IMPLEMENTATION OF AUGMENTED REALITY-BASED LEARNING MEDIA TO IMPROVE THE READING SKILLS OF INDONESIAN MIGRANT WORKERS' CHILDREN IN SB KUBU GAJAH SELANGOR, MALAYSIA

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Abstract: The purpose of this study is to examine in more depth how the implementation of augmented reality (AR)-based learning media improves the reading skills of Indonesian migrant worker children in Kubu Gajah, Selangor, Malaysia. Migrant worker children often face challenges in accessing quality education and learning. This study uses a quantitative method with a survey. The population in this study were all students registered at the school with a total of 20 students, which can be called a saturated sample. It is done by testing prerequisites and hypotheses. Linearity Test Results: Sig = 0.000 <0.05, indicating linear data. Normality Test Results: Sig (2-tailed) = 0.200 > 0.05, indicating normally distributed data. R-Square Test Results: R = 0.725, indicating 72.5% of reading skill variables are influenced by the use of AR media. Regression Test Results: Sig = 0.000 <0.05, indicating a significant effect of AR media on reading skills.

Keyword: augmented reality; reading interest; education; technology

I. INTRODUCTION

Developing literacy is very crucial for students, because in the sense of literacy is a general skill that students should have to carry out their lives in the future. Especially in the development of digital literacy in this sophisticated era. Adam and Hamm on (Widyastuti et al., 2016) emphasized that literacy is "the ability to see, hear, write, read, speak and think". However, the fact is different, according to UNESCO, the reading interest index of the Indonesian population is only 0.001%, which means that out of a thousand Indonesians, only one individual likes to read. The Ministry of Communication and Informatics of the Republic of Indonesia on its official website has also released the results of research entitled Word's Most Literate Nations Ranked conducted by Central Connecticut State University in March 2016, Indonesia is ranked 60th out of 61 countries in terms of reading interest, only better than Botswana (61) and below Thailand (59).

However, in terms of facilities that support reading activities, Indonesia actually has a higher order than several European countries (Liestari & Muhardis, 2020). One of the literacy indicators emphasized by various global initiatives is skills in reading and math. Based on the analysis of PISA 2018, students' basic reading ability is positively influenced by factors such as pleasure in reading, reading metacognition strategies, and discipline conditions in the classroom. These three aspects play a role in increasing students' interest in reading (OECD & UNICEF, 2021). Instilling an interest in

reading from an early age is very important, especially when children are just starting to learn to read or even when they are just starting to learn things (Rukayah et al., 2023). This will increase children's interest in reading in the future. In the achievement of PISA 2018, Indonesia was ranked 10th lowest out of 79 countries that joined. The average reading ability of Indonesian students is 80 points adrift below the OECD average. Indonesian students have skills in reading, mathematics, and science, respectively, 42 points, 52 points, and 37 points adrift of the average achievement of ASEAN students(Machromah et al., 2020).
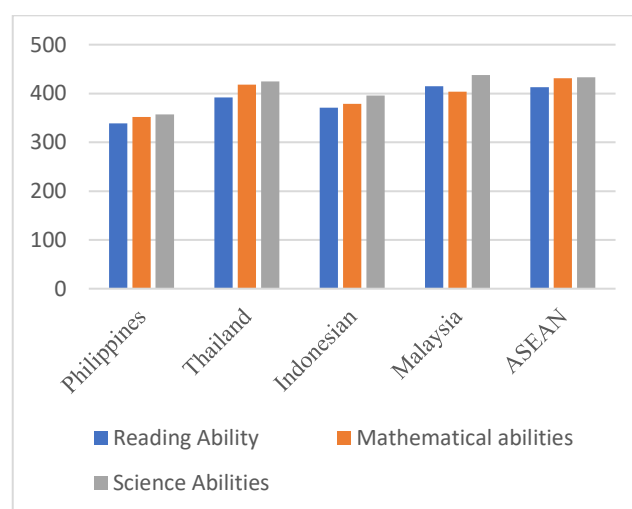
Figure 1. Literacy Ability Score Chart in ASEAN Source: Puspendik (2019)

The graph below shows the PISA (Programme for International Student Assessment) figures for Indonesia from 2003 to 2022 in three categories: Reading Score, Math Score, and Science Score. In general, Indonesia's PISA score shows that there are fluctuations in each category with varying trends. Reading scores show a decline over time, while math and science scores tend to be more stable but do not show significant improvement.
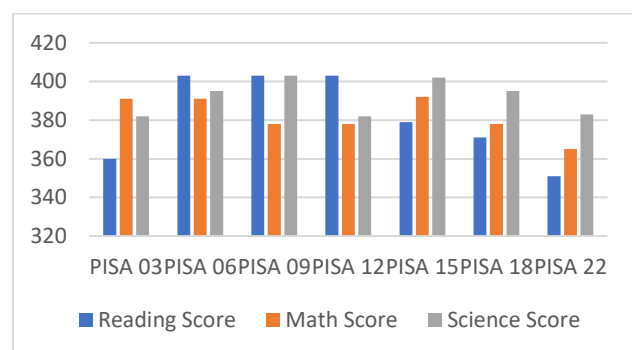

Figure 2. PISA (Programme for International Student Assessment) Score

The results of the researcher's initial observation at the Elephant Camp Guidance Studio consisting of 20 students. Of the 20 students with different abilities or strata, some experienced slow learning. At the age of 15-17 years they still have little ability, only 3 students have moderate skills in the fields of reading, writing, and arithmetic. From this background, their abilities can be categorized below average based on (Ministry of Education and Culture, Directorate General of Early Childhood Education 2020), n.d.). Most of these abilities are hampered, because this child is very dependent on gadgets. Because they are facilitated by their parents who work full-time, so the ability to learn to read is very less than optimal. To divert them to be able to read, they need interesting media, one of the learning media techniques, namely "Augmented Reality Book" carried out by researchers as a solution to overcome obstacles. This activity was carried out for 3 months to carry out implementation trials.

This is supported by the results of children's reading skills from the results of observations made by researchers, which are as follows:
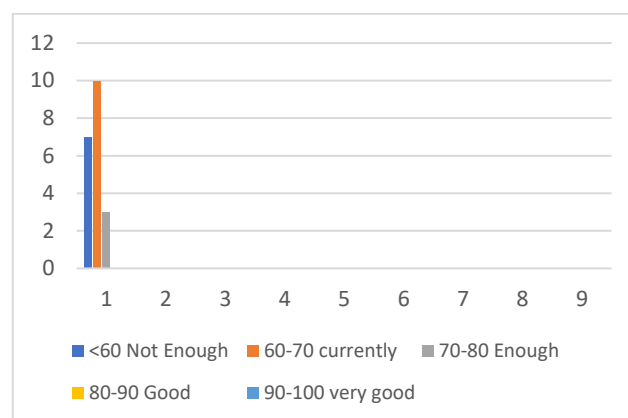

Figure 3. Reading Skills Value Chart for SB Kubu Gajah children

Based on the data from the comparison of the reading skills of SB Kubu Gajah children between pre and post, it showed a significant increase. Before learning, 7 children got a score below 60, while after that, no child got that score. A total of 10 children were in the 60-70 score range in the pre-test, but this number dropped to only 3 children after learning. In the range of 70-80 scores, only 3 children achieved it on the pre-test, while after learning, this number increased to 10 children. In addition, scores in the 80-90 and 90-100 ranges also increased: in the pre-test, no child was in the 80-90 range, while after the test, 4 children achieved it. Likewise, in the range of 90-100, which was previously empty, now there are 3 children who have obtained this score. Overall, these data illustrate significant progress in children's reading skills after learning.

The novelty of this study is the focus of research that prioritizes the reading skills of Indonesian migrant workers in SB Kubu Gajah Selangor, Malaysia, in this case this study examines more specifically about the use of Augment Reality (AR) media compared to other previous studies, with the hope that the results of this study are useful to determine the effectiveness of literacy implementation, such as reading skills, the ability to write, and retell. So, the purpose of this study is to find out how the implementation of the learning media is to improve reading skills. Facilitate their steps towards the future with challenges that must be passed.

II. RESEARCH METHOD

This study employs a quantitative method with a survey to test the effectiveness of Augmented Reality (AR) in improving the reading skills of Indonesian migrant workers' children at SB Kubu Gajah, Selangor, Malaysia. The population of this study consists of all the students enrolled at the school, totaling 20 students, which can be considered a saturated sample (Laili et al., 2025). The data instrument used is a reading test administered to students before and after the implementation of AR-based media. The data collected were analyzed quantitatively using Descriptive Statistics and a Paired T-Test. Descriptive statistical analysis was used to describe the average test results and students' perceptions, while the paired t-test was used to determine if there was a significant difference in reading skills before and after the use of AR-based media.

Prior to further analysis, prerequisite tests and hypothesis tests were conducted, namely (Malay, 2022): Prerequisite Test:
1. Normality Test
2. Linearity Test Hypothesis Test:
3. R Square Test
4. Regression Test

Several experts also argue that Augmented Reality technology can have a positive impact on learning. According to Dede (2009), AR allows students to interact directly with content, which can enhance their understanding of the subject matter. Additionally, Hockly (2013) suggests that AR-based media increases student engagement in a more enjoyable and stimulating way, thereby boosting their learning motivation. In the context of this study, the use of AR is expected to significantly influence the improvement of students' reading skills, in line with the view that technology can enrich the learning experience more effectively.

III. RESULT AND DISCUSSION

The results section reveals the results of the linearity and normality tests. The results obtained provide a clear picture of the influence of the variables studied on students' reading skills, and show that there is a significant difference between the conditions before and after the treatment.

Prerequisite Test:
Linearity Test Results

Based on the results of the linearity test, it is known that the Sig value is 0.000<0.05 so it is concluded that the data is linear and can be accounted for.

Normality Test Results

One-Sample Kolmogorov-Smirnov Test		Unstandardized Residual
N		20
Normal Parametersa,b	Mean	0
	Std. Deviation	5.23270944
Most Extreme Differences	Absolute	0.149
	Positive	0.149
	Negative	-0.106
Test Statistic		0.149
Asymp. Sig. (2-tailed)		.200c,d

a Test distribution is Normal.
b Calculated from data.
c Lilliefors Significance Correction.
d This is a lower bound of the true significance.

Based on the results of the normality test using the Kolmogorov smirnov test, it is known that the Niilai Sig (2-Tailed) is 0.200, which is known that the criteria for accepting the normality test of the Sig value must be >0.05, then the data is said to be normal, based on the results, it can be concluded that the data is normally distributed.

Hypothesis Test:
R Square Test Results

Model Summary

| Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.725a	0.526	0.499	5.376

a Predictors: (Constant), post

Based on the results of the calculation of the R-Square test, it is known that the R value is equal to the R Square value of 52.6%, so that the remaining 47.4% is influenced by other factors outside the variables studied.

Regression Test Results

		Coefficientsa				
		Unstandardized Coefficients		Standardized Coefficients	t	Mr.
Model		B	Std. Error	Beta		
1	(Constant)	11.614	11.76		0.988	0.336
	post	0.659	0.148	0.725	4.465	0.000

a Dependent Variable: reading skills

Based on the results of a simple linear regression test, it is known that the value of the sig found is 0.000<0.05 so that it meets the criteria or. H0 was rejected and Ha was accepted or there was an influence from the use of media in improving reading skills.

Regression Line Equation Results
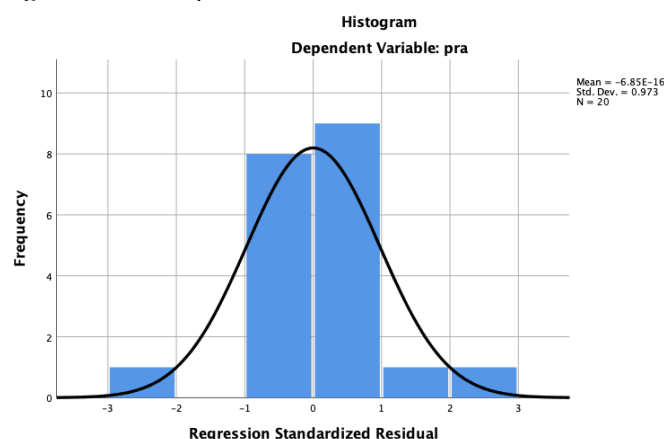
Reading ability is a fundamental skill that must be possessed by every student, including children at SB Kubu Gajah, Selangor, Malaysia. However, the challenge in improving their reading skills is considerable, considering the many factors that influence, ranging from low interest in reading to the limited learning media available. In reading theory, the pleasure of reading is the main aspect that can improve students' literacy. Fun reading activities not only serve as entertainment, but also enrich vocabulary and deepen understanding of texts. A study shows that 79% of students who enjoy reading have a better understanding of reading and have the potential to become lifelong readers (Abdullah et al., 2012). However, at SB Kubu Gajah, only a small percentage of students have the pleasure of reading, so efforts are needed to increase their interest in literacy activities.

In addition to the pleasure of reading, awareness of the benefits of reading is also an important factor in building a literacy culture. The School Literacy Movement initiative in

Indonesia has proven that increasing reading awareness is able to encourage student participation in various literacy activities (Ningsih et al., 2022). At SB Kubu Gajah, awareness of the importance of reading is still at an intermediate level, which is caused by the lack of interesting learning media. Children who have limited access to relevant and interesting reading materials often lack awareness of how important reading is to their intellectual development. For this reason, an effective strategy is needed in fostering reading awareness from an early age.

Reading frequency also has a big impact on improving students' literacy skills. Students who read frequently, both in their native and foreign languages, have a broader vocabulary and easier to understand reading texts. However, the phenomenon that occurred at SB Kubu Gajah shows that the frequency of reading for students is still very minimal. Many of them are not used to reading regularly, either because of the lack of access to interesting reading materials or because of less supportive environmental factors. This low reading habit has an impact on their low literacy competence, especially in understanding and analyzing texts (Valero-Porras et al., 2015).

In addition, reading quality also plays an important role in improving students' reading skills. Optimization of reading ability can be achieved through a constructivist-based learning approach and formative evaluation. In the context of SB Kubu Gajah, the application of Augmented Reality (AR) media in learning shows quite positive results. Some students who previously had reading difficulties began to show progress by being able to retell the content of the readings they had read (Tezer et al., 2019). The use of this technology allows students to better understand the text through interactive visualizations that are engaging and easy to understand.

As an innovative solution, researchers introduced Augmented Reality (AR)-based learning media designed to improve students' reading skills in a more interactive way. AR offers a more engaging learning experience by presenting 3D visual displays and animations that help students understand the material more easily. This technology not only provides entertainment, but it also assists students in building more active and productive reading habits. In its implementation, AR media is applied through three main stages. In the pre-use stage, initial observations were made of students at SB Kubu Gajah which showed that most of them had below-average reading skills. This is due to the dependence on gadgets and the lack of structured study time.

Figure 8. Augmented Reality Book Project Results

When using AR media, students are invited to interact with reading materials that are presented visually and more interestingly. For three months, this program is carried out through online and offline learning with direct supervision from researchers to ensure the effectiveness of media in improving students' literacy skills. After the application of AR media, the results showed a significant improvement in students' reading ability. Those who were previously at a low reading level began to show a better understanding of the text, while students with moderate abilities experienced greater improvement. In addition to improving reading skills, the use of AR has also succeeded in fostering higher learning motivation among students (Putra Socrates & Mufit, 2022).

The application of AR in education has been shown to be able to improve literacy skills in various aspects, including reading, writing, speaking, and listening. Previous studies have also shown that AR technology has great potential in increasing learning motivation and developing students' critical thinking skills. By utilizing this technology, students not only learn to read conventionally, but also get a more interactive and fun learning experience (Budiman, 2016; Nainggolan et al., 2019).

The successful implementation of AR media at SB Kubu Gajah shows that a technology-based approach can be an effective solution in improving students' literacy skills, especially for children of migrant workers who have limitations in accessing formal education. To ensure the sustainability of this program, collaboration between the government, educators, and education volunteers is urgently needed. Further research can also be conducted to explore the challenges and long-term impacts of the use of AR in literacy learning. By making optimal use of technology, it is hoped that Indonesian children abroad will still get equal educational rights and be able to improve their reading skills for a brighter future (Masruroh et al., n.d.).

IV. CONCLUSIONS

The implementation of AR-based learning media has proven to be effective in improving the reading skills of children of Indonesian migrant workers. The use of AR technology can attract children's interest and make the process of learning to read more interactive and fun. AR media is able to increase children's motivation to learn. The visual and interactive experience offered by this technology makes children more engaged and excited about learning, thereby reducing the boredom that is often experienced when learning to read conventionally. The success of AR media implementation also depends on the support of parents and the community. Education for parents about the benefits and how to use this learning media is very important in order to get a conducive learning space at home. Through the use of AR-based learning media, it is hoped that the children of Indonesian migrant workers in Selangor can have better reading skills, which in turn can open up greater opportunities for their education and future.

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