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RESEARCH PAPER

Effect of Safety Education on Students' Knowledge related to their Safety

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ABSTRACT

The study was conducted to investigate the effect of safety education on knowledge of Grade three students. Eighty nine participants were chosen carefully from public sector primary schools. The pretest posttest quasi experimental design was applied. The self-developed tool for evaluate knowledge was used. A piloting study was conducted. Experts' opinion was incorporated in tool for purpose of validity. Independent samples t-test and paired sample t-test were applied for data analysis. A significant effect of safety education on students' knowledge was revealed. It was recommended that safety education should be an integral part of key stages of students at primary level.

KEYWORDS Effect, Safety Education, Students, Knowledge

Introduction

Safety education supported as a helping tool and it is effective for children because it can increase knowledge of safety (Duperrex, Bunn &Roberts, 2002 ; Fox,1932; Kapur,2020). The safety education is often helpful in danger situation. Various studies have highlighted that safety education improves knowledge as well as enhance positive attitude of students towards safety **(**Wiseman,2007 **;**Wurtele & Owens,1997 **;** Valcke, Schellens, Van- Keer & Gerarts, 2008**).** Safety education also promotes deep learning and reduces fear of any danger (United Nations Children's Fund, 2018). The literature discusses that safety education is useful to overcome routinely fear of harm in students (Spinks, Turner, McClure & Nixon, 2004 ;Torani, Majid & Sheikhi, 2019). Safety education consists of many types of safety. All of safety aspects depend upon the safety education. Students can learn collaboratively to find the solution of any danger (Mulvaney, Watson& Errington,2011; Musigapong, & Phanprasit , 2013). Macintyre and Carr (1999) explored that students are mentally prepared in class room for self-defense through safety education. It can be helpful to increase motivation to implement safety measures in case of any danger. Duffey and Saull (2002) identified the impact of safety education on student knowledge. Their study findings indicated that safety measures knowledge helps the children to face challenges with courage and bravely as compared to those who do not know about safety measures. They show negative responses as well as anxiety towards any danger. According to Lamb, Joshi, Carter, Cowburn and Matthews (2006), harm anxiety is the common feeling of fear and tension. The goal of safety education is how students feel and act in risk. Safety education overcomes the fear of children in danger. Fei and Ying (2016) stated safety education helps students to build self –awareness and contribute positively in society. It provides an environment where we can learn a lot of basic safety skills. Benefits of safety education can be seen

personal and societal. It fosters students 'development in their safety skills and emotional responses which are need at all ages and levels of study (Doughty & Wood, 1985; Murray, 2017). Child can face harm anxiety at home in society and classroom. Negative responses in danger can cause loss of life. Safety education ensures safety of students in life span (Frederick, Bixby, Orzel, Brown, &Willett, 2000; Morgan,2010). Insufficient safety knowledge increases complication and cause harms in student's life. Students' feeling of risk produces anxiety and they show immature attitude self safety (Hong, 2016; Reinau, Meler,Gerber&Surber,2014). Students with safety knowledge keep save themselves from harms in any danger situation. Safety knowledge strengthens positive attitude which results in good performance in case of any harm. Students with fear of harm have lack of confidence to face danger. They feel helpless and unable to escape from dangers (Fei, & Ying, 2016; Hood, 2018; Isaac, Sherman, Cusimano&Chipman, 2004; Riyanto, Murwani, Sulistiyani&Rahfiludin, 2017). Negative attitude acts in a destructive manner when students react unconstructively to face any risk. Those Students who have poor knowledge of safety usually have lower beliefs on their abilities. Fear of risk is the common cause of pressure which involves lose of person's life (Alonso etal., 2018). Knowledge and attitude is connected to each other in a positive way (Hong, 2016; Kitamura, 2014; Mani, Demado, Abdul Manaf&Yellappan, 2018; ROSPA ,2018).

Literature Review Teaching safety education as a subject is more effective for the students. Different types of safety knowledge provides understanding of safety measures in risks to students (Kenny, Wurtele & Alonso, 2012). Johnson and Adebayo (2011) said safety education enhances student's knowledge about road safety. It was found in their study that safety education was major tool to improved knowledge. They found that safety education carried significant change in knowledge. The effect of safety education was seen in other experimental studies. The finding of studies indicated that students who taught through safety education intervention showed significant change in the final testing as compared to other group who was not taught through intervention. Safety education increases safety skills in students. Several studies were strong evidence about significance of safety education for students at school as a result of positive attitude related to safety was appeared **(**Finkelhor,Walsh,&Jones,2020;Ismail, Khairani, Syed Abdullah, Mustafa &Zulkafl , 2019; Kenny, Wurtele& Alonso, 2012;Monk, 2011**).** In a study by Berry and Romo (2015**)**, conducted on students. In their study improvement of safety skills were focused. In the final test, the students showed great knowledge which was solid evidence that safety's knowledge can be increased through safety program as a core subject at school level. Morenoet al. (2013)summarized the benefits of safety education applied to as the subject. According to them, safety education helped to fill up the gap among students' knowledge, safety attitude and skills and helped students to build their knowledge on new ideas, concepts and ways. They can use their knowledge to save other and encouraged them in different situation. Wiseman(2007) used safety education as a subject and he concluded that safety education enhanced safety skills for self protection, while crossing the road, selection of food for healthy and unhealthy life, during use of internet, safety for the duration of playing and safe use of fire and many other risks. Dukes, Brady, Scott and Wilson (2016) concluded that the students who have safety knowledge showed positive attitude in danger as compare to those who did not have knowledge related to safety measures. According to Emery and Tyreman (2009) teachers may know the function of safety education and its influence on attitude. There was need to investigate the effect of safety education in Pakistani perspective. However, studies on different types of safety are found separately. The outcome of safety education for student's safety at primary level was a basic purpose of the study.

Hypotheses

Null hypotheses based on objectives were devised for the study:

Ho1: There is no statistically significant difference in safety knowledge of experimental group and control group.

Ho2: There is no statistically significant difference in boys' safety knowledge of experimental group and control group.

Ho3: There is no statistically significant difference in girls' safety knowledge of experimental group and control group.

Material and Methods

A pretest posttest quasi-experimental design was chosen for the study. The underlying basis of the study was to examine the effect of safety education on students' knowledge. The study was enclosed to grade three students of a Government primary school. To accomplish the study, 89 participants of class three were selected. Two Government primary schools were selected on voluntarily basis. It was not possible to assign participants randomly to groups. Participants divided into two groups: one was an experimental group that taught weekly through safety education lesson and the other was a control group that did not teach weekly through safety education lesson. Researcher focused on ethical consideration prior to the study. There was self developed tool administered in Pretest and posttest.

Instrument

The instrument knowledge test for safety and attitude scale were administered in pretest and posttest. There were fifty multiple choice questions in Knowledge test. The reliability and validity of instrument ensured through pilot study on the other group of 75 participants of grade three students. Researcher developed table of specification and analysis of items was carried out to make sure that the items in the test were correct and not ambiguous for the students. The pretest was prepared with the help of content which was taught to students. Researcher discussed with the participants about rules, division of chapters and marks allocation for pretest before commence the study. Bridges (2017) developed a self-report questionnaire consisting of questions developed based on the details of fire safety education. Brenick et al., (2019) developed an instrument to identify the effects of safety education program. Researcher applied factor analysis to know about the statements clarity. The internal consistency of instruments was measured through Cronbach's Alpha. The collected data were analyzed by independent samples t-test to estimate the mean differences between two similar groups. The reliability of a knowledge test was 0.82.

Data Analysis and Interpretation

Researcher formulated Hypotheses to measure the effect of independent variable on dependent variable before and after interventions. Table 1 showed the difference between pretest scores of safety knowledge of control group and experimental groups, table 2 showed the comparison of control group and experimental groups on post-test scores of safety knowledge, table 3 height lighted boys' pre-test and posttest scores of control group and intervention group and table 4 revealed the pretest and post-test scores of girls related to safety.

Table 1
Difference between pre-test scores of safety knowledge control group and intervention group

Safety	Control		Experiment		Independent samples t-test		Effect size
Knowledge	***M***	***SD***	***M***	***SD***	**t**	**p**	**Cohen's d**
Body	51.59	29.09	53.41	24.96	-0.31	0.754	0.067
Road	29.04	19.20	32.83	20.47	-0.90	0.373	0.191
Food	38.64	23.29	40.15	27.24	-0.28	0.780	0.060
Internet	25.28	16.28	34.66	27.21	-1.96	0.053	0.431
Sports	40.53	22.27	38.64	22.95	0.39	0.695	-0.084
Fire	25.85	15.34	26.70	19.36	-0.23	0.820	0.049
Over-all	35.55	9.90	38.27	14.30	-1.04	0.301	0.225

Independent-samples t-test was applied to indentify the variation on pretest scores of control and intervention group towards six types of safety. Table 1 shows the results on the basis of analysis.

There was no difference found through Independent-samples t-test in pretest scores of control group (*M*=51.59, *SD*=29.09) and treatment group on scores of body safety knowledge (*M*= 53.41, *SD*=24.96). There was (1.82) mean difference. The t-value was (*t*=-0.31, *p*=0,754).

Findings indicated no difference between scores of pretest of control group (*M*=29.04,*SD*=19.20) and experimental groups knowledge of road safety (*M*= 32.83,*SD*=20.47). there was difference appear in mean (3.79). The Independent-samples t-test was facilitated the finding of the study (*t*=-0.90, p=0,373).

Findings illustrated that there was no difference in scores of pretest of control group (M=38.64, SD=23.29) and experimental groups on knowledge of food safety (*M*= 40.15,*SD*=27.24) and mean difference was (1.51). The Independent-samples t-test was completely support the findings of the study (*t*=-0.28, p=0,780).

Findings indicated that there was no difference in scores of pretest of control group (*M*=25.28, *SD*=16.28) and experimental groups on knowledge of Internet safety(*M*= 34.66,*SD*=27.21). There was difference in mean (9.38). The findings are supported through Independent-samples t-test (*t*=-1.96, p=0.053).

Findings indicated that the mean score of sports safety knowledge of control group (*M*=40.53, *SD*=22.27) was slightly higher than experimental group (*M*= 38.64, *SD*=22.95), however the difference was not noteworthy (*t*=0.39, p=0.695). The difference in mean scores of control and intervention groups on knowledge of sports safety was (-1.89).The findings were supported through Independent-samples t-test (*t*=-0.39, p=0.695).

Findings showed that there was no difference in scores of pretest of control group (*M*=25.85, *SD*=15.34) and experimental groups on knowledge of fire safety (*M*= 26.70, *SD*=19.36). There was difference in mean (0.85). The findings were supported through Independent-sample (*t*=-0.23, *p*=0.820).

Result revealed that there was no difference in scores of pretest of control group (*M*=35.55, *SD*=9.90) and experimental groups on the whole safety knowledge scores (*M*=

38.27, *SD*=14.30). There was difference in mean (2.72). The results supported through Independent-samples t-test (*t*=-1.04, p=0.301).

Table 2
Post-test scores of Safety knowledge of control group and experimental group

Safety	Control		Experiment		Independent samples t-test		Effect size
Knowledge	***M***	***SD***	***M***	***SD***	**t**	**p**	**Cohen's d**
Body	53.41	22.51	83.18	13.43	-7.53	<.001	1.657
Road	33.33	16.25	80.81	25.74	-10.35	<.001	2.261
Food	42.93	26.53	87.88	18.69	-9.19	<.001	1.988
Internet	30.11	16.69	79.55	20.01	-12.59	<.001	2.694
Sports	45.45	32.62	83.71	22.01	-6.45	<.001	1.401
Fire	28.69	18.20	61.08	26.17	-6.74	<.001	1.460
Over-all	39.27	11.00	65.35	9.20	-15.08	<.001	2.582

The comparison of posttest scores of control and intervention group towards safety knowledge was done through Independent-samples t-test. Table 2 indicates the results of the study.

There was significant difference could be seen in scores of posttest of control group (*M*=53.41,*SD*=22.51) and treatment group on scores of knowledge of body safety *(M*= 83.18,*SD*=13.43). The difference appear in mean was (29.77). The result are confirm through Independent-samples t-test (*t*=-7.53, p <.001).

There was major difference in scores of posttest of control group (*M*=33.33, *SD*=16.25) and experimental groups on scores of knowledge of road safety (*M*= 80.81, *SD*=25.74) and mean difference was (47.48). The Independent-samples t-test was facilitated the findings (*t*=-10.35, *p*<.001).

There was significant difference in scores of posttest of control group (*M*=42.93,*SD*=26.53) and experimental groups on scores of knowledge of food safety (*M*= 87.88,*SD*=18.69). There was difference in mean (44.95). The Independent-samples t-test was sustained the findings (*t*=-9.19, *p*<.001).

There was significant difference in scores of posttest of control group (*M*=30.11, *SD*=16.69) and experimental groups on scores of knowledge of Internet safety (*M*= 79.55, *SD*=20.01) and mean difference was (9.38). The Independent-samples t-test was confirm the findings (*t*=-12.59, p <.001).

There was significant difference in scores of posttest of control group (*M*=45.45, *SD*=32.62) and experimental groups on scores of knowledge of sports safety (*M*= 83.71, *SD*=22.01) and mean difference was (38.26). The Independent-samples t-test was verify the findings (*t*=-6.45, *p*<.001).

There was significant difference in scores of posttest of control group (*M*=28.69, *SD*=18.20) and experimental groups on scores of knowledge of fire safety (*M*= 61.08, *SD*=26.17) and mean difference was (32.39). The result was supported by Independent-samples t-test (*t*=-6.74, p <.001).

There was significant difference in scores of posttest of control group (*M*=39.27, *SD*=11.00) and experimental groups on scores of knowledge of on the whole safety (*M*=

65.35, SD=9.20). There was difference in mean (26.08). The findings supported through Independent-samples t-test (*t*=-15.08, p<.001).

Table 3
Comparison of pre-test and post-test scores of boys experimental group of knowledge

Safety	Pre-test scoress		Post-test		Paired samples t-test		Effect size
Knowledge	***M***	***SD***	***M***	***SD***	***t***	***p***	**Cohen's d**
Body	49.00	22.92	81.50	16.31	-5.28	<.001	1.66
Road	36.11	21.59	80.56	26.95	-7.12	<.001	1.83
Food	41.67	26.21	84.44	22.63	-6.62	<.001	1.751
Internet-Safety	39.38	31.49	75.00	24.33	-5.28	<.001	1.276
Sports	31.67	21.56	84.17	23.24	-8.17	<.001	2.344
Fire	26.25	18.98	65.63	24.96	-5.46	<.001	1.792
Over-all	38.10	13.42	78.60	17.94	-10.05	<.001	2.583

The pre-testand post-test scores of male experimental group of body safety, road safety, food safety, Internet safety, sports safety and fire safety knowledge was compare througha paired-samples t-test. The result presents in table 3.

Result showed difference was significant between pre-test scores of male experimental group (*M*=49.00, *SD*=22.92) and post-test scores of body safety knowledge (*M*= 81.50,*SD*=16.31). The mean difference was (32.5).The paired samples t-test was supported the result (*t*=-5.28, *p*<.001).

Result indicated difference was significant between pre-test scores of male experimental group (*M*=36.11, *SD*=21.92) and post-test scores of road safety knowledge (*M*= 80.56.27, *SD*=26.95). The mean difference was (44.45).The paired samples t-test was supported the result (*t*=-7.12, *p*<.001).

Result revealed difference was significant between pre-test scores of male experimental group (*M*=41.67, *SD*=26.21) and post-test scores of food safety knowledge (*M*= 84.44, *SD*=22.63). The mean difference was (42.77). The paired samples t-test was supported the result (*t*=-6.62, *p*<.001).

Result illustrated difference was significant between pre-test scores of male experimental group (*M*=39.38, *SD*=31.49) and post-test scores of Internet safety knowledge (*M*= 75.00, *SD*=24.33). The mean difference was (35.62). The paired samples t-test was supported the result (*t*=-5.28, *p*<.001).

Result showed difference was significant between pre-test scores of male experimental group (*M*=31.67, *SD*=21.56) and post-test scores of sports safety knowledge (*M*= 84.17,*SD*=23.24). The mean difference was (52.5).The paired samples t-test was supported the result (*t*=-8.17, *p*<.001).

Result indicated difference was significant between pre-test scores of male experimental group (*M*=26.25, *SD*=18.98) and post-test scores of fire safety knowledge (*M*= 65.63, *SD*=24.96). The mean difference was (39.38). The paired samples t-test was supported the results (*t*=-5.46, *p* <.001).

Result showed difference was significant between pre-test scores of male experimental group (*M*=38.10,*SD*=13.42) and post-test scores of safety knowledge (*M*= 78.60,*SD*=17.94). The mean difference was (40.5). The paired samples t-test was supported the result (*t*=-10.05,*p*<.001).

Table 4
Comparison of pre-test and post-test scores of girls experimental group of knowledge

Safety	Pre-test scores		Post-test		Paired samples t-test		Effect size
Knowledge	***M***	***SD***	***M***	***SD***	***t***	***p***	**Cohen's d**
Body	57.08	26.45	84.58	10.62	-4.274	<.001	1.48
Road	30.09	19.52	81.02	25.27	-7.695	<.001	2.27
Food	38.89	28.56	90.74	14.53	-8.972	<.001	2.407
Internet-Safety	30.73	23.01	83.33	15.05	-8.810	<.001	2.764
Sports	44.44	22.88	83.33	21.42	-8.527	<.001	1.756
Fire	27.08	20.08	57.29	27.07	-4.306	<.001	1.281
Over-all	38.42	15.28	80.33	9.65	-11.495	<.001	3.362

The pre-testand post-test scores of female experimental group of body safety, road safety, food safety, Internet safety, sports safety and fire safety knowledge compare througha paired-samples t-test. Table 4 presents result of analysis.

Result showed difference was significant between pre-test scores offemale experimental group (*M*=57.08, *SD*=26.45) and post-test scores of body safety knowledge (*M*= 84.58,*SD*=10.62). The mean difference was (27.5). The paired samples t-test was supported the result (*t*=-4.274, *p*<.001).

Result indicated difference was significant difference between pre-test scores of female experimental group (*M*=30.09, *SD*=19.52) and post-test scores of road safety knowledge (*M*= 81.02.27, *SD*=25.27). The mean difference was (50.93).The paired samples t-test was supported the result (*t*=-7.695, *p*<.001).

Result revealed difference was significant between pre-test scores of female experimental group (*M*=38.89, *SD*=28.56) and post-test scores of food safety knowledge (*M*= 90.74, *SD*=14.53) The mean difference was (51.85). The paired samples t-test was supported the result (*t*=-8.972, *p*<.001).

Result illustrated difference was significant between pre-test scores of female experimental group (*M*=30.73, *SD*=23.01) and post-test scores of Internet safety knowledge (*M*= 83.33, *SD*=15.05). The mean difference was (52.6). The paired samples t-test was supported the result (*t*=-8.810,*p*<.001).

Result showed difference was significant between pre-test scores of female experimental group (*M*=44.44, *SD*=22.88) and post-test scores of sports safety knowledge (*M*= 83.33,*SD*=21.42). The mean difference was (38.89). The paired samples t-test was supported the result (*t*=-8.527, *p*<.001).

Result indicated difference was significant between pre-test scores of female experimental group (*M*=27.08, *SD*=20.08) and post-test scores of fire safety knowledge

(*M*= 57.29, *SD*=27.07). The mean difference was (30.21).The paired samples t-test was supported the result (*t*=-4.306, *p* <.001).

Result showed difference was significant between pre-test scores of female experimental group (*M*=38.42,*SD*=15.28) and post-test scores of safety knowledge (*M*= 80.33,*SD*=9.65). The mean difference was (41.91). The paired samples t-test was supported the result (*t*=-11.495,*p*<.001).

Conclusions

The study was carried out to determine the effect of safety education on knowledge and attitude of grade three students. The findings of the study indicated significant difference in safety knowledge and attitude based on comparison of pretest and posttest scores of experimental and control groups. There were a lot of studies in literature on safety education (Shen, 2010; Tariq, Tariq, Hussain &Shahid,2018). The tool for estimation of safety knowledge was developed by the researcher. The current study identifies that safety education is helpful for deal with safety knowledge and attitude inside and outside the school. The major aim of the study was to identify basic knowledge of safety of grade three students at a Government schools. The interventions, pretest and posttest help to identify the difference in mean scores of safety knowledge and attitude in both groups. It finds out that students can control their fear by knowledge and positive attitude in danger. All participants had better knowledge and attitude after the intervention completion. The results confirm the truth that safety education has a strong impact on knowledge (Frederick et al., 2000; Ismail et al.,2019 ; Johnson & Adebayo, 2011; Kenny, Wurtele& Alonso, 2012; Lee &Derwin, 2019; Mackay,2003; Sepehri&Sheikhalizadeh, 2017; Taparia, Finkelhor, Aguilar &Jhunjhunwala , 2018). Children are scared when they face danger in their life. It is essential for parents and teachers to be aware of this condition and help the children by providing safety knowledge. It would facilitate them in coming out from any harmful situation. It could be possible through safety education that children will increase the self-confidence in any condition with immense bravery and positive attitude. Researcher find out that the effect of the safety education was constructive as the results demonstrated increase in knowledge and decrease in fear(Cakiroglu&Gokoglu, 2019 ; Cullen etal.,2002; Lamb et al.,2006; Luria,Smith&Chapman,2000; Macintyre &Carr, 1999; Sarno&Wurtele, 1997). The above discussion illuminates that safety education considered as a major element that helps to improve knowledge of safety of children at the primary level. Therefore, the current study is an attempt to identify the effect of safety education on knowledge at the primary level towards safety. If safety education will be regularizing throughout a year, it will support students to know about any harm instead of depending on others (Applebury, 2018; Kapur, 2020; Kitamura, 2014; Kuo&Weng, 2021; Satyen, Barnett & Sosa, 2004; Schwebel, 2006).

Recommendation

Safety education helps students to play a significant role in danger situation. The qualitative and quantitative research methods can be used to see the effect of safety education in future, This study can be conducted with boys as well as girls at elementary and secondary level. The administrators, head teachers, teachers and parents may considered importance of safety education at school which may help the students to show positive attitude in case of any danger with confidence and overcome their fear.

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