



The Effect of Mobile Application-Based Education on the Knowledge and Skills of First Aid for Traffic Accidents Among Adolescents at SMAN 1 Martapura, Banjar Regency

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ABSTRACT

First aid in accidents (P3K) is an important skill that can save lives, but adolescents' knowledge and skills about P3K are often low. With technological advancements, mobile applications have become a potential educational tool to improve adolescents' understanding and skills in P3K. This study aims to determine the influence of mobile application-based education on improving adolescent knowledge and skills in providing first aid in accidents. This study uses a pre-experiential method with a one-group pretest-posttest design without control. The sample of this study was 30 students selected using proportional random sampling. The adolescent knowledge and skills were measured before and after the intervention using questionnaires and observation sheets. Data analysis in this study used the Wilcoxon test. The results of the study showed that there was a significant increase in knowledge and skills of first aid in accidents (P3K) with p-value = 0.000. This shows that the use of mobile applications is effective in improving students' knowledge and skills about first aid in accidents (P3K). Mobile application-based education has proven to be effective in improving adolescents' knowledge and skills regarding P3K. Mobile applications can be an efficient and accessible means to disseminate important information about P3K to teenagers.

Keywords: Mobile Application, Knowledge, Skills, First Aid in Accidents (P3K).

INTRODUCTION

Emergency events usually occur very quickly and suddenly, so it is difficult to predict when and where they occur. An emergency, for example, is an accident that can occur anytime and anywhere. Accidents can be caused by fires, being stabbed by sharp objects, natural disasters, and traffic accidents. Many accidents require first aid. In an emergency, dealing with accident

victims within the first hour is essential to save victims and prevent death or bad conditions. This is where everyone needs the knowledge and skills to provide first aid (Anggraini et al., 2018).

Almost 90% of mortality and morbidity that occur due to traffic accidents are caused by slow rescue time, past golden time and inaccuracy of first aid when the victim is first found (Sutanta et al., 2022). In severe traffic accidents, airway disturbances, respiratory failure, and uncontrolled bleeding, are the leading causes of death (Rustagi et al., 2021). The increased likelihood of death in trauma patients is greatly influenced by longer prehospital times or delays in major treatment. Therefore, victims of traffic accidents, especially those who meet the criteria for emergencies, must get first aid in a short time (Gauss et al., 2019).

The number of deaths caused by accidents has reached 1.35 million people every year, 90% of which occur in developing countries that only have 54% of vehicles in the world. Traffic accidents are ranked eighth as the leading cause of death for all ages and the leading cause of death in people with an age range of 5-29 years. As many as 50% of road deaths are vulnerable road users, namely motorcyclists, cyclists or pedestrians. If there are no continuous efforts to handle this problem, it can be predicted that traffic accidents will be the seventh cause of death by 2030 (Machetele, 2020).

In South Kalimantan Province, the proportion of injuries caused by traffic accidents is 1.8%. The proportion of moderate traffic accidents driving motorcycles is around 78%. (Ministry of Health of the Republic of Indonesia, 2018). From the traffic accident data of Banjar Regency, it was recorded that of the 88 traffic accidents in 2020, there were 32.2% dead, 3.9% seriously injured and 63% slightly injured. Meanwhile, in 2021 there were 76 accidents with a death rate of 43.9%, serious injuries of 2.8%, and minor injuries of 53.2%, and in 2022 there were 111 traffic accidents, with a death rate of 33.5%, serious injuries of 1.1%, and minor injuries of 65.2% (Kominfo Regency of Banjar 2022).

From the high number of accidents, the increase in disability and death rates in traffic accident victims is partly due to the delay in first aid when the victim is found and the inaccuracy of the way to handle accident victims can also affect the condition of the victim, lack of knowledge about first aid in accidents, is still the main problem (Asdiwinata et al., 2019). The people of Banjar Regency. When an accident occurs, most people just wait for the arrival of the medical team to provide help, people feel afraid of making a mistake in taking first aid actions, which is based on a lack of knowledge about first aid (Kominfo Banjar Regency 2022).

Accidents can occur because they are influenced by several factors, namely 61% are human factors, 9% are vehicle factors, and 30% are infrastructure and the environment (Ministry of Communication and Informatics, 2019). The human factor or the driver is the most dominant factor, such as deliberately violating traffic, ignorance of the applicable rules, and/or pretending not to know (Debi Aris Siswantoro & Marjan Miharja, 2019).

Based on research conducted by Irfan Lazuardi and Dimas Krishna Aditya, the analysis of the problem has been carried out in stages; information media is needed for the public to easily receive information about first aid science. This is intended for the public to be more vigilant in terms of handling accident victims so as not to cause casualties or possibly save them. Therefore, the design of the mobile application as a first aid information medium is carried out based on these problems. Based on research conducted by Yogi Pratama and Rinna Rachmatika (2022), the creation of an accident first aid education application (P3K) can help the public, especially android-based smartphone users, in obtaining information on first aid measures in accidents (P3K), based on almost the same research conducted by Brooks et al. (2016) the basic life support application Pulse Point Respond has the potential to increase community response against heart attacks, with 80% of respondents trying basic life support when they found a heart attack victim before EMS, based on research conducted by Burgess et al. (2016) The study used a smartphone app-based platform that combined gamification and behavior change strategies to increase knowledge and awareness of the risk of burns on hot drinks and first aid on burns among mothers who were having young children innovative new technologies, such as Smartphone apps, present new ways to convey injury prevention messages at the individual level, and health behavior change researchers are leveraging these technologies as intervention tools. Low cost, scalability, and wide reach make this technology an ideal channel for health interventions especially in the treatment of burns.

Based on this background, the author is interested in developing a mobile application to improve knowledge and skills in handling traffic accident victims, this application will be able to display first aid actions in handling traffic accidents (laka lantas) which can help in handling an accident, the author chooses a mobile application as a medium in delivering information that is effective, informative, and can be accessed with Easy by anyone, this mobile application can be accessed using the internet, making the mobile application have faster performance when used, the visual/image side in the mobile application can make it easier for users to understand each guide in the mobile application. Mobile applications are one of the educational media to the public about first aid in traffic accidents, if this mobile application-based research is not applied, it is likely to have an impact on public understanding of first aid techniques and strategies. This can result in a less effective response in traffic accident situations, increase the risk of more severe injury, and lower overall safety. This research is important to improve first aid standards, minimize the risk of complications, and support community preparedness in dealing with emergencies such as cross-traffic accidents.

In this study, the main target is the community, especially high school students. Students are one of the parts of society that can be given first aid health education in traffic accidents and also they are at a mature age to understand the basic concepts of first aid in accidents, some of high school students have entered their late teens which means they already have a driver's

license (SIM), the need to use the highway by driving a vehicle independently is getting higher, which means the potential to find an emergency is even greater. Driving safety is an important aspect that every driver, including teenagers, must pay attention to. The presence of a driver's license (SIM) is not only proof of the legality of driving but also shows that teenagers have understood the driving rules and etiquette that are important for the safety of themselves and others on the road (Steinka-Fry et al., 2015).

Based on a short interview conducted with students of SMAN 1 Martapura, out of 10 respondents, only 3 respondents knew the basic actions in performing first aid in accidents, this is based on the lack of special education or training regarding first aid in traffic accidents at the school, this is what encourages researchers to conduct first aid education research based on mobile applications. So it is hoped that teenagers can be involved in helping and providing first aid in accidents, which aims to make the Indonesian people more vigilant in responding to traffic accidents.

RESEARCH METHODS

This study uses a pre-experimental method with a one-group pretest-posttest design. The purpose of this study is to determine the influence of education about first aid in traffic accidents on the knowledge and skills of students of SMAN 1 Martapura using mobile application media. In this design, initial measurements (pretest) are made before the treatment is given (intervention), and then measured again (posttest) after the treatment is given to see the changes.

The study's object was class XI students at SMAN 1 Martapura, Banjar Regency, which amounted to 339 people from 10 classes. From this population, 30 respondents were sampled through the proportionate stratified random sampling technique, which ensures each class is proportionally represented in the research sample.

The research data was obtained from two main sources: primary data and secondary data. Primary data was obtained through questionnaires and observation sheets. Questionnaires were used to measure students' knowledge level regarding first aid in traffic accidents, while observation sheets were used to assess students' skills in practising first aid. Secondary data was obtained from various literature, including data from the World Health Organization (WHO), riskesdas, and the Health Office.

Data collection is carried out through several steps. First, preparations were made such as determining the research site, taking care of permits, and preparing research instruments and educational media in the form of mobile applications. Furthermore, at the implementation stage, the researcher conducted a pretest by distributing questionnaires and observing skills. After that, the intervention was given through a mobile application and a posttest was carried out a week later to measure changes in students' knowledge and skills.

The collected data was then analyzed using the SPSS program. The analysis was carried out bivariately using the Wilcoxon test to determine the intervention's influence on students' knowledge and skills. Univariate analysis was also carried out to see the frequency distribution of respondent characteristics and an overview of knowledge and skills before and after the intervention.

Research ethics are also well maintained, where informed consent is obtained from respondents, their identities are kept confidential, and the information provided is guaranteed confidentiality. The researcher ensured that respondents understood the purpose of the study and the advantages of their participation and ensured there was no coercion in participation.

With this research method, it is hoped that valid and reliable data can be obtained on the effect of traffic accident first aid education on improving students' knowledge and skills, which can be the basis for the implementation of similar programs in other schools.

RESULTS AND DISCUSSION

Research Results

Univariate Analysis

Univariate analysis was used to determine the results of knowledge before the intervention, after the intervention and the average before and after the intervention to the respondents at SMAN 1 Martapura as follows:

1. Knowledge before being given first aid education in accidents using application media.

Table 1. Knowledge Before Being Given First Aid Education in Accidents Using Application

Media			
It	Knowledge	Frequency (f)	Percentage (%)
1	Less	4	13,3
2	Enough	26	86,7
Total		30	100,0

Source: Primary Data 2024

Based on table 1. The percentage of knowledge of respondents before the intervention was given was 13.3% for 4 people and 86.7% for 26 people and from this data, it was known that most of the respondents had a level of knowledge in the sufficient category of first aid in accidents.

2. Knowledge after being given first aid education in accidents using application media

Table 2. Knowledge after being given first aid education in accidents with application media

It	Knowledge	Frequency (f)	Percentage (%)
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1	Good	30	100,0
2	Enough	0	0
3	Less	0	0
Total		30	100,0

Table 1 shows that 30 respondents (100%) increased their level of knowledge to the good category after the treatment.

3. Skills before being given first aid education in accidents using application media.

Table 3. Skill level before treatment

It	Skills	Frequency (f)	Percentage (%)
1	Good	0	0
2	Enough	8	26,7
3	Less	22	73,3
Total		30	100,0

Source: Primary Data 2024

Based on Table 3, the percentage of respondents' skills before the treatment was given with the Less category was 73.3% as many as 22 people, the adequate category was 26.7% as many as 8 people, and the category from the data, it was known that the average respondent had a category of skills that were still lacking in first aid in accidents.

4. Skills after being given first aid education in accidents using application media.

Table 4. Skill Level after treatment

It	Skills	Frequency (f)	Percentage (%)
1	Good	22	73,3
2	Enough	8	26,7
3	Less	0	0
Total		30	100,0

Source: Primary Data 2024

Based on Table 4, the percentage of respondents' skills before the treatment was given was 73.3% for 22 people and 26.7% for 8 people. From this data, the results of the post-test increased compared to the pre-test, where the average respondent had a good skill category about first aid.

Bivariate Analysis

1. Data Normality Test

Before conducting a bivariate analysis test on related variables, a normality test was first carried out using the Shapiro-Wilk test because the total number of respondents <50 people. If the data is normally distributed, a bivariate test with a paired t-test is performed. However, if the data is not normally distributed, a bivariate test is carried out using the Wilcoxon test.

Table 5. Results of the Normality Test of Knowledge Level with Shapiro-Wilk

It	Knowledge	Sig	Conclusion
1	Pre-test	0,002	Abnormal distribution
2	Post-test	0,000	Abnormal distribution

Source: Primary Data 2024

The results of the normality test in the table above show that the variable data of the level of knowledge before and after the treatment obtained a significant value of $p < 0.05$, concluding that the data was abnormally distributed.

Table 6. Results of the Normality Test of Skill Level with Shapiro-Wilk

It	Skills	Sig	Conclusion
1	Pre-test	0,006	Abnormal distribution
2	Post-test	0,006	Abnormal distribution

Source: Primary Data 2024

The results of the normality test in the table above show that the variable data of skill level before and after the treatment obtained a significant value of $p < 0.05$, so it was concluded that the data was abnormally distributed.

Based on the results of the normality test carried out on both knowledge and skill variables, the two data were distributed abnormally. So, the test was carried out using the Wilcoxon statistical test to see the influence of application media on knowledge and skills before and after the intervention.

2. The effect of first aid education with application media on the level of knowledge.

Table 7. The effect of first aid education with applied media on the level of knowledge

Knowledge	Mean	Sig
Pretest knowledge level	9,40	0,000
Posttest knowledge level	14,07	

Source: Primary Data 2024

Based on the results of the Wilcoxon test with the help of SPSS software, a $p\text{-value} = 0.000 \leq 0.05$ was obtained, which shows an increase in the level of knowledge of students about knowledge in performing first aid at SMAN 1 Martapura before and after providing education using mobile application media. This shows the influence of mobile application-based education on knowledge of first aid in traffic accidents.

3. The effect of first aid education with application media on the level of skills.

Table 8. Effect of first aid education with applied media on skill levels

Skills	Mean	Sig
Skill level before the intervention	5,57	0,000
Post-intervention skill level	10,27	

Source: Primary Data 2024

Based on the results of the Wilcoxon test with the help of SPSS software, a $p\text{-value}$ was obtained, a $p\text{-value} = 0.000 \leq 0.05$, which shows the influence of mobile application-based education on improving skills in first aid in traffic accidents. So, H_1 is accepted, and H_0 is rejected.

Discussion

The level of knowledge of students before being given first aid education in accidents with application media

Based on the results of the study, it is known that in 26 respondents, the level of knowledge before treatment is in the category of sufficient, and 4 respondents have a level of knowledge before treatment with a low category. This is because some respondents have received information about first aid, and there are still some respondents who have never received information about first aid; this study obtained the results of most of the respondents' knowledge level. Before the treatment was given, it was in the category of adequate, with an overall average score of 9.40 for the pre-test.

According to Notoatmodjo (2022), information is a power obtained from an event and then transformed into a form that can be useful and meaningful for the recipient. The main function of information itself is to increase knowledge.

This research is also in line with almost the same research conducted by Sekarwati et al. (2022) on the influence of the Ayo Addis android application on balanced nutrition knowledge obtained the results of the respondents' knowledge level before the treatment, the majority of respondents knowledge was in the sufficient category.

This research is also in line with the research conducted by Novianto et al. (2019) on the influence of smart mobile adolescent applications on adolescent knowledge in the prevention of

prediabetes. The majority of respondents' knowledge levels before treatment were obtained in the sufficient category, with an average score of 62.61.

The researcher assumes that students' knowledge before being given education is sufficient, but some students still lack knowledge because they have never been exposed to information about first aid in accidents.

The level of knowledge of students after being given first aid education in accidents with application media

In this study, it was found that most of the respondents' knowledge level before the treatment with the first aid application media was in the sufficient category, after the treatment using the first aid application media in the accident, the knowledge level of most respondents increased in the good category. The results of the study showed that there was a significant increase in the value of the knowledge variable after being given first aid learning in accidents with the application. Which where the increase in knowledge can be achieved because the application used in this study provides material features that students can reach to learn anywhere and anytime.

According to Notoatmodjo (2012), knowledge or cognition is a very important domain for the formation of a person's actions (over behaviour). Knowledge in the cognitive domain has 6 levels, namely: Know, comprehension, application, analysis, synthesis, and evaluation

This research is also in line with almost the same research conducted by Sekarwati et al. (2022) about the influence of Android-based applications ayo dedis to increase balanced nutrition knowledge on stunting in pregnant women. Results were obtained with a level of initial knowledge in the sufficient category. After the treatment of using application media, the level of knowledge of most respondents increased to a good category.

This research is also in line with almost the same research conducted by Novianto et al. (2019) on the influence of mobile smart adolescent applications on adolescents' knowledge about prediabetes prevention, obtained results. Broadly speaking, there was an increase in knowledge scores. In this study, respondents successfully applied the application so that the level of knowledge was at the level of "knowing", which is part of cognitive knowledge.

The results of this study are similar to research conducted in Korea regarding the use of mobile phone applications as one of the learning methods for nursing students. The results of the study showed that a significant increase occurred in the knowledge of nursing students about the concept of clinical practice by learning using an interactive application on a mobile phone. The significant increase in the knowledge aspect of the study is due to the interactive application features used to present a 3-dimensional simulation as a means of education for nursing clinic practice (H. Kim & Suh, 2018).

The results of statistics and literature reviews that have been presented previously prove that mobile phone applications contribute to increasing respondents' knowledge about First Aid.

The contribution made through learning first aid in accidents with an application model is expected to prepare students as bystanders to prevent the deterioration of the condition of victims who experience life-threatening conditions by applying their knowledge about first aid.

Skill Level of students before being given first aid education in accidents with application media

Based on the results of the study, it was known that 8 respondents had skills before treatment in the sufficient category, and 22 respondents had skills before treatment in the poor category. This is because some respondents have heard about doing first aid, especially in bidding, but there are still some respondents who have never received information and experience about first aid, especially bidding. In the results of this study, the average score of the pre-test before the treatment was obtained with a score of 5.57

The formation of a behavior begins in the cognitive domain, then gives rise to new knowledge in the subject and then causes an inner response in the form of an attitude, then the stimulus, which is an object that has been fully known and realized, will cause a further response, namely in the form of action against or in connection with the stimulus or object Notoatmodjo (2012).

This research is also in line with research conducted by Ekaprasetia et al. (2018) on the Effect of the Application of First Aid Guidelines on Improving Students' Skills About First Aid Using the Health Belief Model Theory Approach, pre-test results were obtained before being educated about first aid, respondents with an average Prettest skill level score of 4.70.

The researcher assumes that students' skills before education and demonstrations about first aid are still lacking because there are still students who have not been trained and some students who have never gained experience in first aid, especially bidding.

The skill level of students after being given first aid education in accidents, with application media

In this study, the results were obtained that before first aid education, most of the respondents' skill levels were obtained in the lack category. Then the first aid education in accidents was carried out; there was an increase in skills, and most of the respondents experienced an increase in skills to the good category. The results showed that there was a significant increase in the value of the skill variable after being given first aid education in accidents with applications and demonstrations. The increase in knowledge can be achieved because in the application, there is a step-by-step feature in performing first aid and demonstrations in performing first aid.

According to Notoatmodjo (2012) there are 4 levels of skills, namely: 1) perception is knowing and choosing various objects, 2) guided response can do something in the correct order according to examples, 3) mechanism (mecanism) is doing something correctly automatically or something has become a habit, and adaptation is a practice or action that has been well developed.

This research is in line with research conducted by Ekaprasetia et al. (2018) on the effect of the application of first-aid guidance on improving students' skills about First Aid, the results of the post-test were obtained after being educated about first aid, with the skill level with an initial pre-test score of 4.70 after education the average score of the Post-test increased to 7.77. which means that there is a significant difference in the increase in skill variables after receiving first aid education using the First Aid Guide application.

The results of the initial skill level before the education was in the fair category with an initial pre-test score of 16.45 After being given education, the skill level increased to the good category. With the post-test score rising to 86.25

Another similar study discusses the comparison of applications with lecture methods in the learning process. The results of the study showed that the use of applications that presented animated images could significantly improve the skills and confidence of 78 students compared to the lecture method (S.-J. Kim et al., 2017).

This is in line with the research of JENSON & FORSYTH (2012), which states that in addition to knowledge, skills will also increase if training methods are provided by utilizing innovative technology and presenting demonstrations.

In this study, respondents changed their skills in performing first aid to be better by using the First Aid Guide application. Based on the results mentioned above, it is obtained that the first aid education method using the First Aid Guide application has results that can improve skills for the better, this method also has advantages, including that students can focus on using the application that has been installed in their smartphones and can also practice anywhere and anytime so that it is very easy for students to do it.

The Effect of Mobile Application-Based Education on Knowledge and Skills of Traffic Accident First Aid in Adolescents at SMAN 1 Martapura, Banjar Regency

In this study, it was found that the knowledge obtained by students before the provision of health education using mobile application media with the average value of knowledge of students after the provision of health education using mobile application media was obtained as a result of the difference in the average score, knowledge before and after was 4.67. This shows that students' knowledge has improved.

For respondents aged 16-18 years, most of their knowledge increased in the post-test with a level of knowledge in the good category of as many as 30 respondents. The level of skills also increased with the level good category as many as 22 respondents (73.3%) and the sufficient category as many as 8 respondents (26.7%) According to Notoatmodjo (2012) when a person's age increases, there will be changes in a person's physical and psychological condition, the older a person is, the more mature and mature they will be in thinking and working.

Based on the gender characteristics in Table 1, the male gender was 13 respondents (43.3%) while the female gender was 17 respondents (56.7%). according to Leny's research

(2020) explained that although men and women have different levels of knowledge, namely, women are more diligent, diligent and meticulous when given tasks in completing work.

This is in line with the results of Nurhazana's research (2022). Before education using Edu-RJP application media had an average value of 49.25 and after education using Edu-RJP application media had an average value of 70.25. There is an influence of the implementation of education with the Edu-RJP application media on knowledge

In this study, it was also found that students' skills were obtained before the education using application media with an initial average pre-test score of 5.57, after education and demonstrations using application media an increase in the number of post-test average scores of 10.27, then an increase in the difference results of 4.7 was obtained, this shows that students' skills have improved.

This research is in line with the results of research conducted by Ressa Andriyani Utami (2019) about the effect of the application of the "andi symbol" model on the skills of school-age children with the risk of injury obtained by the results of students' skills before the provision of education with application media with an average pre-test score of 7.54. After the education using application media, an increase in the number of average post-test scores of 9.60 was obtained, and then a difference of 2.06 was obtained. This shows that students' skills have improved.

Based on the statistical tests carried out, a value of $p\text{-value} = 0.000 \leq 0.05$ was obtained, which means that there is an influence of health education using application media on students' knowledge and skills about first aid in accidents at SMAN 1 Martapura. The results of the statistical test using the wilcoxon test were obtained $p\text{ value} = 0.000$, with a value of $\alpha = 0.05$ ($p < \alpha$), so that there was an influence of education using application media on first aid knowledge and skills in SMAN 1 Martapura students.

This study uses an application media called Gacet (easy, fast and precise) which is planted on an Android-based mobile phone as a learning method for first aid in accidents. This application has different characteristics from previous studies that use technology as learning. The characteristics of this application include text/writing, images and emergency call menus as additions and novelties offered. The features presented can make it easier for students to learn about first aid in accidents according to the advantages and advantages offered through learning using mobile phones, so that it can produce a good stimulus and ultimately be able to improve the cognitive abilities of respondents. In addition, respondents have the opportunity to be able to learn about first aid in accidents in the application whenever and wherever they want. In addition, learning using applications on mobile phones is a new thing, so it can attract the attention of respondents.

The researcher assumes that education using application media about first aid in accidents has been proven to be influential in improving the knowledge and skills of students at SMAN 1

Martapura. The results of statistical tests show that education using application media affects the level of knowledge and skills of students.

Research Limitations

Each study will have its own limitations, as well as this research. The limitations of this study are as follows:

1. There is a limitation of research time, so researchers only research their knowledge and simple skills.
2. The First Aid Guide application used in this study is still available on the Android smartphone operating system, while the operating systems using IOS and Windows Phone are still not available. The effort will be to find sponsors who can provide funds to include this application in IOS and Windows Phone.
3. This study has not included the video features in the application used. Video features need to be added as support in optimizing the learning process of first aid in accidents.

CONCLUSION

Based on the research objectives and the results obtained from "The Effect of Mobile Application-Based Education on Knowledge and Skills of First Aid in Traffic Accidents in High School Adolescents at SMAN 1 Martapura, Banjar Regency," it can be concluded that there is an increase in knowledge about first aid in accidents by using educational media, namely mobile applications, both before and after treatment. Furthermore, there is an improvement in skills related to first aid in accidents through education using mobile application media before and after treatment. The implementation of first aid learning in accidents using mobile application media affects students' knowledge and skills about first aid in accidents.

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