingness to learn; kids can utilize it with ease and engage in discussions about it. 2) Sensory feedback: By allowing schoolchildren to explore the area created by virtual objects and the actual surroundings, the 3D real-time model helps students become immersed. 3) Spatial association: It's simple to determine the spatial relationships between every virtual object, every actual object, and the space. 4) Learning novelty: AR can function as multimedia because to its innovative method of knowledge presentation and its intuitive and simple interaction, which can make learning

enjoyable for students and spark their interest and motivation.

Constructivism, sociocultural theory, and connectivism are believed to guide the use of AR among many theories of language acquisition and learning because of some of its attributes (Zhang, Wang & Wu, 2020, p.219). Nonetheless, task-based language teaching (TBLT) and communicative language teaching (CLT) are two approaches that could serve as the foundation for AR. According to constructivist theorists (Bruner, 1996; Dewey, 1916; Piaget, 1973), students combine previously learned material with newly acquired information to create their knowledge. This concept is based on students' active participation. Problem-based, situation-based, and discovery-based learning theories are all founded on constructivist theory. Wang et al. (2018) claim that AR-supported learning is a contemporary paradigm with constructivist roots since it enables students to study in a context-specific environment. Students can absorb, learn, and create knowledge with the use of AR-based language resources. They can then use their kinesthetic and critical thinking abilities to apply this knowledge to their productive work (Liu & Tsai, 2013).

The implementation of Augmented Reality (AR) through 3D object manipulation techniques can be done by utilizing three main categories of interaction, namely touch-

based interaction (TBI), mid-air based interaction (MBI), and device-based interaction (DBI). In TBI, users can translate, rotate, and scale objects with touch gestures such as dragging, pinching, or two-finger rotation on the device screen, while MBI allows manipulation through hand movements in the air with the support of a depth camera or hand tracking. Meanwhile, DBI utilizes device movements (such as rotating a cell phone) to control the orientation of objects in real space. These three techniques have advantages and limitations: TBI is relatively precise and familiar to users, MBI is more natural but prone to fatigue, while DBI is effective for large-scale rotation but requires intuitive motion mapping (Goh et al., 2020).

In practice, AR implementation with 3D object manipulation requires a pipeline ranging from tracking & registration (SLAM, plane detection) to input mapping that connects gestures to object transformations. Interaction stability can be improved with filtering such as smoothing or Kalman filters, while the user experience is enhanced through visual feedback (highlight, ghost preview) and snapping mechanisms so that objects look realistic and are embedded in the real environment (ACM, 2012). For 3D asset sources, platforms such as Hedra can be used in the content creation stage, as Hedra enables the creation of AI-based characters or animations that can be exported to 3D

formats. Thus, Hedra does not function as a direct AR platform, but rather as a provider of assets/animations that can then be manipulated in an AR environment using existing 3D interaction techniques (Hedra, 2025).

This study will create an educational tool for learning English vocabulary that uses augmented reality vocabulary cards. The foundational vocabulary of object recognition is learned through English vocabulary development. A voice has also been included in this English vocabulary learning app to help with proper pronunciation. Real things and sounds will be displayed in the learning materials, making it simpler for students to learn and comprehend English terminology in both writing and proper pronunciation.

B. Previous Research on AR in Language Teaching

The application of augmented reality (AR) as a teaching tool in language instruction has attracted increasing attention. One notable study, "The Effect of Augmented Reality on the Language Learning Process: A Review of the Literature," by Akçayır & Akçayır (2017), emphasizes how AR might improve language engagement and acquisition. This review summarizes the results of several studies, highlighting the potential of augmented reality (AR) to offer immersive experiences that support grammatical comprehension and vocabulary retention. The authors came to the conclusion that augmented reality (AR) technologies have a positive impact on

motivation and language understanding, which supports the use of technology in language instruction.

Cheng and Tsai (2019) did a noteworthy study named "Exploring the Use of Augmented Reality in English Language Learning," which looked at the effects of AR applications on junior high school students' educational experiences. The study, which used a mixed methods approach, discovered that AR applications enhanced speaking and listening abilities in addition to increasing student engagement. The qualitative information gathered from student interviews indicated that the interactive aspects of augmented reality promoted increased engagement and cooperation in language learning exercises.

Similar to this, an experimental study titled "Augmented Reality-Based English Vocabulary Learning: An Study" was carried out by Hwang et al. (2016). The purpose of this study was to find out how well augmented reality (AR) helps elementary kids learn vocabulary. Students' vocabulary test scores significantly improved, according to the results, suggesting that augmented reality (AR) could be a useful tool for language learning. Furthermore, in contrast to conventional approaches, the students expressed greater levels of enthusiasm and motivation in learning English through augmented reality.

Santos et al. (2021) conducted a study named "The Role of Augmented Reality in Enhancing English Learning: A Case Study" to further investigate the effects of AR on language acquisition. The results showed that incorporating augmented reality (AR) into language instruction improved students' overall understanding and helped them visualize abstract ideas. According to the study's findings, augmented reality (AR) can be a useful tool for language instructors who want to create a more engaging and dynamic learning environment.

Overall, these studies underscore the effectiveness of Augmented Reality in language teaching, particularly in enhancing student engagement, motivation, and language skills. The positive outcomes associated with AR suggest its potential as a transformative tool in the educational landscape, particularly for language learners.

C. Conceptual Framework

This study consists of two variables, namely the independent variable (X) and the dependent variable (Y). The independent variable is the Augmented Reality (AR) as a tool, while the dependent variable is Students' English Vocabulary Mastery. The purpose of this research is to find out whether the Augmented Reality (AR) is an effective learning method for students. The following graph describes the conceptual framework of this research as follows:
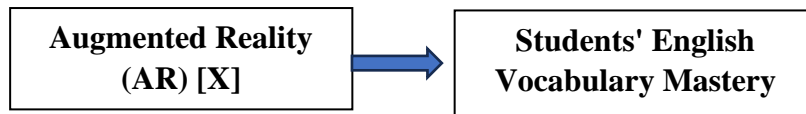
| **Augmented Reality (AR) [X]** | → | **Students' English Vocabulary Mastery** |

Figure 1. Conteptual Framework

D. Hypothesis

The formulation of this research hypothesis can be described below:

1. Alternative Hypothesis (Ha): Using Augmented Reality (AR) [X] has a favorable and significant effect on students' English vocabulary mastery[Y] at SMP ISLAM seventh grade. Salutations to AL AZHAR 52 Kota Bengkulu.

2. Null Hypothesis (Ho): Students' English vocabulary mastery [Y] at seventh grade SMP ISLAM is not positively and significantly impacted by using Augmented Reality (AR) [X]. Salutations to AL AZHAR 52 Kota Bengkulu.