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Original Research

Knowledge and Perception of Secondary School Students in Belgrade about Earthquakes as Natural Disasters

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Abstract

The aim of this quantitative research is to determine the perception and actual knowledge of secondary school students in the Belgrade region with respect to earthquakes as a natural disaster and security threat, and to identify the factors that influence their knowledge and perceptions. The authors used a method of surveying students to identify and describe the factors that influence student knowledge and perceptions about earthquakes. For the purpose of this research, a sample of 3,063 students was drawn from the total population of secondary school students in Belgrade (65,561 students), which equates to 4.67% of the population. The results show that the sources of information on natural disasters and their threatening consequences influence the perceptions of secondary school students. In view of the evident lack of education about natural disasters in Serbia, the results of this study can be used when creating a strategy for educational programs. This research is the first step in developing and realizing a future strategy for natural disaster management by informing and including public (school population), scientific, and administrative communities in the process.

Keywords: natural disasters, earthquakes, secondary schools, knowledge, Belgrade

Introduction

Geospatial and temporal analyses of the total number and consequences of various natural disasters in the world clearly indicate their increase, thus creating the need for the population to be better prepared to react appropriately in such situations [1-6]. At the same time, natural disasters are no longer perceived as a threat only to the security of people but also as a serious threat to national and international security [6]. Therefore, the reasons for mitigating the consequences are a concern for every person, society, and nation. In this context, education about natural disasters is gaining increasing importance and is also being recognized as a key factor in mitigating the consequences of disasters that cannot be prevented.

Seismic hazards, landslides, excessive erosion, floods, torrential floods, rock falls, droughts, and forest fires are examples of the significant natural hazards within the territory of Serbia [7-11]. These natural processes both directly and indirectly endanger the environment, population, and material goods. Serbia belongs to a region that features moderate seismic activity, according to the number and frequency of earthquakes as well as their magnitude (Richter scale) and intensity (MCS-64 scale).

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From 1956 to 2009, 7,407 earthquakes were registered with an intensity of IV on the MCS-64 scale, 284 earthquakes had an intensity of V, 115 earthquakes had an intensity of VI, 20 earthquakes had an intensity of VII, and 4 earthquakes had an intensity of VIII on the MCS-64 scale [12]. Out of the total area of Serbia, 38% of the territory is at risk for a maximal intensity earthquake between VII and VIII MCS, 14% of the territory is vulnerable to an earthquake with an intensity of VIII to IX MCS, and 0.3% of the territory is at risk of an earthquake in the zone of IX to X MCS [7]. By understanding the nature and the spatial distribution of natural hazards in Serbia, risk management plans can be developed to reduce the risks.

With respect to disaster risk reduction, schools should become increasingly important targets for creating and improving the culture of security that includes training youth to respond knowledgably to earthquakes [13]. Schools should play a key role in providing basic information (knowledge) about potential and actual disasters in the local communities. Shiwaku [14] agrees that the importance of educating students about disasters has grown rapidly because children are the most sensitive group of individuals in a society. As schools are recognized as centers of culture education, the actual outcomes of the educational process are transferred to students' families and the local community. Analyzing the textbooks used in primary and secondary education programs in Serbia, Milošević, Kovačević, and Panić find that the topic of natural disasters is not properly explained in these books [15]. Specifically, the textbooks stress the natural processes involved in the event, although they give minimal attention to the consequences and even less to what to do before, during, and after such disasters.

Accordingly, the aim of this quantitative research is to analyze factors that influence the knowledge and perception of secondary school students in Belgrade – the capital of the Republic of Serbia – about earthquakes as natural disasters. Given that the research is based in the geographic area of Belgrade, the findings can be generalized only to the population of secondary school students in this specific area.

Literature Review

The role of education in reducing the risk of natural disasters is a very topical issue tackled by many who study and research disasters [14-26]. In addition, a number of papers are related to the link between education and readiness to respond in the event of a natural disaster [24-33]. Tanaka [30] examines how educating people about disasters increases the readiness of the population for disasters. Examining the relationship between participation in educational programs on hazards and hazard awareness, risk perception, knowledge, and readiness of households, Finnis et al. [34] suggest that there is a positive correlation between participation in educational programs and a higher level of preparedness at the household level. Kohn et al. [35], however, indicates that there are significant variations in the results of research concerning the impact of education on the level of readiness of citizens. Some studies, for instance, indicate that individuals with high levels of specific knowledge are more likely to be prepared for such events [36, 37]. Similarly, Faupel et al. [27] show that participation in educational programs on disasters is closely linked with level of readiness. Becker et al. [38] suggest that traditional educational programs focused on passive information about disasters provide a very low level of awareness and motivation regarding disaster preparedness. From a slightly different perspective, Shaw et al. [20] find that having previously experienced an earthquake does not contribute significantly to one's awareness or knowledge about the disaster, but it does contribute to a student's understanding of what an earthquake is. At the same time, Shaw et al. [20] emphasize that school education is crucial in enhancing knowledge and perceptions about earthquakes as disasters. Recognizing that family education is an important element affecting its level of readiness, Johnson et al. [26] suggest that there is a positive correlation between the readiness of households and the participation of children in educational programs on disasters.

Mishra and Suar [36] suggest that education about disasters and resources are partial mediators between anxiety and readiness for floods and major mediators between anxiety and readiness for heat waves. Shiwaku et al. [21] suggest that although current school education (which is based on lessons) can raise awareness about the risks, it cannot provide students with knowledge about the importance of preventive measures aimed at reducing risk. Although Adem [39] shows that there is a clear correlation between knowledge and attitudes about earthquakes, Hurnen and McClure [37] note that prior knowledge about earthquakes is correlated with preparedness for earthquakes. Kurita et al. [40] suggest that more than 90% of the population do not have adequate knowledge about tsunamis and that the main source of information during disasters is family members and neighbors. In addition, they contend that school education is important in raising awareness about disasters. Becker et al. [38] describe the effectiveness of general preventive education on disasters and highlight the fact that students come home with information regarding the necessary measures of preparedness, and thus they encourage parents to prepare for such disasters. Accordingly, the authors suggest that there is a transfer of knowledge from students to parents.

Methodology and Data

To reach valid conclusions about factors that influence the knowledge of the respondents about earthquakes, we examined the effects of several groups of factors. First, we examined the influence of demographic characteristics such as sex, education, domestic partners, employment, parental education, and knowledge about the definition of an earthquake. Next, we examined the effect of the place and/or the media from where the respondent obtained information about earthquakes. The results of the effects of these factors

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allow for the selection of instruments that are most effective way in influencing the knowledge that secondary school students have about earthquakes. In addition, in this paper we examine the influence of personal experience or experiences of their closest family members with respect to earthquakes. These results determine whether the education of secondary school students had the same degree of influence in those areas where substantial consequences from earthquakes were reported and those areas where major consequences caused by earthquakes were not reported. Finally, we examine the relationships between feelings of fear about earthquakes and knowledge about earthquakes and the link between knowledge of earthquakes and the desire for further learning about earthquakes. The results of these explorations allow for the selection of the best ways to learn about earthquakes.

With respect to the analysis of the influence of the place or media from which the student obtains information about earthquakes, two approaches are applied to determine what really affects and what ostensibly affects student knowledge about earthquakes. The first approach examines the correlation of the actual knowledge of students about earthquakes (which involves identifying the definition of an earthquake) and the selected influencing factors, whereas the second approach examines the relationship between student perception (representing the opinion of the respondent about whether she/he knows what an earthquake is) and their own knowledge and selected influencing factors.

Study Area

Belgrade occupies an area of 3,227 km^2, or 3.6% of the territory of the Republic of Serbia. According to the 2011 census, 1,731,425 inhabitants live in Belgrade, or 22% of the total population of Serbia. Belgrade is located at the confluence of the Sava and Danube Rivers, where the Pannonian Plain meets the Balkan Peninsula. The region of Belgrade is subdivided into 17 municipalities, the largest of which is Palilula (451 km^2) and the smallest of which is Vračar (3 km^2) (Fig. 1).

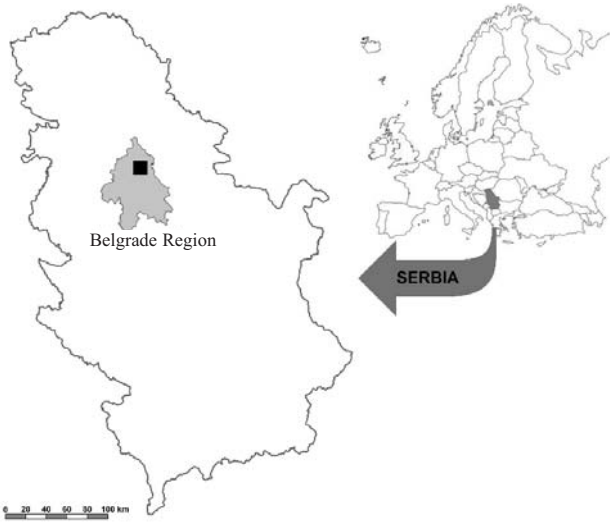

Fig. 1. Position of the Belgrade Region in Republic of Serbia.

Table 1. Characteristics of the students in the sample by gender in select schools.

Name of school	Gender of students (%)		Total
	Male	Female	
Mathematical Gymnasium (gymnasium)	54.5	45.5	323
School of Law and Business (specialized school)	29.8	70.2	242
Nikola Tesla (specialized school)	84.0	16.0	243
School of Agriculture (specialized school)	35.3	64.7	150
Geodetic Technical School (specialized school)	67.7	32.3	161
Nadežda Petrović (specialized school)	19.4	80.6	350
Milutin Milanković (specialized school)	49.4	50.6	83
Nada Dimić (specialized school)	38.0	62.0	50
School of Tourism (specialized school)	48.9	51.1	180
School of Agriculture (specialized school)	90.9	9.1	11
Sixth Belgrade Gymnasium (gymnasium)	39.6	60.4	457
First Belgrade Gymnasium (gymnasium)	36.1	63.9	379
School of Graphics (specialized school)	40.2	59.8	92
School of Electrical Engineering (specialized school)	94.4	5.6	342

Although recent earthquakes in the territory of Serbia have been of different magnitudes, in densely populated areas there has not been any increase in the stronger earthquakes. Furthermore, the city of Belgrade does not have an indigenous foci for strong earthquakes. In fact, the most seismically threatened area of Belgrade is that of Lazarevac, where an extremely strong earthquake was recorded in 1922 (ML=6.1) [8].

Sample

For the purpose of this study, a sample of 3,063 students was drawn from a total population of 65,561 (4.67%) secondary school students in Belgrade. A multistage sampling process was employed, wherein during the first stage,all Belgrade schools were observed, from which 14 were randomly selected (Table 1). In the second stage, randomly selected classrooms within the selected schools constituted observation units wherein those students who attended

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Table 2. Characteristics of the sample and overall population.

Categories		Structure of sample (%)	Structure of population (%)
Gender	Male	49.6	51.07
	Female	50.4	48.93
Grade	I	30.9	27.51
	II	27.4	25.87
	III	22.0	25.29
	IV	19.7	21.33

classes on the day of the observation were surveyed. The response rate was approximately 98%.

To gain insight into the representativeness of the sample, it was necessary to analyze the structure of the respondents according to key characteristics in the field of natural disasters. Of the sample, 49.6% were male and 50.4% were female (Table 2), which is representative of the population in general as 51.07% of the population are males and 48.93% are female (Table 2). With respect to specific characteristics of the students (such as grade level), as presented in Table 2, we note that 30.9% of the participants were enrolled in their first year of secondary school, 27.4% were in their second year, 22% were enrolled in their third year, and 19.7% were in their fourth year of secondary school (similar to those of the overall population by grade level: 27.1%, 25.87%, 25.29%, and 21.33%, respectively).

Based on the characteristics of the students and according to the members of the household with whom they live, it is observed that almost all respondents live with their mothers (96.30%), whereas the fathers of a slightly smaller number of students (86.20%) have their fathers living in their households. Furthermore, grandmothers live in the homes of every fifth student, whereas grandfathers live in the homes of every 10th student. It is further expected that a small number of secondary school students live with their grandparents because these are respondents from Belgrade, a culture where children, when they form their own families, typically do not live with their parents. Thus, these data are good indicators of the representativeness of the sample.

To gain better insight into the representativeness of the sample, we also analyzed the characteristics of respondents according to the education of their parents. The results indicate that the education of the parents of students in the sample and those in the general population do not differ substantially and that the educational level of parents is as expected. A very small percentage of the parents of students in the sample has only a primary education, which is characteristic of Belgrade. Additionally, it is expected that most parents have a secondary education (42.2% mothers, 44% fathers), followed by those with some post-secondary education (25.9% mothers, 24.1% fathers), those with higher education (22.3% mothers, 21.6% fathers), and those with academic titles (7.4% of mothers, 9% fathers).When considering the employment status of the parents of secondary school students, it is noted that both parents of 61.2% of the students are employed, that one parent of 32.6% of the students is employed, and that neither parent of 6.2% is employed. Based on these statistics, we consider that the selected sample is representative of the population of secondary school students from Belgrade.

Instrument

The main instrument used in the study was a questionnaire that was created for the purposes of this research. The survey consisted of only closed questions. The first set of questions assessed the knowledge and perceptions of students about natural disasters, whereas the second set sought to identify the sources students used to obtain information about earthquakes. Additional questions were related to feelings (fear, anxiety) and to the desire to learn more about natural disasters.

Research Method

After randomly selecting classrooms from within the randomly selected schools, questionnaires were distributed to students and were completed under the supervision of one of the interviewers. The interviewer provided all necessary explanations for those questions with which students had problems.

Data Analysis

The analysis of the data collected from the survey was based on the application of the method of descriptive statistics, namely the determination of frequency and the calculating of percentages and mean values. The chi-square test was used for testing the independence between the knowledge of respondents about earthquakes and the factors that were assumed to influence this knowledge. It was also used to test the equality of proportions of certain categories of variables from the two samples – one sample consists of respondents who know what an earthquake is, and second sample consists of respondents who do not know – and for drawing conclusions about the influence of analyzed factors on the knowledge that secondary school students have about earthquakes.

Results and Discussion

It was previously indicated herein that the goal of this quantitative research was to determine the perception and actual knowledge of secondary school students in the Belgrade region with respect to the earthquake as a natural disaster and to determine factors that influence their knowledge and perceptions. Accordingly, we will present results that indicate the current state and then the results of the analysis of the impact of certain factors on the knowledge and perceptions of secondary school students. The vast majority of secondary school students in Belgrade (94.8%) think that they know what an earthquake is, whereas only 1.3% indicate that they do not know what an earthquake is.

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Table 3. The influence of select factors on the knowledge of secondary school students about earthquakes.

Variable	Categories	Definition of earthquake		Test results	χ^2	df	p	phi
		Correct	Incorrect					
Gender	Male	51.6%	47.6%	=	1.693	1	0.193	0.024
	Female	48.4%	52.4%	=				
Education	Sufficient	1.7%	3.4%	≠	25.496	3	0.000	0.092
	Good	17.0%	23.6%	≠				
	Very good	40.0%	46.9%	≠				
	Excellent	41.3%	26.0%	≠				
Living with father	Yes	86.0%	86.1%	=	0.003	1	0.953	0.953
	No	14%	13.9%	=				
Living with mother	Yes	96.0%	96.6%	=	0.057	1	0.811	-0.004
	No	4.0%	3.4%	=				
Living with grandfather	Yes	10.1%	12.6%	=	1.832	1	0.176	-0.025
	No	89.9%	87.4%	=				
Living with grandmother	Yes	18.6%	21.2%	=	1.031	1	0.310	-0.018
	No	81.4%	78.9%	=				
Employment of parents	One parent is employed	32.4%	34.4%	=	14.443	2	0.001	0.069
	Both parents are employed	61.8%	54.8%	≠				
	Unemployed	5.8%	10.9%	≠				
Education of mother	Primary	2.3%	1.4%	=	26.053	4	0.000	0.093
	Secondary	42.0%	42.9%	=				
	Higher	22.2%	24.1%	=				
	High	26.8%	18.0%	≠				
	Academic title	6.7%	13.6%	≠				
Education of father	Primary	1.1%	2.1%	=	23.113	4	0.000	0.088
	Secondary	44.1%	42.6%	=				
	Higher	21.6%	23.0%	=				
	High	25.0%	17.2%	≠				
	Academic title	8.2%	15.1%	≠				

= Difference of column proportion is not statistically significant
≠ Difference of column proportion is statistically significant

The remaining 3.8% do not know whether they know what an earthquake is. Of the respondents who stated that they know what an earthquake is, 9.6% responded incorrectly when asked what an earthquake is. In other words, approximately 10% of those who said they knew what an earthquake is do not really know, while 88.9% answered correctly, i.e., they do know what an earthquake is.

Although it seems that secondary school students are familiar with the phenomenon of an earthquake, we find that their knowledge is incomplete. In fact, less than half of the respondents, 45.9%, know how to respond in the event of an earthquake. First, we present the results of the impact of demographic factors and the factors of a closed environment, which are given in Table 3. To test the independence of individual factors and knowledge of respondents, a chi-square test was used, whereas for the determination of final conclusions, the results of testing the equality of proportions of certain categories of variables from two samples were used, where one sample consisted of respondents who know what an earthquake is and the other consists of respondents who do not know. It is concluded that the knowledge of the respondents about an earthquake is significantly affected by the education of the respondents ($p=0.000<0.05$), and the employment ($p=0.001<0.05$) and

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education of the parents (p=0.000<0.05 for mother and p=0.000<0.05 for father) of the respondents. The students who excel academically, to a significantly greater extent, know what an earthquake is, whereas the other students, to a statistically significant greater extent, do not know what an earthquake is. With respect to the employment status of the parents of the respondents, it is concluded that students whose parents are unemployed, to a statistically higher percentage, do not know what an earthquake is, whereas the situation is reversed when both parents are employed.

Although the level of education (primary, secondary, or post-secondary) of parents does not affect the knowledge children have about earthquakes, a statistically higher percentage of children of higher educated parents possess knowledge of what constitutes an earthquake. On the other hand, children whose parents have an academic title, to a greater percentage, do not know what an earthquake is (Table 3). Although this is an unusual finding, it is likely because the parents do not devote enough time to the upbringing and education of their children or they emphasize their own narrow field of professional specialization in more specific areas, such as social, natural, and technical-technological sciences, and thus neglect educating their children about natural disasters.

It is well known that children receive their first knowledge at home from family members and at school from teachers. In addition, however, they also acquire certain knowledge and skills by watching television, using the Internet, playing computer and video games, etc. Accordingly, we first analyzed the independence of the question "Has someone at school talked to you about natural disasters?" and the knowledge of secondary school students. According to the survey, 65.7% of the students had first heard about natural disasters at school, whereas 69.9% had heard about them from their families. At a significance level of 10%, it is concluded that the respondents' actual knowledge of earthquakes (χ^2=3.607, df=1, p=0.058<0.1, phi=0.035) and their perceptions (χ^2=11.27, df=2, p=0.004<0.1, phi=0.061) of earthquakes depended on whether there was someone at school talking to them about natural disasters. More specifically, those respondents who had someone at school talking to them about natural disasters, for the most part, gave correct answers to the question "What best describes an earthquake?" and vice versa. A similar conclusion applies to the respondents' perceptions of earthquakes. In fact, those who had someone at school talking to them about natural disasters more often believed that they knew or were not sure whether they knew what best describes an earthquake, whereas those who did not listen at school when the subject of earthquakes was discussed more often believed that they did not know what an earthquake is. Whether someone in the family told the respondents about natural disasters was not related to the actual knowledge of the respondents (χ^2=0.098, df=1, p=0.754>0.1), but it was associated with perceptions (χ^2=16.578, df=2, p=0.000<0.05, phi=0.074) of students about earthquakes. At a significance level of 5%, it is concluded that those who listened when their family discussed natural disasters more often believed that they knew what an earthquake is, and those who did not listen when the family talked about natural disasters were not sure or did not know what an earthquake is.

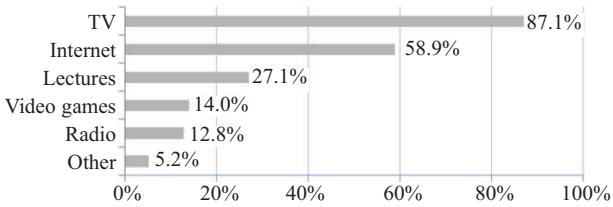

Fig. 2. Responses to the question: Where did you acquire information about earthquakes?

The way in which students have acquired information about natural disasters was a potential factor that affected their knowledge of such disasters (Fig. 2). The results of the analysis show that at a significance level of 5%, it is concluded that those who gained certain knowledge about natural disasters by watching television (χ^2=19.772, df=1, p=0.000<0.05, phi=0.081) knew, to a greater extent, what characterizes an earthquake or, to a greater extent, thought they knew what an earthquake is (χ^2=92.743, df=2, p=0.000<0.05, phi=0.174). The reverse was also true. The same conclusions are true with respect to the Internet (χ^2=22.574, df=1, p=0.000<0.05, phi=0.087 for actual knowledge and χ^2=27.448, df=2, p=0.000<0.05, phi=0.095 for perceptions). Playing computer and video games also affected the actual knowledge of students (χ^2=3.629, df=1, p=0.058<0,1, phi= -0.035) and the perceptions of students with respect to natural disasters (χ^2=17.261, df=2, p=0.000<0.05, phi=0.075). Specifically, at a significance level of 5%, it is concluded that a significantly higher percentage of students who played video games with elements of natural disasters thought that they did not know what an earthquake is, whereas those who did not engage in these video games (in a statistically higher percentage) believed that they knew what an earthquake is. As the radio was a medium that secondary school students used to a lesser extent to gain information about natural disasters, a statistical analysis shows that this medium was not connected with the knowledge of the respondents about earthquakes (χ^2=0.002, df=1, p=0.967>0.05 for actual knowledge and χ^2=0.191, df=2, p=0.909>0.05, for perception). With respect to lectures, it was determined that they significantly influenced participants' knowledge of natural disasters (χ^2=10.687, df=1, p=0.001<0.05, phi=0.06). At a significance level of 5%, based on comparison of column proportions technique, it is concluded that a greater percentage of respondents who attended lectures know what an earthquake is, whereas a greater percentage of those respondents who did not attend lectures did not know what an earthquake is. The same conclusion applies to respondents' perceptions about whether they know what an earthquake is (χ^2=8.371, df=2, p=0.015<0.05, phi=0.052). Accordingly, it is concluded that although students who heard about natural disasters at home and at school think they know what these events are, the statistical tests show that actual knowledge exists only in those students who listened and learned about natural disasters at school.

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Research results as to whether there is a connection between the knowledge of respondents about earthquakes and either personal experience or the experience of a family member show that 46% of respondents have not experienced the consequences of natural disasters. After a statistical analysis and at a significance level of 5%, it is concluded that, to a greater extent, those students whose fathers suffered the consequences of a natural disaster know what an earthquake is (χ^2=21.41, df=2, p=0.002<0.05, phi=0.30). However, the experiences of mothers, grandfathers, and grandmothers do not affect the knowledge of the respondents. With respect to personal experience, it is concluded that, to a significantly greater extent, the respondents who have experienced the consequences of an earthquake both think they know (χ^2=21.41, df=2, p=0.002<0.05, phi=0.30), and actually know (χ^2=21.41, df=2, p=0.002<0.05, phi=0.30), what an earthquake is. This conclusion is expected and logical as it confirms the validity of the results. It is indicative that individuals who have not personally experienced a natural disaster (46%) do not know what an earthquake is and do not know how to describe what best characterizes an earthquake. The general conclusion is that the knowledge students have about earthquakes is affected by personal experiences and by the experiences of the father as the head of the family. Thus, it is important to examine whether there is a correlation between the knowledge of the respondents about earthquakes and their feelings regarding natural disasters. According to the collected data, 44% of the respondents have no fear of natural disasters, 31% fear natural disasters, and 25% are not sure whether they are afraid of natural disasters.

With respect to feeling protected from natural disasters while at school, it was determined that 40% of the students feel safe, 38% are not sure, and 22% of the students do not feel that they are protected from natural disasters while at school. A statistical analysis, chi-square test concludes that at a significance level of 5%, there is no dependent relationship between the respondents' fear of natural disasters and their actual knowledge about earthquakes (χ^2=1.852, df=2, p=0.396>0.05). However, with respect to their feelings of protection from natural disasters while at school there are somewhat different results. Particularly, a statistically higher percentage of those students who are not sure whether they feel protected from natural disasters while at school actually know what characterizes an earthquake, whereas a statistically higher percentage of secondary school students who do not feel protected at school either do not really know what an earthquake is or think they do not know what an earthquake is (χ^2=19.769, df=2, p=0.000<0.05, phi=0.081 for actual knowledge and χ^2=13.161, df=4, p=0.011<0.05 phi=0.066 for perception). Accordingly, the general conclusion is that we cannot influence the feeling of fear of natural disasters, but we can influence their sense of security and safety while at school.

An analysis of the independence of the knowledge of the respondents and their desire to learn more about natural disasters, or the manner in which they want to learn more, found that 55% of students wanted to learn more about natural disasters, 26% of them did not want to enhance their knowledge, and the remaining 19% were uncertain as to whether they wanted to learn more about natural disasters. The same was true for attending the training on dealing with situations that arise as a result of natural disasters. The results of a statistical analysis indicate that a higher percentage of secondary school students who wanted to learn more about natural disasters know what an earthquake is compared with those who do not know what an earthquake is (χ^2=9.115, df=2, p=0.01<0.05, phi=0.055). In other words, students who do not know what an earthquake is are not interested in learning about natural disasters, whereas those who know what an earthquake is are interested in learning more about natural disasters. With respect to training, the situation is relatively the same (χ^2=6.908, df=2, p=0.032<0.05). That is, a statistically and significantly greater number of students who do not want to train do not know what an earthquake is, whereas a significantly greater number of those who want to train think they know or are not sure whether they know what an earthquake is. When analyzing the interdependence between knowledge of the respondents about earthquakes and the attitude of secondary school students with respect to the subject of natural disasters and other security issues, we concluded that a statistically significant higher percentage of respondents who are not accepting of a discussion of natural disasters believe that they do not know what an earthquake is (χ^2=18.638, df=4, p=0.001<0.05, phi=0.078).

By examining the preferences of students with respect to whether or not they would like to learn more about natural disaster, it was found that 57.1% of the respondents want to watch educational films and series, 33.1% want to participate in workshops, 21.7% want to participate in traditional lessons, 20.2% prefer interesting video games, and 17.1% want to learn through case studies. After conducting statistical tests, it was concluded that, overall, the knowledge of secondary school students about earthquakes was not related to the way in which they would like to acquire information about natural disasters, such as classical lessons, engaging video games, case studies, and workshops (p=0.988, p=0.889, p=0.653, and p=0.991 respectively). The exceptions, however, are educational films and series (χ^2=6.013, df=1, p=0.014<0.05, phi=0.045) as a significantly higher percentage of those who gain information about natural disasters from these sources in knowing what an earthquake is and vice versa.

Conclusions

When considering the results of the previously conducted analyses, it is concluded that the sources of information about natural disasters (family, school, television, Internet, radio, video games, and lectures) influence the perceptions of secondary school students with respect to their knowledge about earthquakes such that those respondents who acquired a statistically significantly higher percentage of information believe they know what an earthquake is. One exception is video games, as they influence the perception of knowledge in a way that respondents who have not played feel they know what an earthquake is,

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whereas those who have played video games believe that they do not know what an earthquake is. Also, the exception is the radio as a source of information, which is used by secondary school students to a lesser extent and which does not affect the attitude of the respondents. Accordingly, we conclude that the actual knowledge of secondary school students about earthquakes is affected by lectures, school, television, and the Internet, and it is not affected by radio, video games, or stories from family members.

A statistically higher percentage of those with no personal experience with the consequences of natural disasters do not know what an earthquake is. Although the personal experiences of those respondents who have witnessed the consequences of earthquakes affect their knowledge of earthquakes, personal experiences of the effects of landslides tend to mislead the subjects such that, for the most part, their knowledge of earthquakes is not affected and they still do not know what constitutes an earthquake. This result is plausible for two reasons: first, people learn best from personal experience, and second, as the effects of earthquakes and landslides are manifested through the movement and shifting of soil, it is expected that respondents describe the consequences of an earthquake. However, the experiences of immediate family members, for the most part, do not affect the knowledge of the respondents as to what constitutes an earthquake (with the exception of the father). This is likely because, in Serbia (and therefore in Belgrade), families are predominantly patriarchal. Thus, the father is the head of the family and the person responsible for the safety of the family, and as such, it is logical that the father transfers his personal experiences to his children with special interest due to his concern that they remain safe safe in the event of a natural disaster.

Secondary school students who do not feel safe from natural disasters while at school, to a greater extent, exhibit a lack of understanding and knowledge with respect to what constitutes an earthquake. Moreover, there is a dependence between the knowledge the respondents have about earthquakes and their desire to learn more about natural disasters. In other words, a statistically higher percentage of those students who know what an earthquake is indicate a desire to enhance their knowledge. It is further noted that there is a dependent relationship between the variables "acquisition of knowledge about natural disasters through educational films and series" and "knowledge about earthquakes."

Therefore, the level of knowledge of secondary school students with respect to the earthquake as a natural disaster is influenced by television, the Internet, and school lectures. Thus, it is suggested that encouraging secondary school students in Belgrade to participate in the clean-up and rebuilding of an area after an earthquake would increase their knowledge of the consequences of such disasters. Moreover, increasing the knowledge of secondary school students would, in turn, affect their sense of security. The results suggest that secondary school students who know what an earthquake is and are aware of the possible dangers of natural disasters have an increased desire to further their learning. Thus, secondary school students should be trained primarily through educational films and series.

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