



Safety Promotion Through Educational Games Media Towards the Knowledge of Primary School Students

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Abstract

Background: Primary school students are a group that potentially have accidents, this is due to the character of students who have high curiosity and exploration. A student's understanding of his own safety is inseparable from the cognitive limitations it has. Therefore, it is necessary to promote occupational safety and health to primary school students. This research was conducted to determine the impact of occupational safety and health promotion on the level of knowledge of primary school students.

Methods: This research is a quasi-experimental with non-equivalent control group design. The research sample consists of 222 respondents, but only 126 respondents met the inclusion and exclusion criteria. Data analysis used the Wilcoxon test.

Result: The results shows there is impact of occupational safety and health promotion on the knowledge of primary school students. This can be seen based on the significant difference in the knowledge level of primary school students who received occupational safety and health promotion (p value=0,000<0,05) and there was no significant difference in knowledge in the group that did not receive occupational safety and health promotion (p value=0,849>0,05).

Conclusions: The conclusion finds that occupational safety and health promotion has impact on the knowledge level of primary school students.

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INTRODUCTION

School is where all students, teachers, and staff gather to conduct teaching and learning activities (Ahmad & Hussain, 2021). Children spend a significant amount of time at school, which plays a crucial role in their physical and mental development (Behzadkolaee et al., 2015). During their school years, children engage in a variety of activities both inside and outside the classroom. Within these activities there are, of course, potential hazards that threaten children's safety. Hazards in the school environment may include violence against children, natural disasters, inadequate security, and biological hazards such as infectious diseases and outbreaks (Widowati et al., 2021).

Unintentional injuries account for >875,000 child deaths annually worldwide, with 95% of injuries occurring in low- and middle-income countries (Mohammed et al., 2020). Africa and Southeast Asia had the highest child injury mortality rates, at 53.1 per 100,000 population and 49 per 100,000 population, respectively (Morna et al., 2020). According to the 2018 Basic Health Research Report, the national prevalence of injury was 9.2%. A total of 14 provinces have a prevalence of injury higher than the national prevalence, one of which is Central Java, which is 9.3%, with the proportion of injured body parts in the 5-14 age group being the head (10.03%), chest (0.89%), back (2.22%), abdomen (1.40%), upper limbs (24.10%) and lower limbs (77.59%) (Badan Penelitian dan Pengembangan Kesehatan, 2019). Based on a previous study, out of 250 primary school students, 16.8% of male students and 4.4% of female students suffered severe injuries (Usman et al., 2021). Student accidents can happen during play, sports activities, crossing the road, and walking home from school (Widowati, Koesyanto, et al., 2018).

According to (Caine, Maffuli, & Caine, 2007), reported in the journal (Park, 2018), primary school students are more likely to experience accidents compared to high school students and adults. This is driven by the nature of primary school children, who exhibit a high level of curiosity and are keen to explore the environment around them. Additionally, they are in a period of growth and development,

and are very active due to having more energy, which they channel through movement and a desire to learn about their surroundings (Hutasoit & Widowati, 2017). School safety encompasses not only the safety of the school environment, but also the safety of children, school staff and teachers travelling to and from school (Erçek & Birel, 2021). Safety and health in school environment is one of the factors which influence the development of students' talents. (Poursadeqiyani & Arefi, 2020). The sense of insecurity felt by students is linked to poor academic performance, affecting students' ability to complete assignments and contributing to students' emotional problems such as anxiety and depression (Côté-Lussier & Fitzpatrick, 2016). To create a safe and healthy work environment, in addition to paying attention to efforts to prevent risks and hazards, it is necessary to protect and promote health, safety and welfare (De Cieri & Lazarova, 2021).

Schools are susceptible to physical, biological, and psychosocial hazards and yet safety education for school children has not been widely practiced, either in formal education (in the teaching and learning process with teachers) or in informal education (extracurricular activities) (Widowati, Hendriyani, et al., 2018). According to (Nugraheni et al., 2018), According to (Nugraheni et al., 2018), children's understanding of their own safety is inextricably linked to their cognitive limitations, therefore all children must receive good safety education to increase students' understanding of the hazards that exist in schools and how to overcome these hazards. In (Setiawan et al., 2020) it is explained that character development learning and the introduction of children's personality values such as honesty, discipline, health, safety, mutual respect and esteem, among others, is best started at primary school age.

OSH promotion aims to influence workers' behaviour through education and training, using various interactive methods and media (Hasibuan et al., 2020). A person's behaviour is formed on the basis of one's knowledge; behaviour based on knowledge will be more enduring than one that is not based on knowledge (Darsini et al., 2019). A study conducted in Malaysia demonstrated that students' knowledge of road safety improved

after being taught a road safety education module (Ismail et al., 2019). A study conducted in Grenada demonstrated that water safety training improved the knowledge of primary school students (Solomon et al., 2013). In addition, research conducted by (Klas et al., 2015) regarding the implementation of the "Risk Watch" programme effectively increases knowledge about fire safety in primary school students. The promotion of occupational safety and health (OSH) is a strategic step towards improving students' knowledge of safety in schools. However, OSH promotion in schools has not been widely implemented. This study utilized safety snakes and ladders educational game and rock paper scissors props to promote OSH in schools. This educational game was chosen because it is commonly played by children, making learning more fun and interactive.

The preliminary study revealed that SD Negeri Krapyak Lor 02 and SD Negeri Krapyak Lor 04 have not been exposed to occupational safety and health promotion. Additionally, there are potential hazards that may occur in these two schools. These include traffic safety hazards, fire hazards due to the densely populated residential environment, environmental hazards, hazards during play, biological hazards such as infectious diseases, non-communicable diseases, poisoning, and the risk of natural disasters such as tidal floods and tsunamis. The researcher aims to investigate the impact of OSH promotion on the knowledge level of primary school students, based on the identified issues.

METHODS

This is a quantitative research study that uses a quasi-experimental method and a nonequivalent control group design. The experimental and control groups were determined through a simple drawing process. The first group selected during the drawing will be the experimental group, while the group selected in the second drawing will be the control group.

Prior to receiving treatment, the sample will undergo a pre-test. Following treatment, a post-test will be administered. The experimental group will receive OSH promotion through

educational game media, based on previous research conducted by (Widowati, Hendriyani, et al., 2018) and (Widowati & Hendriyani, 2018), while the control group received no OSH promotion treatment. The low-grade group (grades 1-3) will receive OSH promotion with the educational game of safety snakes and ladders, while the high-grade group (grades 4-6) will receive OSH promotion with the educational game media of rock paper scissors card props. The selection of game media in this OSH promotion was adjusted based on the different reading skills between low-grade and high-grade students.

The research was conducted in SD Negeri Krapyak Lor 02 and SD Negeri Krapyak Lor 04 from November to December 2022. The independent variable in this research is the promotion of occupational safety and health (OSH) using educational game media, while the dependent variable is the level of knowledge of primary school students regarding occupational safety and health.

The population in this study were all students of SD Negeri Krapyak Lor 02 and SD Negeri Krapyak Lor 04, Krapyak Village, Pekalongan Utara, Pekalongan City. The sampling method in this study was non probability sampling using total sampling technique with a total of 222 respondents, but only 126 respondents met the inclusion and exclusion criteria. The inclusion criteria of this study were 1) students in grades 1-6 of Krapyak Lor 02 and Krapyak Lor 04, 2) willing to be a sample while the exclusion criteria in this study were 1) students who were sick, permission or absent, 2) students did not fill out the questionnaire completely.

Based on the results of the simple draw, the experimental group selected in this study were students of SD Negeri Krapyak Lor 02, totalling 59 students and the control group in this study were students of SD Negeri Krapyak Lor 04, totalling 67 students.

The research instrument used in this research was a questionnaire that had been tested for validity and reliability. This questionnaire is an instrument used to determine the level of knowledge about occupational safety and health. In this research, the validity test of the questionnaire was conducted on 30 respondents

outside the population of this research, namely students of SD Negeri Krapyak lor 01. Pearson's product moment r test was used to measure the validity of the questionnaire. The validity test results for all 10 items indicated validity ($r_{count} > r_{table}$). The results of the reliability test of the questionnaire on 10 items showed that the value of the split-half Guttman coefficient (0.816) was greater than the r_{table} (0.361), which means that the questionnaire was reliable. The questionnaire was administered to both the experimental and control groups before and after the intervention. Wilcoxon and Mann-Whitney tests were used for data analysis since the data did not follow a normal distribution.

This study has obtained ethical clearance from the Health Research Ethics Committee (KEPK) on 9 November 2022 with ethical approval number 535/KEPK/EC/2022.

RESULTS AND DISCUSSION

After conducting research on 126 respondents, the results of the frequency distribution of respondents according to age, gender and class are shown in Table 1. The majority of respondents in both the experimental and control groups were 8 years old, with 13 respondents (22.0%) in the experimental group and 14 respondents (20.9%) in the control group. Meanwhile, the frequency distribution based on gender showed that there were more male respondents than female respondents. Specifically, there were 33 respondents (55.9%) in the experimental group and 38 respondents (56.7%) in the control group. Based on class, it can be observed that in the experimental group, the majority of respondents were grade 6 students, namely 14 students (23.7%), while in the control group, the majority of respondents were grade 2 students, namely 14 students (20.9%).

Table 1. Frequency Distribution of Respondent Characteristics by Age, Sex, and Grade

Characteristics	Experiment Group		Control Group		Σ	%	
	Σ	%	Σ	%			
Age (years)	7	8	13,6	11	16,4	19	15,1
	8	13	22,0	14	20,9	27	21,4
	9	12	20,3	11	16,4	23	18,3
	10	9	15,3	11	16,4	20	15,9
	11	8	13,6	10	14,9	18	14,2
	12	9	15,3	8	11,9	17	13,5
	13	0	0	2	3,0	2	1,6
Sex	Male	26	44,1	29	43,3	55	43,7
	Female	33	55,9	38	56,7	71	56,3
Grade	Grade 1	7	11,9	12	17,9	19	15,1
	Grade 2	6	10,2	14	20,9	20	15,9
	Grade 3	12	20,3	6	9,0	18	14,3
	Grade 4	13	22,0	11	16,4	24	19,0
	Grade 5	7	11,9	13	19,4	20	15,9
	Grade 6	14	23,7	11	16,4	25	19,8
Total		59	100	67	100	126	100

Table 2 presents the frequency distribution of students' level of knowledge about occupational safety and health (OSH). In the experimental group, 16 students (27.1%) had good knowledge, 26 students (44.1%) had sufficient knowledge, and 17 students (28.8%) had insufficient knowledge before receiving OSH promotion. Following the OSH promotion, the number of students in the experimental group with good knowledge increased by 32 students,

reaching 48 students (81.4%), the number of students with sufficient knowledge decreased by 15 students, reaching 11 students (18.6%), and the number of students with insufficient knowledge decreased by 17 students, showing that there are no students with insufficient knowledge. In the control group, the pretest results indicated that 27 students (40.3%) had good knowledge, 27 students (40.3%) had sufficient knowledge and 13 students (19.4%)

had less knowledge. In the post-test score of the control group, the number of students with sufficient knowledge increased to 34 students (50.7%), while the number of students with good and less knowledge decreased to 24 students (35.8%) with good knowledge and 9 students (13.4%) with less knowledge about occupational safety and health.

The normality test is carried out to determine the hypothesis test to be used on the research data. If the data is normally distributed, a parametric test hypothesis test is used, while a non-parametric test is used if the data is not normally distributed. In this research, the Kolmogorov-Smirnov test is used as the normality test because the number of samples is more than 50. The results of the normality test indicate that the data is not normally distributed, with a p-value of less than 0.05. The analysis of differences in pretest and post-test scores between the experimental and control groups was conducted using an alternative paired T test, specifically the Wilcoxon test.

The initial knowledge value was taken at the beginning of the research, before the respondents received any treatment. Table 4 shows the results of knowledge measurement for each group. The experimental group showed an increase in student knowledge scores. The pretest values ranged from 3 to 10 with an average of 6.47, while the post-test values ranged from 6 to 10 with an average of 8.69. The Wilcoxon statistical test analysis resulted in a p-value of $0.000 < 0.05$, leading to the rejection of H_0 and acceptance of H_a . This indicates a significant difference in knowledge before and after receiving OSH promotion. The experimental group's increase in knowledge aligns with previous research (Iva, 2022) that found an increase in knowledge about basic occupational safety and health in primary school students after OSH promotion.

In the control group, the pretest knowledge scores ranged from 3 to 10 with

an average of 7.06, while the post-test scores ranged from 3 to 10 with an average of 7.03. The Wilcoxon test results showed a p-value of 0.849, indicating that H_0 is accepted and H_a is rejected. Therefore, there is no significant difference in knowledge between the control group that did not receive the OSH promotion treatment and the control group that did receive the OSH promotion treatment.

The results of the analysis in Table 3 show that the delta value of the knowledge score of the experimental group is 2.22 and that of the control group is -0.3. The average increase in the delta value of the knowledge score of the experimental group that received the promotion treatment was higher than that of the control group that did not receive the promotion treatment. Based on the delta value of the knowledge score, it also shows that the knowledge of the experimental group after receiving the treatment increased by 34.3%, while the knowledge level of the control group that did not receive the treatment decreased by 0.42%.

Based on Table 4, before the experimental group received the OSH promotion treatment, the experimental group and the control group had the same knowledge about occupational safety and health. This is evidenced by the Mann-Whitney test results on the pre-test scores of the two groups, which shows a p-value of $0.059 > 0.05$, which means that there is no significant difference in the students' initial knowledge of OSH. Meanwhile, after the experimental group received OSH promotion treatment, the Mann-Whitney test results on the post-test results showed a p value of 0.000. Thus, there is a difference in the final knowledge of OSH between the experimental group that received OSH promotion and the control class that did not receive treatment. Since there is a significant difference, it can be said that there is an effect of OSH promotion on students' knowledge level of OSH.

Table 2. Frequency Distribution of Students' Knowledge of Occupational Safety and Health

Knowledge	Experiment Group				Control Group			
	Pretest		Post-test		Pretest		Post-test	
	n	%	n	%	n	%	n	%
Less	17	28,8%	0	0	13	19,4	9	13,4
Fair	26	44,1%	11	18,6	27	40,3	34	50,7
Good	16	27,1%	48	81,4	27	40,3	24	35,8
Total	59	100	59	100	67	100	67	100

Table 3. Analysis of Pretest and Post-test Results of Experimental Group and Control Group

Variables	Experimental Group	Control Group
Initial Knowledge Value (Pretest)		
Minimum	3	3
Maximum	10	10
Average	6,47	7,06
Final Knowledge Value (Post-test)		
Minimum	6	3
Maximum	10	10
Average	8,69	7,03
P	0,000	0,849
Delta Knowledge Score		
Minimum	-1	-4
Maximum	7	4
Average	2,22	-0,3

Table 4. Analysis of the Effect of OSH Promotion on Primary School Students' Knowledge Level of Occupational Safety and Health

Variables	Experimental Group	Control Group	p
Initial Knowledge	6,47	7,06	0,059
Final Knowledge	8,69	7,03	0,000

The education sector is an important sector for OSH efforts. Schools are strategic environments for the process of promoting a culture of occupational safety and health (Iva, 2022). At primary school age, children's characters tend to be easily formed, hence instilling an OSH culture at an early age will form a child's mindset to always act safely. Various media can be used for OSH promotion to provide knowledge to students. The use of the relevant media can help facilitate the process of delivering messages so that they are more easily understood and accepted by the intended target (Riswanti, 2017).

Educational games are one of the media that can be used to convey learning. OSH promotion with educational game media certainly has advantages, one of which is that it can improve memory so that students can absorb the information conveyed for a longer time compared to conventional methods

(Vitianingsih, 2016). According to (Nurhidayati & Hilal, 2018) learning process using game media encourages children to learn through sight, hearing and touch. The more senses one uses for the reception of information, the higher and clearer the knowledge one receives (Ariyoso, 2016). This is in line with the research conducted by (Fitriastuti, 2015) that health promotion with snakes and ladders game media is more effective in increasing the practice of washing hands with soap compared to picture storybook media, because snakes and ladders game media is in line with the developmental stage of children who are still in the play stage, so the information conveyed is more easily accepted by children. Research conducted by (Demitri et al., 2015) indicates that nutrition education through puzzle game media can effectively enhance children's understanding of balanced nutrition patterns.

This research used educational game

media to promote occupational safety and health. The results of the Wilcoxon test indicate a significant difference between the pretest and post-test in the experimental group that received OHS promotion treatment. In contrast, the results of the Wilcoxon test on the control group, who did not receive OSH promotion treatment, showed no significant difference between the pretest and post-test. It can be concluded that OSH promotion has an effect on students' knowledge of occupational safety and health. The use of educational game media in this study successfully increased students' knowledge about occupational safety and health, and it is hoped that after students have knowledge about occupational safety and health, it can have an impact on increasing students' safe behavior to prevent accidents.

CONCLUSIONS

The results of the research on the effect of occupational safety and health promotion on the knowledge level of primary school students, it can be concluded that there is a significant difference in the knowledge level between pretest and post-test at SD Negeri Krapyak Lor 02 as the experimental group. However, at SD Negeri Krapyak Lor 04, there was no significant difference in knowledge level between pretest and post-test. This demonstrates that promoting OSH has an impact on primary school students' knowledge level of OSH.

Therefore, the Department of Education should make efforts to develop OSH promotion in the school environment, especially in the learning curriculum of primary school students. For SD Negeri Krapyak Lor 02 and SD Negeri Krapyak Lor 04, it is necessary to deliver information on OSH in the school environment in the agenda of school activities of students, such as morning assembly and/or routine familiarization activities before teaching and learning activities are conducted, so that students have insight on OSH from an early age and the teaching and learning process can be convenient and safe.

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