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Problem and needs analysis for the development of traffic safety education for elementary school students in Yogyakarta

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Article Info

ABSTRACT

The establishment of a traffic safety culture in Indonesia is a challenge, and there are many factors that contribute to this difficulty. To instill awareness and culture, the concept is taught through education from an early age. Therefore, this study aimed to develop traffic safety education for elementary school students in Yogyakarta using a qualitative approach. Data were obtained through four focus group discussion (FGD) sessions with school principals, teachers, parents, and school security officers. The analysis was conducted by transcribing, extracting important statements, formulating meanings, and categorizing the findings into themes. The results showed four themes from the analysis, such as unsafe behavior, education content, teaching methods, and stakeholder support. Traffic safety education was taught from an early age to elementary school students, and the content was delivered using appropriate teaching methods. The success of education required support from different parties in Yogyakarta City.

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1. INTRODUCTION

The number of traffic-related deaths is a concerning issue, and there are various factors contributing to this increase, reaching 1.5 million in 2016. Injuries resulting from accidents constitute the cause of mortality within the demographic including children and young adults aged 5-29 years. This underscores the importance of a paradigm shift in the extant child health agenda, which has largely omitted the crucial aspect of safety. Traffic accidents occupy the eighth position in the hierarchy of death across all age groups, exceeding the toll imposed by HIV/AIDS, tuberculosis, and diarrhea [1]. According to the 2018 basic health research data, the proportion of injuries caused by traffic accidents is 31.4% [2].

Yogyakarta, Indonesia is known as a city of students with various educational facilities ranging from elementary schools to universities. The number of injuries caused by traffic accidents shows a significant figure. Based on the 2018 basic health research data, the proportion of injuries in Yogyakarta is 31%, occurring frequently among children (17.4%) [2]. The causes of accidents in children are attributed to their impulsive nature, lack of emotional control and knowledge, as well as an understanding of traffic rules [3].

Accidents on the road were caused by three main factors, including human factors, the environment, and vehicle conditions [4], [5]. Environmental factors such as bad weather and driving at night contribute to road accidents [6]. Among different factors, some studies have identified human factors as a significant determinant in traffic accidents [7], [8]. The factors such as inattention, fatigue, wrong situation assessment,

high speed, conscious disregard of rules, lack of experience, alcohol influence, and psychoactive substances contribute to accidents.

Due to the significant impact of human factors as the cause of accidents, education plays a significant role in traffic safety [9]. In Vietnam, traffic education has a positive impact on confidence, awareness, independence, and driving skills [10]. A study in Shandong Province, China found that this education improved knowledge and awareness [11].

To instill a culture and awareness of traffic safety, continuous education efforts and promotion need to be implemented from an early age [12]. Furthermore, previous study [13] showed the importance of road safety education programs to reduce injuries among children. Research by Alonso *et al*. [14] emphasized the positive impact of safety education on children behavior in Spain. Positive attitudes, risk perception, and knowledge of traffic norms were found to correlate positively with safe behavior.

Teaching safety to children requires innovation in teaching methods. Khan *et al*. [15] indicated that game-based adaptive learning strategies using virtual reality (VR) had a positive impact on improving crossing behavior. In addition, Feng *et al*. [16] proposed two intervention methods based on different primary roles within the family, namely parental guidance and Feynman learning intervention for children. Another result by Bazargani *et al*. [17] showed that traffic law enforcement was not significantly effective in reducing accidents without education. Therefore, the role of education is crucial in lowering the rate of accidents.

Yogyakarta, as an educational city in Indonesia, shows a trend of increasing traffic accidents among children with the primary cause of human factors [18]. A key intervention strategy in changing the behavior is through safety education [19], [20]. Therefore, this study aimed to develop traffic safety education for elementary school children.

2. RESEARCH METHOD

A qualitative study was conducted to analyze the need for the development of traffic safety education for elementary school students in Yogyakarta, Indonesia. Guided focus group discussions (FGD) were conducted to gather data and the informants were selected using purposive sampling techniques. The informants included school principals, teachers, parents, and students from five elementary schools in Yogyakarta. The selected schools fulfilled the criteria of being located along busy roadsides, as well as included public and private schools. At the beginning of each FGD session, participants were asked to complete consent forms and were informed about the study objectives.

In total, four FGD sessions were conducted with different groups, namely school principals, teachers, parents, and security guards. The deliberations transpired through the online Google Meet platform, adhering to predetermined timings in the afternoon and evening, which were mutually agreed on by all participants. Each FGD session maintained an approximate duration of 1.5 hours and comprised a collective assembly of 26 participants, including nine teachers, eight parents, four security personnel, and five school principals.

Data analysis started during the data collection process and FGD was transcribed verbatim. A comprehensive understanding of the data was achieved by reading the transcripts several times. Data were analyzed using Collaizi's approach [21], including re-listening to the recorded FGDs with the four different groups. Subsequently, the study extracted important phrases and statements from the transcripts and the step was to formulate meanings from these important statements, followed by organizing the findings into themes.

3. RESULTS AND DISCUSSION

This study aimed to develop traffic safety education for elementary school students. Education is a crucial aspect of achieving road safety [22] and to prevent accidents, the concept needs to be taken seriously [23]. In Indonesia, the proportion of injuries resulting from traffic accidents among children aged 5-14 years is 17.4% [2]. Therefore, road safety education should be taught from an early age. The analysis of the need for the development of traffic safety education showed four themes, such as unsafe behavior, educational content, teaching methods, and stakeholder support. Further information about the themes and categories is presented in Table 1.

3.1. Unsafe behavior

The first theme identified for the development of traffic safety education is unsafe behavior related to traffic safety among students and their parents. A total of 10 unsafe behaviors were identified, including children crossing the road suddenly without looking left and right, crossing the road by running and playing, opening car doors without checking behind, not wearing helmets when riding motorcycles, riding with three people on a motorcycle, not wearing seat belts when riding in a car, parents driving at high speeds and in the wrong direction.

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One of the common unsafe behaviors observed among children is crossing the road suddenly without checking left and right. This is evident in the statement provided:

"*The dangerous part is that children cross the road by running without looking left and right while playing with their friends.*" (School Principal 1)

Another common unsafe behavior is not wearing helmets when riding motorcycles as shown in the statement:

"*Concerning safety, the dangerous part is when children are driven by their parents without wearing helmets.*" (Parent 5)

Unsafe behaviors commonly observed in children driven by their parents' using cars include not wearing seat belts and checking behind before opening car doors and this is shown in the statement:

"*It is often observed that children, when opening car doors, do not look behind, which can endanger drivers behind them. Additionally, children are often seen not wearing seat belts inside the car.*" (Security Personnel 2)

Traffic injuries are one of the leading causes of disability or death in children [24], [25]. Human behavior is a significant factor contributing to road accidents [26]. The results indicate that the unsafe behaviors frequently observed in children include being careless when crossing. The reasons are their impulsive and less cautious nature, lack of knowledge, and understanding of traffic rules [3].

Table 1. Themes and categories

Theme	Category
Unsafe behavior	– Crossing the road while running
	– Crossing the road suddenly
	– Crossing the road without looking left and right
	– Crossing the road while playing
	– Opening car doors without checking behind
	– Not wearing a helmet
	– Not wearing a seat belt
	– Speeding while driving
	– Driving in the opposite direction
	– Riding with three people
Educational content	– Road-crossing procedures
	– Traffic lights
	– Traffic signs
	– Walking on the sidewalk
	– Driving equipment
	– Helmet usage
	– Seat belt usage
Teaching methods	– Direct practice
	– Posters
	– Lectures by the police
	– VR games
	– Educational videos
	– Case studies
	– Songs
	– Role-play
Stakeholder support	– Parents
	– Teachers
	– School staff
	– Seller near the school
	– Police
	– Transportation department
	– Online drivers
	– Community around the school

3.2. Traffic safety education content

The second theme from the analysis of traffic safety education on the road is educational content. Based on the discussions, seven road safety education topics taught to children were identified, including road-crossing procedures, traffic lights, traffic signs, walking on the sidewalk, driving equipment, helmet usage, and seat belt usage. Table 2 explains the content along with explanations and quotes.

Table 2. Traffic safety education content on the road for elementary school students

Educational content	Description	Quote
Road-crossing procedures	The correct way to cross the road includes not crossing suddenly, looking left and right before crossing, as well as not running or playing while crossing.	"*The most basic knowledge that needs to be taught to children is how to cross the road, no need to rush, look to the right and left*." (Teacher 6)
Traffic lights	The meaning of traffic light colors, such as red, yellow, and green.	"*The education material provided to children is simple and easy to learn, specifically about the meaning of red, yellow, and green lights*." (Security Personnel 3)
Traffic signs	Examples and meanings of traffic signs.	"*Children need to be taught basic signs, such as prohibition signs and command signs*." (School Principal 3)
Driving equipment	Various equipment should be used when driving.	"*It is essential to educate both parents and children about the importance of wearing jackets, gloves, and shoes when riding*." (Security Personnel 1)
Helmet usage	The benefits and importance of wearing a helmet while riding a motorcycle.	"*Teaching children to always wear a helmet when riding a motor vehicle to school*." (Parent 3)
Seat belt usage	The benefits and importance of using a seat belt when in a car.	"*Educating about using seat belts when in a car is important because I have observed that many children still do not do it*." (Security Personnel 2)

The educational content is consistent with the educational content in various countries worldwide. In Cambodia, the presented road safety education materials include seven topics, namely 'safe commuting to school', 'signs', 'safe bike riding', 'causes and prevention of motorcycle road accidents', 'understanding motor vehicles and drivers', 'motor vehicle accidents and how to prevent them,' as well as the 'proper use of the seat belt' [27]. In Saudi Arabia, the safety education topics provided to elementary school students include rules for using mobile phones while driving, parking rules, wearing seat belts, blind spots, safe following distances, and traffic signs [28]. The educational materials provided have been proven effective in increasing students' knowledge of road safety.

3.3. Teaching methods

Based on the discussions, eight methods for teaching traffic safety to elementary school students were identified, including direct practice, educational posters, police lectures, games, educational videos, case studies, songs, and role-play. Table 3 shows the teaching methods, descriptions, and quotes from the discussion. The needs analysis results for the development of road safety education for elementary school students highlight the importance of selecting teaching methods and using technology. The identified teaching methods are relevant to different teaching methods from previous studies. According to Thomson and Whelan [29], the direct practice includes children receiving guided experience in solving traffic problems in real traffic situations. This was considered one of the most effective methods for improving children's pedestrian competence. However, direct training is time and energy-consuming, making it difficult to harness the power of the method.

Meanwhile, Giannini *et al*. [30] found that educational media with videos, when accompanied by verbal explanations, have a high emotional impact and are more informative than those without commentary or written descriptions. Participants also assessed their affective responses and moods based on the intensity and type of scenes presented. The study concluded that verbal commentary can modulate the emotional effects of visual presentations. The research by Khan *et al*. [15] suggested an adaptive game-based learning strategy using VR and Kinect sensors for children's road safety education. This system includes a virtual city simulation, performance evaluation for children, and different interface settings. Experimental results showed a positive impact of the system on improving children's road-crossing behavior.

3.4. Stakeholder support

To teach traffic safety to children, the inclusion and collaboration of various parties are required. Based on the analysis, the parties include parents, teachers, school staff, local merchants, security personnel, police, transportation departments, online transportation drivers, and the community around the school. This education undoubtedly needs to be taught in schools as evident in the statement provided:

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"*Parties to be included in educating traffic safety for children are all members of the school community, namely teachers, staff, security personnel, merchants in the school's vicinity, and community members.*" (School Principal 1)

Besides school support, the primary role in this education begins with parents as shown in the statement:

"*The role of parents is crucial in setting an example of traffic safety education for their children because parents who violate traffic rules are examples for their children.*" (Parent 2)

This requires support from external parties, namely the police and transportation departments, as evident in the statement provided:

"*We also need to collaborate with the police regarding traffic regulations, and the transportation department regarding traffic signs.*" (Security personnel 2)

The success of education needs the support of various parties and the inclusion of various sectors is seen as a significant strength. In Malaysia, this education receives significant support from all parties, such as the Ministry of Transport, the Ministry of Health and Education, the police, teachers, and academics [13]. The results of Feng *et al*. [16] showed that parental guidance interventions were effective in instilling traffic safety awareness in children. Parental guidance interventions include educating parents on road safety and guiding their children. Other studies also reported the positive impact of parental education on children's road safety. Traffic safety education programs including parents have been effective in increasing seat belt and helmet usage, improving pedestrian safety, and enhancing cycling skills [31].

Table 3. Teaching methods for traffic safety education for elementary school students

Teaching methods	Description	Quotes
Direct practice	Direct practice of traffic etiquette in real settings, such as on the road or in a traffic park.	"*Instilling a road safety culture from an early age by practicing it directly in a traffic park. Therefore, children have firsthand learning experiences in real conditions.*" (Teacher 1)
Educational posters	Road safety education media through posters displayed on school walls.	"*Creating posters about traffic signs and showing in schools.*" (Parent 1)
Socialization	Socialization of road safety through lectures.	"*Road safety education can be carried out through lectures by inviting the police to come to schools, allowing students to interact directly with the police.*" (Teacher 9)
VR Game	VR technology allows users to interact with a virtual world.	"*Since children love to play, educating through games may make children happier and understanding the material.*" (Teacher 5)
Educational videos	Using media that combines audio and visual elements to depict road safety objects and concepts in detail.	"*Educational videos might be more appealing to children nowadays.*" (Parent 8)
Case studies	Problem-based or case-based learning methods.	"*This can be carried out by using a problem-based learning method, hence discussing frequently encountered road safety issues together.*" (School Principal 4)
Songs	Songs with harmonious rhythms and lyrics.	"*Using songs can be enjoyable for children.*" (Parent 4)
Role-play	Playing a certain role.	"*Children will be interested when they can play different roles, such as police officers, drivers, and others.*" (School Principal 3)

4. CONCLUSION

In conclusion, traffic safety education was expected to be taught to children from an early age. The problem identification showed that unsafe behaviors exhibited by children included crossing the road without looking left and right. Furthermore, needs analysis related to education content for elementary school children included simple topics such as how to cross the road, understanding traffic lights and signs, as well as wearing helmets and seat belts. The education content was delivered using different methods for children and leveraging technological advancements such as educational videos and VR games. Traffic safety education for children also required support and collaboration from different parties such as teachers, parents, the local community, online transportation companies, the police, and transportation departments in Yogyakarta City.

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