



The Effect of Augmented Reality-Based First Aid Health Education On Youth Red Cross at Titian Teras State Senior High School in Jambi City

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Abstract. Health education is a crucial aspect of guiding learners about health in a broad range, encompassing physical, mental, and social well-being. Schools, being environments where students are exposed to various hazards, are particularly vulnerable to accidents. First aid education is essential in preventing injuries and ensuring that students are equipped with the necessary skills to respond effectively in emergency situations. This study aims to evaluate the effect of Augmented Reality (AR) based First Aid health education on the knowledge of Youth Red Cross (PMR) members at Titian Teras State Senior High School, Jambi City. This study employed a quasi-experimental design with one pretest-posttest group without a control group. A total of 50 PMR members were involved, divided into an intervention group (n=25) and a control group (n=25). The intervention group received AR-based First Aid health education, while the control group received conventional methods. Data collection was conducted using a knowledge assessment tool, and pre- and post-test analyses were performed to evaluate the effectiveness of the intervention. The results showed a significant increase in the intervention group's knowledge. After the intervention, 80% of respondents in the intervention group achieved the "good" category, compared to only 36% in the control group. The Mann-Whitney test confirmed the significant difference between the two groups ($p < 0.05$), indicating that the AR-based First Aid health education was more effective in improving PMR members' knowledge compared to conventional methods. This study concludes that AR-based First Aid health education is more effective in improving PMR members' knowledge compared to conventional methods. The integration of AR technology in health education highlights its potential in enhancing learning outcomes and improving the preparedness of students in responding to emergencies. The findings suggest that AR can be a valuable tool in health education, particularly in first aid training, by providing an immersive and interactive learning experience that enhances both knowledge and skills acquisition.

Keywords: Health Education, First Aid, Drowning Victims, Knowledge, Lifeguard

1. INTRODUCTION

Health education programs in schools aim to improve learners' knowledge, attitudes and skills to prevent and reduce injuries in schools (Andi et al. 2023). Injury first aid emergency response health education is an example of health education that offers guidance or demands about health covering all aspects of health (physical, mental and social). Many potential threats, including biological, physical, and chemical safety factors, as well as mental health hazards, make schools relatively safe places for environmental risks (Denault, Ratelle, Duchesne, & Guay, 2019).

First aid, also known as first aid, is help that aims to provide emergency care to victims before medical personnel arrive (Djuwadi, 2021). First aid, also called first aid, is the initial management or assistance of a victim before medical personnel arrive (Djuwadi, 2021). which is given after an accident or illness occurs (Nurul Huda et al., 2021). Based on the above understanding, it can be concluded that first aid is the first action that must be taken after the

medical team arrives.

In 2020, the World Health Organization (WHO) stated that accidents are still the leading cause of youth death and disability. There are four main causes of death: car crashes 30%, accidents 15%, homicides 15%, and suicides 12%. All of these account for 72% of all deaths of adolescents aged 10 to 24. Furthermore, every year between 10 and 17 years old (Widiastuti & Adiputra, 2022). According to the 2018 Riskesdas conducted in 2018, the prevalence of injuries increased from 8.2% to 9.2%. Injuries were most common in the 5 to 24 age group, with the majority of injuries occurring in the home and its environment (44.7%) and also at school and its environment (6.5%) (Ministry of Health, 2018).

This shows that most emergency situations can happen to students from the earliest level to the highest level. These students are more prone to accidents due to their eagerness to learn something new. Help should be provided quickly and appropriately according to available resources and infrastructure. First aid procedures done correctly can prevent death and reduce disability or suffering of the victim, but if not done correctly, they can cause more severe injuries and even result in death (Oktaviani et al., 2020). When there is an emergency at school, knowledge and skills are needed to perform first aid. First aid must be done quickly and appropriately, so good knowledge is needed to do it. It is very important for teachers and PMR (Palang Merah Remaja) to understand how to handle students who experience emergencies at school (Mutmainah, 2020).

Palang Merah Remaja (PMR) is an organization assisted by the Indonesian Red Cross that is centered in schools and community groups such as studios and study groups. PMR is one of the extracurriculars related to health because they are a group of teenagers who focus on health in schools. To keep schools healthy, we must utilize the training of teenagers, who are an important part of the community. Health education, especially on first aid, is essential to improve the health of the school. awareness of the importance of health. First aid knowledge is very important for students so that they can help their friends or themselves in the event of an accident at school (Sri et al., 2021).

Previous research related to health education in first aid in syncope, one of which was regarding the effect of health education with audio-visual methods on first aid knowledge in students who experienced syncope, it was found that there was a significant effect of health education with audio-visual methods on knowledge (Sitorus et al., 2020).

Further research on the effect of health education with the peer group method on adolescent red cross students on the level of readiness for the first handling of syncope, found that the peer group method of health education can improve the readiness for the first handling

of syncope in Youth Red Cross students (Agustini et al., 2020).

Further research on the effect of health education on attitudes and practices on first aid for burn treatment, found that there was an effect of health education on attitudes and practices on first aid for burn treatment using video media and demonstration methods (Herlianita et al., 2020).

In this rapidly developing world, technological sophistication must be used to develop the first aid learning process. Augmented Reality (AR) is one of the technologies that has developed and started to be used in various sectors, including education. Multimedia software development consists of 6 stages, namely concept, design, material collecting, assembly, testing, down distribution. Applications of AR technology in health education include the use of augmented reality presentations such as Card Fist Aid and PowerPoint to improve students' knowledge and skills about first aid.

According to an interview with Zelda, the former head of PMR at SMAN Titian Teras, PMR activities are conducted every Friday. She also said that her PMR coach is a certified teacher, and she has limited time and communication with the coach. Therefore, the research entitled "The Effect of Augmented Reality-Based Fist Aid Health Education on the Youth Red Cross at Titian Teras State Senior High School" is intended to determine the effect of Augmented Reality-based Fist Aid Health Education on the PMR. Whether the use of AR can improve students' knowledge and skills about first aid, and whether AR can increase students' awareness about the importance of first aid

2. MATERIALS AND METHODS

The research was conducted using a quasi-experimental research method: one group pretest post test design without control group. In this design, one group is given two treatments and the results are measured before and after treatment. To make the sample representative, this study used 100 PMR members and a population (N) of 100 with a 10% margin of error. Thus, the sample used was 50 respondents. The total sampling method was used to select the sample. Thus, there were two treatments: treatment one offered the Augmented Reality-based First Aid education method and treatment two offered the traditional First Aid education method.

The research method involved a pre-test for each sample used, which totaled 50 respondents. For treatment one group, 25 people were selected for augmented reality-based fist aid health education. After treatment one, a second test was conducted to measure changes. For treatment two group, conventional fist aid health education was given. After the second

treatment, a final test was conducted to measure changes. This study used a questionnaire instrument to measure knowledge. The study was conducted at Titian Teras State Senior High School in Jambi City. Previous researchers conducted research on the effect of first aid training on the level of knowledge of PMR members at SMA Negeri 1 Pejagoan. The results showed that there was a difference in the level of knowledge of PMR members before and after first aid training.

3. RESULTS

Tabel. 1 Overview of Respondent Characteristic

Characteristics	Frequency (f)	Percentage (%)	Average
Respondents			
Age			16
16	32	64	
17	13	26	
18	4	8	
19	1	2	
Total	50	100	
Gender			
Male	35	70	
Female	15	30	
Total	50	100	
Class			
1	32	64	
2	13	26	
3	5	10	
Total	50	100	

A total of 50 respondents from Palang Merah Remaja (PMR) SMAN Titian Terrace Jambi City participated in this study. Among the 50 respondents, key demographic characteristics such as gender, age, and grade were identified. Gender Of the total number of respondents, females constituted the majority as many as 35 people (70.0% of the total).

There were 15 male respondents (30.0% of the total). Age There is a significant difference in the age characteristics of respondents. Most respondents were 16 years old, namely 32 people (64.0% of the total). Thirteen respondents were 17 years old (26.0% of the total) Four respondents were 18 years old (8.0% of the total). Finally, only one respondent was 19 years old (2.0% of the total). Grade By grade, 32 people (64.0% of the total) belonged to grade 1, which was the largest number. Class 2 respondents numbered 13 people (26.0% of the total). While class 3 respondents amounted to 5 people (10.0% of the total).

The results of the description of the respondents' characteristics showed that the majority of the research participants were first-year females aged 16 years. This data provides information on the demographic distribution of respondents who took part in the survey. It is important to take demographic variables into account in the analysis again and again.

Tabel.2 Pre Test Knowledge Level of Intervention and Control Groups

Knowledge Level	Intervention Group		Control Group	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Less	20	80	12	48
Simply	4	16	9	36
Good	1	4	4	16
Total	25	100	25	100

Intervention Group Pre-Test and Control, the level of student understanding before receiving the intervention through augmented reality and the control method (conventional) will be compared. Based on the intervention group pre-test results below: 20 students 80% are deficient, 4 students 16% are sufficient and 1 student 4% are good. The control group was 12 students 48% were deficient, fair: 9 students 36%, good 4 students 16%.

Based on the pre-test results, it can be concluded that most of the students in the intervention group 80% fell into the "Less" category, whereas only 48% of the students in the control group fell into the same category. This in turn indicates that the intervention group had a higher level of pre-intervention comprehension compared to the control group.

Tabel.3 Post Test Knowledge Level of Intervention and Control Groups

Knowledge Level	Intervention Group		Control Group	
	Frequency (f)	Percentage (%)	Frequency (f)	Percentage (%)
Simply	5	20	16	64
Good	20	80	9	36
Total	25	100	25	100

After the intervention, with 25 given learning intervention through augmented reality and 25 control group (conventional), students' knowledge level was measured again. The post-test results of the intervention group were: Moderate 5 students and Good 20 students. Control group: 16 students were fair and 9 students were good. The post-test results showed a statistically significant improvement in the intervention group, 80% of students fell into the

"Good" category In contrast, the control group also showed improvement, but not as much as the intervention group; only 36% fell into the "Good" category.

1. Mann Whitney Test

Tabel.4 Ranks

	Kelas	N	Mean Rank	Sum of Ranks
Augmented Reality Learning Outcomes	Experiment Class (Augmented Reality)	25	35.30	882.50
	Control Class	25	15.70	392.50
	Total	50		

Tabel.5

Test Statistics^a

	Augmented Reality Learning Outcomes
Mann-Whitney U	67.500
Wilcoxon W	392.500
Z	-4.769
Asymp. Sig. (2-tailed)	.000

Based on the Mann-Whitney test results above, there is a significant difference between augmented reality and control learning outcomes with a p-value of .000 ($p < 0.05$). This shows that the augmented reality learning method gives a greater influence on learning outcomes than the control method.

4. DISCUSSION

Overview of Respondent Characteristic

The number of respondents in this study were 50 members of the Youth Red Cross from Titian Teras Senior High School in Jambi city. Analysis of the respondents' characteristics resulted in several findings:

1. Gender

The gender of the majority of respondents was female, at 70 percent, while male was 30 percent. The findings of this study are consistent with previous studies implicating this research, showing that women tend to be more interested in social and health activities. Sitorus et al., 2020 showed that women are usually more empathetic and more interested in health work, a fact that could explain the high participation of women in PMR.

2. Age

The majority of respondents were 16 years old. That includes 64% of the total, followed by 17-year-olds with 26%, 18-year-olds with 8%, and 19-year-olds with 2%. That most of the respondents were 16 years old shows that the majority of PMR members are 1st year high school students. This is possible because students who are new to high school have a high level of interest in various extracurricular activities in high school. The age of 16 years is also based on Erikson's developmental theory in the stage of identity vs role confusion, where in this age range, adolescents are looking for a better self-identity to be applied in various activities, one of which is organizing or can be through PMR membership.

3. Class

Based on age data, the majority of participants (64%) were from grade 1, followed by grade 2 (26 percent) and grade 3 (10 percent). Increased focus on academics and exam preparation may lead to decreased participation in class. This is in line with the study by Denault et al. (2019), who found that as age and grade level increase in secondary school, participation in extracurricular activities tends to decrease.

The distributed characteristics of these respondents have a significant impact on the interpretation of the results of the research and development of the Augmented Reality-based First Aid health education program. The dominance of female respondents and first grade students may affect the interpretation of the results. Effectiveness of the intervention and should be considered in future program design. In addition, the low participation of students in grade 3 suggests that special strategies are needed to maintain the PMR engagement of senior students.

Pre Test Knowledge Level of Intervention and Control Groups

Pre-Test Knowledge Level: Intervention and Control Groups The pre-test results showed significant differences between the intervention and control groups. Most respondents (80 percent) in the intervention group had lower knowledge levels, while most respondents in the control group had lower knowledge levels (48 percent). This difference may be due to variables in respondents' individual characteristics or external factors. Nevertheless, these different initial conditions should be considered when interpreting the results of the study. The low initial knowledge level in both groups (80% and 48% respectively) indicates that the members of the PMR need First Aid health education. This finding is in line with Mutmainah's (2020) research, which emphasizes the importance of good knowledge to provide first aid in school emergencies.

Post Test Knowledge Level of Intervention and Control Groups

After the intervention, the knowledge level of both groups increased significantly, but with different patterns: 1. Intervention Group: 80% of respondents reached a good level of knowledge, 20% reached a sufficient level of knowledge; 2. Control Group: 36% of respondents reached a good level of knowledge, and 64% reached a sufficient level of knowledge.

Augmented reality-based First Aid health education showed greater improvement in the intervention group (80% compared to 36% in the good category). This finding is consistent with the research of Sitorus et al. (2020), who found that first aid knowledge was strongly influenced by health education with audio visual methods.

The percentage of respondents with good knowledge was much lower compared to the intervention group, although the control group also showed improvement. This suggests that conventional methods, although effective, may be less optimal in improving First Aid knowledge compared to Augmented Reality-based methods.

Man Whitney Test

The Mann-Whitney test results showed a significant difference between the learning outcomes of the Augmented Reality and control groups ($p\text{-value} = 0.000$, $p < 0.05$). This finding strengthens the evidence of the superiority of Augmented Reality learning methods over conventional methods in improving First Aid knowledge.

The sizable mean rank difference (35.30 vs. 15.70) indicates that the Augmented Reality group consistently achieved higher scores than the control group. This may be due to the interactive and immersive nature of Augmented Reality technology, which can increase student engagement and knowledge retention.

These results are in line with Moon & Hyun's (2019) study which found the effectiveness of blended learning in improving nursing students' knowledge, attitudes, and self-efficacy in cardiopulmonary resuscitation. The use of Augmented Reality technology in First Aid health education seems to provide similar benefits in improving learning outcomes.

5. CONCLUSIONS

The study looked at how Augmented Reality (AR)-based first aid health education improved the knowledge and skills of Youth Red Cross (PMR) members at Titian Teras State Senior High School in Jambi City. The results showed that, compared to the traditional

approach, the use of AR improved the knowledge and skills of PMR members in performing first aid.

The pre-test results showed that most respondents from the intervention group (80 percent) had low knowledge about first aid. However, after the intervention with Augmented Reality-based education, 80 percent of respondents from the intervention group improved their knowledge significantly and reached the "good" category, whereas only 36% of respondents from the control group reached the "good" category after the intervention with the control (conventional) method.

With a p-value of 0.000 ($p < 0.05$), the Mann-Whitney test results show a significant difference between the learning outcomes of the Augmented Reality group and the control group. The sizable difference in mean scores between the Augmented Reality group (35.30) and the control group (15.70) indicates that the Augmented Reality group consistently received higher scores.

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