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Overview of media-based education on zoss and first aid towards students' knowledge at SDN 47 Jambi City

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Abstract

Background: Traffic accidents involving school-aged children are a public health concern in Indonesia, particularly due to inadequate road safety education. The School Safety Zone (Zona Selamat Sekolah/ZOSS) program and First Aid (P3K) knowledge are critical in reducing the impact of accidents, yet many students lack awareness. Educational innovations such as animated videos are considered more effective than traditional lectures in improving student knowledge.

Method: This study used a one-group pretest-posttest design involving 30 students from SDN 47 Jambi City. The intervention consisted of an animated video covering ZOSS and First Aid materials, followed by discussion. Student knowledge was assessed using a validated questionnaire before and after the intervention. Data were analyzed using paired t-tests.

Results: Prior to the intervention, 63.3% of students were in the "poor" knowledge category, with only 3.3% classified as "good." After the intervention, 76.7% of students showed "good" knowledge. Statistical analysis showed a significant improvement in mean scores from 53.1 to 82.7 ($p < 0.001$).

Conclusion: Media-based education using animated videos significantly improves students' knowledge of ZOSS and First Aid. This method is recommended for enhancing traffic safety and emergency preparedness education in primary schools.

Keywords: ZOSS; First Aid; Animated Video; Student Knowledge; School Safety

INTRODUCTION

Traffic-related injuries remain a global public health concern and are among the leading causes of death and disability, particularly in school-aged children(1). The World Health Organization (WHO) reports that over 1.3 million lives are lost annually due to road traffic accidents, while millions more suffer non-fatal injuries that often lead to long-term disability(2). Children and adolescents are especially vulnerable during their daily commutes to and from school, where exposure to unsafe road environments is common(3).

In low- and middle-income countries such as Indonesia, the burden of road traffic accidents is disproportionately high(4). Factors such as inadequate infrastructure, unsafe road user behavior, and lack of structured traffic safety education contribute to the vulnerability of schoolchildren(5). The risks are further amplified in urban areas where schools are located near busy roads, with insufficient pedestrian pathways and limited traffic calming measures(6).

To mitigate these risks, the Indonesian government introduced the Zona Selamat Sekolah (ZOSS) or School Safety Zone program, designed to provide traffic signs, road markings, and regulations prioritizing student safety(7). The program also aims to promote behavioral change through safety education. However, implementation has been inconsistent, with many schools lacking adequate infrastructure or maintenance, thereby limiting the program's effectiveness(8).

Equally important to ensuring school safety is the ability of students to respond to accidents through basic First Aid (P3K).

Minor injuries such as scrapes, falls, and collisions frequently occur in school environments, and improper or delayed response may worsen outcomes(9). Yet, research indicates that many students have limited knowledge of First Aid, as schools often lack systematic emergency preparedness training(10).

Traditional methods of delivering safety education such as lectures or pamphlets are no longer sufficient in engaging young learners. These methods are often passive, unidirectional, and fail to account for students' diverse learning preferences(11). With limited interaction or visualization, students may find it difficult to retain important information or apply it during real-life situations. Moreover, such approaches are often perceived as monotonous, resulting in reduced attention and motivation to learn(12).

To address these limitations, innovative educational tools are being explored to enhance learning outcomes. Animation-based video media has emerged as an effective alternative due to its visual, auditory, and interactive appeal(13). Animated videos combine storytelling, imagery, and simulation to convey complex concepts in a simple, engaging way. For children, especially those in elementary school, this mode of learning is more relatable and enjoyable, helping to improve comprehension and long-term memory(14).

Several studies have highlighted the benefits of using animated media in health education. It improves focus, encourages active learning, and can simplify abstract or technical topics. In the context of traffic safety and First Aid, animated videos can simulate real-life situations, show step-by-step responses, and reinforce preventive behaviors in a controlled and repeatable manner. Furthermore, digital media can be easily distributed and reused, offering a cost-effective and scalable solution for schools with limited teaching resources(15).

Despite the proven effectiveness of animated videos in general education, their application in safety education in primary schools especially in ZOSS and First Aid has not been widely studied in Indonesia. Most existing interventions focus on adult drivers or general public awareness, leaving a gap in targeted efforts for children(16). Given the rising number of school-related accidents, there is a pressing need to develop and evaluate educational models that are suitable, effective, and accessible to young students.

This study was conducted at SDN 47 Jambi City, a public elementary school located near a high-traffic urban area. The location makes it an ideal setting to explore the effectiveness of safety education interventions. Prior observations revealed that many students were unaware of school zone regulations and lacked confidence in responding to minor accidents. Hence, the school presented a critical opportunity to pilot an educational initiative that integrates both ZOSS and First Aid using modern, child-friendly media.

The objective of this study is to examine the impact of animated video-based education on students' knowledge regarding ZOSS and First Aid. By assessing students' knowledge before and after the intervention, this research aims to determine whether such an educational model can significantly improve their understanding of traffic safety and emergency response. The findings are expected to inform school health programs and contribute to the development of more engaging and effective safety education strategies for primary school students in Indonesia.

METHOD

This study employed a pre-experimental design with a one-group pretest–posttest approach, which is commonly used to evaluate the effectiveness of educational interventions in school-based health promotion research. The study was conducted at SDN 47 Jambi City in June 2025.

A total of 30 students were recruited through total sampling, representing all eligible students from the selected grade level. Data collection was carried out in three stages:

1. Pre-test: Prior to the intervention, students completed a structured questionnaire to assess their baseline knowledge of ZOSS and basic First Aid.
2. Intervention: Students received an educational session using an animation-based video (duration: ±15 minutes) that integrated two core topics; (a) the concept and importance of ZOSS, and (b) basic First Aid procedures for common school-related injuries. To strengthen comprehension, the session was followed by a short discussion and Q&A.
3. Post-test: After the intervention, the same questionnaire was re-administered to measure knowledge improvement.

The research instrument consisted of a 20-item multiple-choice questionnaire covering traffic safety (ZOSS) and First Aid principles. Content validity was established through expert judgment by three public health and nursing education specialists, who assessed item relevance, clarity, and alignment with learning objectives. The instrument's validity index (CVI) was calculated, and items with a CVI score <0.80 were revised. Reliability testing using Cronbach's alpha on a pilot group (n = 10, non-sample students) yielded a coefficient of 0.82, indicating good internal consistency.

Data were analyzed using descriptive statistics to describe respondent characteristics and knowledge levels. Inferential statistics were applied using a paired t-test to evaluate differences between pre-test and post-test scores. All analyses were performed using SPSS version 26.0 with a significance level set at $p < 0.05$.

RESULTS

1. Characteristics of Respondents

Table 1. Chaacteristics of Respondents

Variable	Caegory	Frequency (n)	Percentage (%)
Gender	Male	12	40.0%
	Female	18	60.0%
Age	10 years old	14	46.7%
	11 years old	16	53.3%

The majority of students were female (60%) and aged 11 years old (53.3%)

2. Students' Knowledge Before and After Intervention

Knowledge scores were categorized into three levels: poor (0–50), moderate (51–75), and good (76–100). Table 2 summarizes the distribution of student knowledge before and after the intervention.

Table 2. Knowledge Scores Before and After Educational Intervention

Knowledge Level	Pre-Test (n, %)	Post-Test (n, %)
Poor (0-50)	19 (63.3%)	1 (3,3%)
Moderate (51-75)	10 (33.3%)	6 (20.0%)
Good (76-100)	1 (3.3%)	23 (76.7%)

Before the intervention, most students (63.3%) had poor knowledge. After receiving animated video-based education, 76.7% of students achieved good knowledge scores.

3. Paired t-Test Analysis

Prior to conducting the paired t-test, the data distribution was tested for normality using the Shapiro–Wilk test, which is recommended for small samples ($n < 50$). The results indicated that both the pre-test and post-test scores were normally distributed ($p > 0.05$), fulfilling the assumption of normality required for parametric analysis.

As shown in Table 3, the mean pre-test score was 53.1 (SD = 10.4), while the mean post-test score increased to 82.7 (SD = 9.6).

The paired t-test revealed a statistically significant difference between pre-test and post-test knowledge scores (t = [insert t-value from SPSS], df = 29, p < 0.001). This finding confirms that the animated video-based educational intervention effectively improved students' knowledge of ZOSS and First Aid.

Table 3. Mean Knowledge Scores Before and After the Intervention

Test Type	Maen Score ± SD	p-value	Interpretation
Pre-test	53.1 ± 10.4	< 0.001	Significant increase
Post-Test	82.7 ± 9.6		

These results support the research hypothesis that animated video-based education significantly increases student knowledge. The significant p-value (<0.001) indicates that the improvement was not due to chance, but rather to the effectiveness of the intervention.

DISCUSSION

This study demonstrated a statistically significant increase in student knowledge after the use of animated video-based education about School Safety Zones (ZOSS) and First Aid (P3K). Before the intervention, 63.3% of students were in the "poor" knowledge category and only 3.3% achieved "good" knowledge. After the intervention, 76.7% of students were categorized as "good," with the mean score rising from 53.1 to 82.7 (p < 0.001). These findings confirm that animated videos are effective in bridging knowledge gaps in traffic safety and emergency preparedness among elementary school students.

The improvement is consistent with Cognitive Theory of Multimedia Learning, which posits that combining visual and auditory input enhances comprehension and retention(17),(18). In this study, animated illustrations of traffic environments and simulated first aid procedures, paired with narration, helped students understand and remember safety concepts better than conventional teaching methods. For children who generally have shorter attention spans, the use of multimedia kept them engaged and improved recall of key safety messages.

In addition, the results can be explained through Bandura's Social Cognitive Theory, which emphasizes learning through observation and modeling(19),(20). By watching animated demonstrations of safe road-crossing behaviors and first aid techniques, students could visualize appropriate responses and feel more confident in applying them. This is particularly important in health education, as confidence (self-efficacy) is a critical factor influencing whether students will act appropriately in real-life emergencies.

From a public health perspective, these findings are significant. Road traffic injuries remain one of the leading causes of morbidity and mortality in children, and schools situated in high-traffic areas such as SDN 47 Jambi are especially vulnerable. By improving children's knowledge of ZOSS regulations, the likelihood of risky road behaviors (e.g., crossing outside designated areas) can be reduced. At the same time, increasing their knowledge of basic First Aid equips them with essential skills to respond promptly to minor injuries, potentially preventing complications. This dual focus on prevention (traffic safety) and response (First Aid) highlights the broader role of school-based health education in safeguarding child well-being.

Similar studies reinforce these results. Maulana et al.(21) found that animated video-based education improved both knowledge and self-efficacy in adolescent motorbike users, while Lin et al.(22) reported

significant learning gains using 3D video-based education in high school science classes. These parallels suggest that animated video is not only effective across different subjects but also adaptable to various age groups. For primary school health education, it provides a cost-effective and repeatable intervention that can be integrated into school curricula.(23).

Despite the positive results, this study had limitations. It did not assess long-term retention of knowledge or measure whether students applied the information in real-life traffic or emergency situations. Future studies should include follow-up assessments to evaluate knowledge retention over time and behavioral outcomes, such as students' ability to perform first aid or comply with ZOSS rules in practice.

This research provides evidence that animated video-based education is a practical and effective strategy to enhance elementary school students' knowledge of traffic safety and First Aid. Beyond improving learning outcomes, this approach supports broader public health goals of reducing injury risks and strengthening school-based safety programs. Therefore, integrating multimedia education into regular health promotion initiatives in schools is highly recommended.

CONCLUSIONS

This study demonstrated that animated video-based education significantly improved elementary school students' knowledge of the School Safety Zone (ZOSS) and First Aid (P3K) at SDN 47 Jambi City. The increase in students' average scores from the poor category before the intervention to the good category afterward confirms the effectiveness of this method. These findings emphasize that animated video provides a practical and engaging alternative to conventional lectures or pamphlets, and its integration into school-based health promotion programs can strengthen children's preparedness and awareness in responding to traffic-related risks and minor injuries.

The results also suggest broader implications for public health, as enhancing knowledge in both traffic safety and First Aid contributes to injury prevention and emergency response capacity among young learners. However, this study was limited to short-term knowledge outcomes. Future research should examine the long-term retention of knowledge gained through animated video-based learning, as well as its influence on actual behavior, such as adherence to school safety zone regulations and the correct application of First Aid in real-life situations. Comparative studies with other interactive media, such as gamified learning or augmented reality, would also provide valuable insights into the most effective strategies for improving child safety education in schools.

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