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ORIGINAL ARTICLE

STUDY OF THE LEVEL OF KNOWLEDGE OF PRIMARY SCHOOL STUDENTS IN THE FIELD OF PUBLIC PROTECTION IN EMERGENCIES

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Summary

Introduction: Sufficient continuous preparation is needed to ensure that citizens are able to respond adequately in the event of emergencies. This preparation is a continuous process of education in the Czech Republic that is part of primary school educational programmes.

Objective: To determine the knowledge of 6th and 9th grade primary school students in the field of protection of people in emergencies.

Methodology: A questionnaire survey was conducted among a group of 1,943 respondents at 19 primary schools in the Olomouc and Moravian-Silesian regions in 2018 to 2019.

Results: The results showed that students in 6th, 7th and 8th grades have the same level of knowledge, and that the knowledge of students in the 9th grade is at a higher level. An average level of knowledge was found in 42.98% of students, 29.64% of students have below-average knowledge, and 27.38% of students have above-average knowledge.

Conclusion: The results indicate that the sub-objectives set out in the Framework Education Programme for Basic Education have not been fully met. The authors propose teaching the topic of Protection of People in Emergencies from the 6th to 8th grade cross-sectionally in individual subjects, and adding it as a separate subject in the 9th grade.

Key words: emergencies; human security; knowledge; 6th and 9th grade primary school students; educational programmes

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Introduction

Theoretical knowledge and practical skills of the population in dealing with an emergency are effective prevention that can contribute to the protection of a person and mitigate the consequences of an emergency.

On the basis of the Instruction of the Ministry of Education, Youth and Sports to include the topic of the protection of people in emergency situations in educational programmes (1) (č.j. 34 776/98-22 ze dne 4. května 1999), the topic of the protection of people in emergencies (hereinafter PPE) was included in the educational programme of primary and secondary schools in 1999. The content of citizen preparation for the defence of the state is included in the educational fields of "Man and his world", "Man and society" and "Man and health".

By transforming the educational system in schools based on framework curricular documents at the beginning of the school year 2006/2007, the topic of "Protection of people in emergencies" was incorporated into cross-sectional topics in framework educational programmes, and key competencies of students were determined (2) (Jeřábek & Tupý, 2007). The civic competencies of the framework educational programme for basic education state that students: "*make responsible decisions according to the given situation, provide effective help as possible, and behave responsibly in crisis situations and in situations threatening human life and health*" (2) (Jeřábek & Tupý, 2007).

The implementation of the established measures within educational school programmes contributes to the fulfilment of the tasks set out in the "Schedule for the implementation of measures for population protection until 2013, with an outlook to 2020" (3, 4) (Kopecký, 2013; Kirsch & Padrnos, 2013). The obligation to include 6 hours of the given matter in individual academic years is gradually being replaced by the conceptual integration of the protection of people in emergencies in individual educational school programmes (5) (Věstník, 2010).

In 2013, the framework educational programme of basic education was revised and amended. The reason for this was the lack of the population's knowledge of behaviour in emergencies. According to the Czech School Inspectorate (6) (2016, hereinafter referred to as the CSI), the educational area of the protection of persons in the event of common risks and emergencies (hereinafter referred to as PPCRE) is included in basic education as part of the educational field Man and society (citizenship education), Man and health (health and physical education), and Man and nature (natural history and geography).

Education in the field of PPCRE (6) (CSI, 2016) aims to prepare students for the impact of possible consequences of natural disasters and other extraordinary events caused by human activity, which may endanger the physical and mental health of the population and cause loss of life or property (e.g. floods, fires, accidents involving the release of dangerous substances, terrorism acts).

The next step to mitigate the consequences of emergencies is the adoption of legislative and organizational measures in every developed country. "*Population protection is the goal*", as stated in the Concept of population protection until 2020 with an outlook to 2030. The new update was approved by the Czech government on 23 October 2013 no. 805 (7) (Koncepce ochrany obyvatelstva, 2014).

Research Focus

The main objective of the research was to determine the level of theoretical knowledge of 6th to 9th grade students in the field of the protection of people in emergencies at primary schools in the Olomouc and Moravian-Silesian regions by means of a questionnaire survey.

Methodology of Research

Sample of Research

The research group consists of 1,943 students in 6th to 9th grades, with 1,017 boys (52.34%) and 926 girls (47.66%). The questionnaire survey was conducted at 19 urban and rural primary schools in the Olomouc Region

(10 schools) and the Moravian-Silesian Region (9 schools) in the years 2018 to 2019 (Table 1). The questionnaire response rate was 100%, because the authors of the survey conducted the questionnaire survey at the respective schools in person.

Table 1. Numbers of respondents in individual classes in towns and villages.

Grade	Town		Village		Total	
	N	%	N	%	N	%
6	416	69,57	182	30,43	598	30,78
7	319	74,19	111	25,81	430	22,13
8	361	77,47	105	22,53	466	23,98
9	356	79,29	93	20,71	449	23,11
Total	1452	74,73	491	25,27	1943	100,00

Legend: N – absolute frequency, % – relative frequency

Instruments and Procedures

The questionnaire survey was anonymous, and the questionnaire contained demographic information about the respondent (gender, class, place of school), 10 questions in the field of the protection of people in emergencies, and one question asked whether students were acquainted with the matter during the educational process and if so, in which subjects. The questions were closed-ended, polytomous, semi-closed, and open test items requiring the students' own answer.

The questionnaire was compiled on the basis of an analysis of the focus of student education in the field of PPE in framework educational programmes, and it was consulted with experts of the Ministry of Interior - Directorate General of the Fire Rescue Service in Prague.

Data Analysis

Data normality was verified using the Shapiro-Wilk test. A parametric ANOVA and Sheffe's method, a two-sample Student's t-test, a nonparametric Mann-Whitney U-test, and a Student's t-test of the difference of two relative values, were used to evaluate the results (8) (Hendl, 2004). Students' answers were then evaluated on the basis of the sum of correct answers and placed into categories: average level of knowledge ($M \pm 1SD$), below-average level of knowledge ($M - 1$ SD) and above-average level of knowledge ($M + 1SD$). The tests were performed at a 5% level of significance (for $\alpha = 0.05$) (8) (Hendl, 2004). The results were evaluated by the statistical program TIBCO STATISTICA version 13.3 and SPSS.

Results of Research

In the event of an emergency, one of the main steps in calling for help is knowledge of emergency telephone numbers, because the departments of the Integrated Rescue System (IRS) are activated during the call (9) (Kopecký, Tilcerová, & Šiman, 2014).

Students' answers to question no. 1 showed that 96.04% of respondents would choose the correct emergency telephone number, namely 150 - Fire Rescue Service, in the case of personal injury, 95.88% would dial the number 155 - Emergency Medical Service, in case of theft or damage to property, 93.77% of students would dial the number 158 - Police of the Czech Republic. In the event of a combination of all three types of events, 89.55% of respondents would dial the number 112, the universal European emergency number. The above indicates that 93.81% of students in 6^{th}-9^{th} grades would call the right emergency number. 6.19% of students did not know the right emergency number for respective emergency situations. The difference between correct and incorrect answers is statistically very significant ($p=0.000$ **).

In order for students to understand the activities of individual departments, they must also know the relevant IRS departments, which consist of the Fire Rescue Service of the Czech Republic, fire protection units for coverage of the region, providers of Emergency Medical Service, and the Police of the Czech Republic (10) (Zákon č. 239/2000 Sb.).

Students of the 6th – 9th grade chose the correct answer to polytomous question no. 2, where there were three possible answers. 49.61% of students answered correctly, and 50.39% of students did not know which departments form the IRS. This difference is not statistically significant (p = 0.730).

In question 3, students had to answer what is not considered an accident (list of answers: collapse of a house, terrorist act, volcanic eruption, traffic accident, large forest fire). 69.6% students answered correctly (p=0,000**). However, the students' answers showed that they did not have a clear idea of concepts: terrorist act (50.9% of students answered correctly) and volcanic activity (48.3% of students).

The siren test has become a common part of the life of every person living in the Czech Republic. Since October 2002, a regular siren test with a constant sounding tone lasting 140 seconds takes place every first Wednesday of the month between 12.00 noon and 12.15 pm (10) (Zákon č. 239/2000 Sb.). Question no. 4 was aimed at determining whether the students know on which day of the month and at what time the siren test takes place in the village. They had three answers to choose from. 89.60% of students (n = 1741) chose the correct answer, and 10.40% (n = 202) of 6th-9th grade students chose the wrong answer (p = 0.000 **).

Schoolchildren may encounter floods and anti-flood measures in everyday life in the Czech Republic (11) (Martínek *et al*., 2003; (12) Zeman & Mika, 2007). The answers of 6th-9th grade students to question no. 5 showed that 51.42% of students (n = 1057) are unable to distinguish between individual degrees and they do not know at what risk they are. This difference is statistically significant (p = 0.005 **), and it shows that students do not know the various degrees of flood activity.

Question no. 6 was aimed at the situation when the "*General warning*" signal is sounded. Students had to choose an answer that offered the right way to respond to the signal.

The "*General warning*" signal is information publicly disseminated by the public alarm system warning the population of impending danger. The general warning signal consists of a fluctuating siren tone lasting 140 seconds (13) (Vyhláška č. 380/2002 Sb.).

The students could choose from three answers. The following was the correct answer: "*immediately hide wherever you can, preferably in the nearest building, close the windows and doors, and turn on the radio or television to find out everything you need*". The correct answer was chosen by 54% (n = 1057) of 6th - 9th grade primary school students, and a different answer was chosen by 45.60% (n = 886) of the students (p = 0.001**).

The protection of persons in the event of an emergency is always a priority, which is why it is necessary to have basic knowledge in the event of an ordered evacuation of persons. Evacuation is passive protection, and it means moving people (animals, property) from a dangerous place to a safe place (4, 14) (Balabán & Stejskal, 2010; Kirsch & Padrnos, 2013). Students answered question no. 7 "What is evacuation and how should you behave in the event of evacuation?". The results showed that a total of 61.14% of students (n = 1188) chose the correct answer, and 38.86% (n = 755) of students did not provide an answer to what they should do in the case of evacuation (p = 0.000 **).

During an evacuation, as citizens don't know how long and where they will be staying when away from home, each citizen should prepare his own evacuation luggage. Evacuation luggage means a "bag (backpack, suitcase)" containing items necessary for one's own survival and personal needs (15) (Martínek & Linhart, 2006).

In question no. 8, students answered the following question: "*List the items that evacuation luggage should contain.*"

Students provided a list of items that they thought should be included in the evacuation luggage. Students chose the following items in the following order: food (75.40%), spare clothing, a raincoat (69.33%), drinking water (67.06%),

identity documents and money (54.25%), medication (39.22%), a portable radio, a flashlight (33.45%), toiletries and hygiene items (32.42%), a sleeping bag or blanket (30.52%), a bowl, cutlery, a sewing kit (13.25%), toys, books, games (7.93%). The above answers show that students' knowledge is not adequate, with only 42% of students knowing what evacuation luggage should contain.

An analysis of the risk of emergencies shows that fires of various magnitudes are the most common emergency, resulting in unwanted burning of organic substances. Students encounter this topic, and it is explained to them in the thematic section "*Student safety and protection, fire protection*".

Polytomous question no. 9 in the questionnaire was aimed at determining whether 6th-9th grade students know what they can extinguish with a foam fire extinguisher. Students could choose from three different answers. The correct answer was: "a foam fire extinguisher cannot be used on live electrical equipment, and it is unsuitable for extinguishing flammable liquids mixed with water." 58.93% of students answered correctly, while 41.07% of students answered incorrectly (p= 0,000**).

The last question, question no. 10, was aimed at determining the function of improvised means of personal protection. Improvised means of personal protection are used to protect persons in a radioactive or chemically and biologically contaminated environment (7, 13, 16) (Koncepce ochrany obyvatelstva, 2014; Vyhláška č. 380/2002 Sb.; Zákon č. 222/2000). Students could choose from three answers. 45.96% of students answered correctly, but 54.04% of students had insufficient knowledge in this area (p = 0.004**); they didn't know what body parts the means of protection should be used for.

The overall results of the questionnaire survey conducted among 6th to 9th graders in towns (n=1452) and villages (n=491) based on the sum of all correct answers are shown in Tables 2 and 3. Respondents could get a total of 25 points from the 10 questions.

The results of the ANOVA test (p = 0.000**) and the post-hoc test showed that there was a statistically significant difference in the level of knowledge of students between the 6th to 9th grade. The level of knowledge is the same among 6th, 7th and 8th graders, but there is a significant difference between the knowledge of 6th, 7th and 8th graders and the knowledge of 9th grade students (Table 2). This result suggests that there is an upward trend in the teachers' handing down of knowledge and an increase in students' knowledge from the 6th to the 9th grade. This is confirmed by the fact that the theory of learning in a spiral, i.e. a spiral curriculum, is applied in pedagogical practice.

Table 2. Comparison of the sum of average results of 6th, 7th, 8th and 9th grade students (n = 1943).

Grade	N	M	SD	Grade			
				6	7	8	9
6	597	15.85	3.94	-	0.3453 ns.	0.1441 ns.	0.0000**
7	431	16.25	3.33	0.3453 ns.	-	0.9800 ns.	0.0007**
8	466	16.35	3.11	0.1441 ns.	0.9800 ns.	-	0.0030**
9	449	17.22	3.21	0.0000**	0.0007**	0.0030**	-

*Legend: N – absolute frequency, M – arithmetic mean, SD – standard deviation, *p<0.05, **p<0.01, ns.– insignificant differences*

Table 3 shows the level of knowledge of 6th to 9th grade students in towns and villages. The results showed that there is a statistically significant difference between averages in the number of correct answers both in individual classes and in the overall evaluation of answers in towns (M = 16.74 points) and in villages (M = 15.30 points). Students in 6th and 9th grades in towns have a significantly higher level of knowledge than students in villages (p = 0.000 **).

An evaluation according to the total number of 25 points showed that the total average value of the sum of positive answers for 1,493 respondents was 16.37 points. The results showed that 26.64% of students have below-average knowledge, 42.98% have average knowledge, and 27.38% of students have above-average knowledge.

Table 3. Comparison of the results of the average sum of correct answers of respondents in primary schools in towns and villages (n = 1943).

Grade	Town			Village			p
	N	M	SD	N	M	SD	
6	415	16.12	4.12	182	15.23	3.45	0.011*
7	320	16.82	3.26	111	14.62	2.98	0.000**
8	361	16.69	3.16	105	15.18	2.67	0.000**
9	356	17.43	3.33	93	16.39	2.47	0.006**
Total	1452	16.74	3.55	491	15.30	3.06	0.000**

*Legend: N – absolute frequency, M – arithmetic mean, SD – standard deviation, *p< 0.05, **p< 0.01, ns.– insignificant differences*

Discussion

In a comparison of the results of our survey with the survey of the Czech School Inspectorate (CSI) conducted in 2004, 96.3% of primary school students (17) (CSI, 2004) successfully answered the CSI's question on the use of emergency telephone numbers, and in 2016/2017 the results of our survey showed that 93.81% of respondents answered correctly.

Kučerová (18) (2010) reports that 93% of students knew that the number 155 is for Emergency Medical Services, and 98% knew that emergency numbers 158 and 150 should be called in the event of an emergency.

In a test conducted in 2012, 95% of students correctly answered which telephone number should be called if a cyclist is found lying motionless on the road (19) (Surala, 2012). The results of a survey conducted among 731 primary school students in 2011 in the Olomouc region showed that 97.2% of students know that the telephone number 150 is for the Fire Rescue Service, 97.4% know to call 155 for Emergency Medical Services, and 95.8% can call the Police of the Czech Republic at 158 (20) (Navrátilová, 2012).

In a survey conducted in the South Bohemian and Karlovy Vary regions among students in the 5th and 9th grades, 80% of students answered correctly (21) (Štěříková, 2016).

In her research, Katolická (22) (2019) showed that 90% of students are familiar with IRS emergency numbers. Students demonstrated a lower level of knowledge of the universal European emergency number 112. Our survey showed that 89.55% of students are familiar with this number. Similar results are reported by Šteříková (21) (2016), who found that 79% of 9th grade primary school students in the South Bohemian and Karlovy Vary regions know the 112 emergency number. Kučerová (18) (2010), on the other hand, reported that only 18% of 8th grade students know how to use the universal European emergency number. In 2011, Navrátilová (20) (2012) found that 89.7% of 6th-9th grade students know the universal European emergency number 112.

Surveys have consistently shown that increased attention needs to be paid to the universal European emergency number 112 so that students know its meaning and use.

In the area of the protection of people in emergencies, it is important to know how to act if the sirens are sounded.

The results of our survey showed that 89.60% of students know the sound of the siren test. Pecina (23) (2013) reports that 48% of students in the 5th grade know on which day the siren test takes place in the village.

A survey conducted in 2011 (20) (Navrátilová, 2012) showed that 91.6% of 6th-9th grade students in the Olomouc Region are familiar with the siren test. A survey conducted in 2017 among 9th grade students showed that 96% of students answered correctly (24) (Katolická, 2017).

Štěříková (21) (2016) reports that 88.31% of students in the 5th to 9th grades of primary schools in the Karlovy Vary and Ústí nad Labem regions answered this question correctly.

From the above data, it can be concluded that the percentage of students' knowledge of the time of the siren test increases gradually from the 5th to the 9th grade of primary schools.

Being able to recognize the "*General warning*" signal also means knowing how citizens should behave when they hear this signal. In our questionnaire survey, 54% of 6th-9th grade students answered correctly.

The results of a survey conducted by the CSI (17) (2004) in primary schools in 2004 showed that 73% of respondents know how to respond to this signal. A survey conducted in 2008 showed that 47% of students know how to behave when they hear the sound of the siren (25) (Kopáček, 2009). In 2011, Navrátilová (20) (2012) conducted a questionnaire survey in 6th-9th primary school grades, and she found that 44.7% of students would respond adequately to the signal.

According to the results of a survey, Štěříková (21) (2016) reports that only 31% of respondents chose the correct answer. Surala (19) (2012) found that in the 5th grade, only 16% of students answered this question correctly. Štěříková (21) (2016) further reports that 9th graders have better knowledge in this area than 5th graders, but only about 60% of respondents know the correct answer.

Katolická (24) (2017) reported a higher level of knowledge and preparedness of 9th graders in this area, finding that 76% of students answered how they should react in the event of a "General Warning" signal correctly.

In the event of an emergency in which citizens must be evacuated, knowing what to put in evacuation luggage is necessary.

The answers of our respondents showed that 42% of students know what evacuation luggage should contain.

In 2004, a questionnaire survey conducted by the Czech School Inspectorate found that 21.6% of primary school respondents answered correctly (17) (CSI, 2004).

In 2011, a questionnaire survey conducted among 6th-9th grade students in the Olomouc Region discovered that only 10.9% of students know what evacuation luggage should contain (20) (Navrátilová, 2012).

A certain consistency in respondents' answers can be seen in the surveys below. In all the surveys, about 60–70% of students correctly answered that food and spare clothes should be taken along. On the other hand, not many students indicated the need to pack medication, a blanket or sleeping bag and toiletries (hygiene), with answers ranging from about 30–40%.

The performed surveys are consistent in the lack of students' knowledge of the contents of evacuation luggage. Only 28% of respondents would know how to properly pack evacuation luggage (21) (Štěříková, 2016). Pecina (23) (2013) reports that only 10% of 5th grade students would choose at least 5 correct things to take in their evacuation luggage. Štěříková (21) (2016) reports that only 28% of all 9th grade students would pack their evacuation luggage correctly. According to a survey conducted by the CSI in 2016 (6) (Česká školní inspekce, 2016), only 8% of 9th grade students know what evacuation luggage should contain.

Citizens are warned by means of a flood service system, a flood warning service and flood risk warning, and a patrol service and flood protection and rescue work are established (11) (Martínek *et al*., 2003).

The results of our survey showed that 51.42% of students do not know the significance of the degree of flood activity. Navrátilová (20) (2012) reported a similar result in 2011, when 53.8% of 6th to 9th grade students were not familiar with the degrees of flood activity.

According to teaching documents for primary schools, knowledge of the protection of people with improvised protective equipment is also a necessary skill for students (26) (MŠMT, č.j. 12-050/03-22).

The results of our questionnaire survey showed that 54% of 6th-9th grade students do not know what improvised protective equipment is used for. Navrátilová (20) (2012) reported similar results in 2011, when she conducted a survey at primary schools in the Olomouc Region.

The last question of our questionnaire survey asked students whether they were acquainted with the issue of the protection of people in emergencies in the 6th to 9th grade and, if so, in which subject.

The survey showed that there was no separate subject for PPCRE education at any school, i.e. the said area is included in other subjects.

The answers of our respondents showed that 51% of students were not familiar with the issue. If so (49% of the students surveyed), the students answered that they were most often acquainted with the matter in the subjects civics (13.9%), health education (6.63%) and physics (4.59%), and only 1.38% in physical education, or in other subjects (3.6%: geography, physics, natural history, chemistry, etc.), or the subject was not listed (4.51%). The survey also showed that 14.39% of students were acquainted with this issue in project education in 6th-9th primary school grades. Our results do not correspond with the CSI's statement from 2016 (6) (CSI, 2016) that 90% of schools teach PPCRE in civics and other social sciences; in the case of multi-year gymnasiums, Our finding does not correspond to the CSI's statement from 2016 (6) (CSI, 2016) that OČBRM is taught by 90% of schools in civics and other social sciences, and that in multi-year gymnasiums, PPCRE education is included in civic education (86.7%) and physical education (76.9%).

The above results did not confirm our assumption that the main subjects for theoretical and practical teaching of PPCRE in the 2nd level of primary school would be health education and physical education.

The results of our survey and the presented sub-surveys conducted in recent years in the 2nd level of primary schools show that the objectives and expected outputs of the Framework Educational Programme for Basic Education are not being fulfilled to the appropriate quality and extent, and the tasks set out in the "Schedule for population protection until 2013 with an outlook to 2020" are not being fulfilled.

The main problem is the fact that PPCRE is not included as a separate subject in primary schools. We believe that it is not appropriate or effective to teach certain areas of human protection cross-sectionally in various subjects. Students are not able to connect individual sub-areas and subsequently utilize them. Based on the above research results, we propose teaching individual areas of the protection of people in emergencies from the 1st to the 8th grade, but in the 9th grade we believe it is necessary to include "Protection of people in emergencies" as a separate subject to strengthen students' practical skills.

Conclusion

The results of the survey conducted among 6th to 9th grade students of primary schools showed an insufficient level of knowledge in selected areas of protection of people in emergencies. The results indicate that the subtasks defined in the Framework Educational Programmes in the topic of the protection of people in emergencies are not being fulfilled.

The results further show that there is no uniformity in the education of this issue, and it is probably still underestimated in the educational process at primary schools. To improve education in the matter of protection of people in emergencies, we propose teaching the above issues cross-sectionally in relevant subjects in the 1st to 8th grades. In the 9th grade, it is necessary to introduce a separate subject for "Protection of people in emergencies", in which students could repeat, deepen and, above all, clarify their knowledge. We believe it is necessary for the process of educating students in this area to not end in the 9th grade of primary school, and that it should continue in educational programmes at secondary, higher vocational and higher education institutions, and in further lifelong learning.

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Author Contribution

The authors contributed equally to this study.

Conflict of interests

The authors declare that he has no conflicts of interest regarding the publication of this article.

Adherence to Ethical Standards

This article does not contain any studies involving animals performed by any of the authors. This article does not contain any studies involving human participants performed by any of the authors.

Refereneces

1. Pokyn Ministerstva školství, mládeže a tělovýchovy k začlenění tematiky ochrany člověka za mimořádných situací do vzdělávacích programů, č.j. 34776/98-22, ze dne 4. května 1999.
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