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SOCIAL EDUCATION ON EXTREME NATURAL EVENTS IN VIEW OF EXTREME FLOODS AND LANDSLIDES IN POLAND

Abstract: The contents of geography textbooks and school atlases have become the basis to elaborate on preparations of our society for contact with natural hazards. Leaving aside the causes of more frequent inflow of information about natural disasters, the question comes up on the effectiveness of education in view of raising education level intended in the reform of education system of 1999. This research was conducted in post middle schools in Warsaw in 2006/07. The debate on the need for broad geography education about natural hazards in the schooling period was started. It was pointed out that it is necessary to develop the ability to understand and recognize the hazard and the attitude which allows to take responsible decisions prior to, in the face of and following an extreme natural event.

Key words: extreme events, environment, education, society

INTRODUCTION

The article makes a reference to studies on environment perception. It contains the results of works whose objective was to understand social awareness of dangerous natural events and the role of geography education at school in its development. The most important results of analysis of school curriculum (describing general guidelines of geography education at school), study programmes, textbooks and geography atlases were presented as the major sources of obtaining information by young people. It also includes the results of surveys conducted among high school students in Warsaw in 2006/07 which refer to the perception of dangerous events, knowledge of them and attitude towards

them before and after. The obtained results were related to the reform of education system of 1999, whose objective was to raise the level of social education¹.

PERCEPTION OF NATURAL HAZARDS

Behaviourists assumed that discernible patterns in perception (less in behaviour) may be a basis to form conclusions about greater groups of people. However, a socially developed style of thinking may also have a significant impact on perception of natural hazards, which was pointed out by B. J. L. Berry (Wojciechowski 2004). This position seems to be a departure from a previous school of accepting the possibility of existing many subjective perceptions of the environment by a person (Pocock 1978; Słodczyk 2001; Wojciechowski 2004).

The specificity of research on perception of hazards causes many methodological problems. At the same time, it is suggested that research should be carried out in order to learn what a hazard is to people who have contact with it (Saarinen 1974), what they think and feel about potential hazards (Golant, Burton 1976) indicating the method of semantic difference analysis (Osgood et al 1957; Walmsley and Lewis 1997). The appropriately developed awareness determines the ability to take protective actions (collective and individual) (Kates 1971; Hanson et al 1979). Human reaction in the face of hazard reflects a person's attitude. Behaviours often have an individual character (Ittelson 1974) and do not change automatically (Brooks 1973). The following elements affect people's reaction: the frequency of event's occurrence, the abruptness of the strike, the fact whether the event is typical of a given area (Kates 1971), experience (Lisowski 1993), communication of information about the hazard and the effects of events (Walmsley, Lewis 1997). However, the most important factors influencing the attitude to natural events include a person's age (Abney, Hill 1966; Lisowski 1993) and education level (Baker, Patton 1974; Lisowski 1993).

The subjects of natural hazards, elementary and elemental disasters have been raised in Poland since the beginning of the 20th century (Polaczkówna 1925; Bujak 1932; Plit 1989; Lisowski 1993, 1996, 2000). Among others, the behaviours of local communities in the face of extreme natural events were analyzed (Drabek 1986; Lisowski 1996). Researchers are also interested in defining the threshold from which a given natural event (or condition of the environment) starts to be treated as a natural disaster, because this threshold varies for different groups of people and local communities. These differences in evaluation of nature are most often explained with experiences of natural disasters,

¹ Education in Poland: primary school (from 7 to 13 years of age), middle school (from 13 to 16 years of age), high school (from 16 to 19 years of age), university education (from 19 years of age).

attitude to nature, attachment to the area of residence and personality traits (Domański, Libura 1986).

MATERIALS

The studied documents included general education curriculum by Ministry of National Education for middle schools (2003) and high schools (2002) and their amendment (2008), as well as study programmes (2002) and school textbooks and atlases published in 2002 – 2005 (in total 32 textbooks and 12 geography school atlases for middle schools and post middle schools from several publishing houses available in bookstores in Poland during the period of research).

In order to define the situation in Poland following the floods and landslides of 2010, up-to-date information from press, Internet (National Water Management Authority), conference (National Institute of Geology) and ministry sources (Ministry of Interior and Administration, Ministry of Agriculture and Rural Development) was used. It included the opinions of victims of floods and scientists as well as official statements of representatives of state authorities presented in mass media.

METHODS

First of all, qualitative comparison of contents included in teaching materials was used applying the method of explanatory description. The research indicated the need to conduct surveys, which allowed to verify the hypothesis stating that knowledge and attitude of students in respect of extreme natural events does not differ significantly at particular education levels. The analysis included descriptive statistics, internal coding, point grading, indexation, scaling, incidental method as well as established for that purpose knowledge and attitude index.

In the survey (anonymous auditorium questionnaire) purposive sampling was used. The students of five state high schools in Warsaw on different education levels were surveyed. They included:

- 1) first-grade high school students constituting a selected group of 251 respondents enrolled in the high school, who represented middle school level;
- 2) third-grade high school students (pursuing two various levels of geography education), who finished studying geography at the post middle school level. Two subgroups of third-grade students were distinguished in the research: students of elementary (100 respondents) and extended geography study programme (110 respondents);

3) first-year university students at Faculty of Geography and Regional Studies at Warsaw University, accounting for a selected group of 137 respondents, potentially more interested in the subject and at the same time with a more extensive geographic knowledge. The timing of research was strictly adjusted to respondent groups in order to meet certain conditions (initial or final stage of education). Therefore, the surveys were conducted at the beginning of the school and academic year in autumn 2006 (among first-grade high school students and university students) and before the end of the school year in spring 2007 (among third-grade high school students). The survey questionnaire consisted of 19 questions (open-ended, close-ended, multiple choice questions). The answers were divided into three thematic groups informing about: knowledge, attitude and sources of information about natural hazards. On their basis, knowledge (K) and attitude (A) indexes were established by assigning weighted points to particular answers. It was assumed that the index value equals the ratio of actual to maximum value of weighted points in the group. The lower the index value, the lower knowledge or the less responsible respondent's attitude in the particular respondent group. 5% was established as a significant difference of index value (which corresponds to significance at 0.05 level).

In order to make the description simpler, the following abbreviations for particular groups were assumed:

- first-grade high school students (bHS – beginning high school),
- third-grade high school students (eHS – ending high school),
- third-grade high school students with basic geography level (ebHS – ending high school basic geography level),
- third-grade high school students with extended geography level (eeHS – ending high school extended geography level),
- university students – (bU – beginning university).

RESULTS

The results of analysis of source materials. The vagueness of curricula contributes to duplicating some and lack of other significant issues in syllabuses. The result of including one term in curricula, namely natural disasters, is its inclusion in study programmes and then, presenting it in textbooks and atlases with a different level of detail. However, lack of recommendation to refer to extreme natural events results in lack of the term in study programmes, textbooks and school atlases. Due to general formulation of curricula, there is a lot of freedom in the selection of texts in textbooks and gaps are still not eliminated. Various textbooks contain extracts concerning dangerous natural events; however, they are all different in nearly each of them. The information

about the possibility of occurrence of flood in Poland is an exception, where the presentation of events of 1997 and their effects is dominant; however, the contents differ with regard to the detail. In textbooks and atlases lack of selection of definitions and presentations of extreme natural events is clear. Predominantly, the average picture of natural events is presented – extremes are disregarded, while rare facts about extreme elements of climate most often do not refer to related hazards and their dangerous effects. The contents of curricula do not extort enforcement of particular skills, which is partly the cause of free selection of dangerous events and inclusion of only certain subjects in the process of education. There is lack of enforcement of the following skills: knowledge of maps of endangered areas (in particular, more detailed maps indicating the possible range of event), understanding the need to observe the environment and knowledge of both permanent features of the environment as well as changes taking place, recognition of hazards on the basis of changes visible to the naked eye. One can also observe lack of requirement to understand: hazards resulting from the extreme character of events, the existence of possibility to take decisions eliminating contact with the hazard, warning messages, the need to take individual and collective actions aimed at minimizing the results of events with the indication of possible solutions. There is also no enforcement of knowledge of natural environment elements which have a protective function and support mitigation of negative effects, as well as the existing adaptation solutions before the occurrence of the hazard in case of inhabiting the area of potential occurrence of the event, reactions resulting from understanding warning messages and the level of hazard during the event, behaviours and activities after the occurrence of the event aimed at removing the damage, as well as adaptation to the next event or avoiding it. There is also disregard for requirement of knowledge of solutions proposed by the state, aimed at minimizing negative effects of natural disasters, knowledge of erroneous solutions and understanding its social harmfulness. The realization of spiral concept, which is most often proposed in study programmes, enhances the necessity of repeating the contents of teaching materials, at the same time limiting the possibility to introduce new elements.

The amendment of curriculum of preschool and general education (2008) makes raising the subjects of natural hazards easier due to the greater impact in geography education on natural environment – man relationship (e.g. *Europe. Nature – man – economy relationships*. p. 163); *Selected regions of the world. Nature – man – economy relationships*. p. 164, middle school level of education, www.reformaprogramowa.men.gov.pl) and on acquiring the ability by the student to characterize the natural environment and its natural advantages (e.g. *Geographical regions of Poland*, p. 163, middle school level of education or *Geography of Poland – natural environment* p. 174, high school level of education

– extended curriculum). The issues of extreme natural events, and speaking more generally – natural hazards, are still not emphasized. The term *natural disasters* has been replaced with the term *ecological disasters* (*Economic diversity of the world*, p. 166, high school level of education, basic curriculum; educational contents: 2.2). Although this change will make it easier to maintain proportions between the contents about anthropogenic and natural hazards, it still raises concern about the criterion of events selection. The very definition of ecological disaster implies it is an event which leads to permanent changes in the ecosystem, while not all dangerous events to man's life and health lead to this kind of results. Moreover, the term *hazards* was used in the context of anthropogenic hazards (high school level of education – basic curriculum: 2.5, p. 166). The adopted amendment has not specified the contents in the context of natural hazards and the selection of events, regions and subjects in relation to hazards was still left to be decided by authors of curricula, textbooks and geography atlases. The freedom to choose the educational contents at schools is an extremely valuable element included in the Polish education system in 1990s. However, it is necessary to notice the fundamental difference between teaching the material aimed at protecting life, health and property as well as minimizing the losses caused by dangerous natural events and other geographical subjects. In order for students to acquire the necessary skills, the contents of study programmes need specification in this respect. Similarly as in case of teaching about the variety of cultures, religions and political-economic systems in the world, we are obliged to teach about various natural hazards not restricting ourselves to selected events.

Survey results. Respondents, regardless of the group, demonstrated a very high interest in the subject, which in their opinion is among important geographical issues. They were aware of the possibility of swelling rivers and floods in the territory of Poland, but third-grade high school students and university students were more likely to find this event more probable than first-grade high school students. The differences were significant: 38.6% – bHS, 53.8% – eHS, 62.8% – bU; 47.0% – ebHS, 60.0% – eeHS. To a lesser extent they were aware of the occurrence of such events as drought, hail and storms manifested through lightning discharges. They were critical about their knowledge of natural hazards which can occur both in Poland and around the world. They expressed willingness to extend their knowledge enabling to solve problems and take actions before, after and during the situation of hazard. They wanted to find out, e.g., what are the causes of hazards, how to avoid hazards, how they can be recognized, how to behave in the situation of a real hazard, how to avoid disastrous outcome, how to help people, how to prevent the effects (38.2% – bHS, 39.0% – eHS, 47.4% – bU; 35.0% ebHS, 42.7% – eeHS). To a lesser extent they were interested in information about the natural events themselves (the

percentage of answers did not exceed 8%), nor they were interested in the regions or areas of events occurrence (the percentage of answers did not exceed 5%).

A large percentage of respondents did not come across the term *extreme natural events* and in case of declared awareness, TV, radio and Internet were quoted most often as sources of knowledge. This term was understood as an untypical event, which normally does not occur in the given area (e.g. earthquakes in Poland). The following percentages of respondents did not across it: 36.7% – bHS, 24.8% – bU; 38.0% – ebHS, 21.8% – eeHS. A natural hazard proved to be a more familiar term; however, it was often interpreted as an anthropogenic hazard. A greater part of respondents stated that at geography classes no photos or films about natural hazards had been presented. Contact with maps of hazards at geography classes was confirmed by 34.7% – bHS, 28% – ebHS, 64.5% eeHS, 61.3% – bU, and besides these classes: 15.9% – bHS, 11% – ebHS, 9.1% – eeHS, 13.9 – bU. The maps they have seen focused mostly on geology (earthquakes and volcanism). Flood maps were seen by only 17.1% – bHS, 19% – ebHS, 28.2% – eeHS, 35% – bU; while maps of landslide areas were seen only by university students (statistically insignificant result).

The results of knowledge and attitude analysis. The following values of respondents' knowledge (K) and attitude (A) indexes towards extreme events were recorded (table 1).

Table. 1. Values of knowledge and attitude indexes

Respondents	Knowledge index (%)	Attitude index (%)
bHS	35,1	37,2
eHS	39,4	38,1
ebHS	34,0	34,4
eeHS	44,3	41,5
bU	45,3	42,8

The following regularity has been observed: the higher education level, the greater knowledge (K bHS < K eHS < K bU) and the better developed attitude (A bHS < A eHS < A bU). However, after dividing third-grade high school students into two groups (basic vs. extended geography level) these regularities have changed. In case of both knowledge and attitude, the results of first-grade high school students come out better than those of third-grade high school students with basic geography level. The greatest difference of knowledge index values was recorded between bHS vs. eeHS (9.3 %) and between ebHS vs. eeHS (10.3%), while in terms of attitude – between ebHS and eeHS groups (7.1 %).

DISCUSSION AND SUMMARY

Extreme natural events are not an important element of geography education, and the introduced amendment to the curriculum will not have a significant impact on change of attitude in teaching about dangerous natural events. As information is obtained by students mainly from mass media, lessons and education materials are not the most important factor developing students' knowledge and attitude. The proposed hypothesis was partly confirmed. There are slight differences in knowledge of and attitudes to extreme natural events among students beginning and ending post middle school education (initial or final stage of high school education). The differences did not exceed 5 % of index values between groups of first-grade and third-grade high school students – in case of knowledge and attitude, as well as between first-grade and third-grade basic geography level high school students. The differences did not exceed 10 % of knowledge index values between first-grade and third-grade extended geography level high school students in favour of third-grade students. The observed differences do not demonstrate greater knowledge and sufficiently better developed third graders' attitude to extreme natural events than in case of their younger counterparts. A small difference between opinions of first-grade students and third-grade basic geography level students is a cause for concern, which can be explained with lack of expected progress in perception of natural hazards after completing post middle school education. A significant difference proving greater knowledge among third-grade students than among first-graders was only observed in the group of third-grade extended geography level students, which indicates that only this narrow group of students is educated in this respect. However, the objective is not to educate only elite group of third-grade high school students and university students (fig. 1) about extreme natural events. Although the knowledge and attitude index exceeded the level of 30 % also among bHS and ebHS, it is reasonable to pose a question whether the threshold set at this level will be equally suitable in direct contact with a natural hazard. One can have serious concerns in this respect.

Despite selecting Warsaw (the area which is not particularly exposed to hazards of natural events) as the researched area, students demonstrated significant interest in this subject, understanding its importance among other geographical issues. The purposive sample which was surveyed does not justify far-reaching generalizations concerning the total population of students in Poland. Certain differences can be expected, should a similar research be conducted in the areas affected by extreme natural events in recent years. However, the selection of respondents from the areas exposed to flooding does not guarantee greater knowledge of hazards, either. It may rather indirectly contribute to better developed attitude resulting from own or other people's experiences. Moreover, when

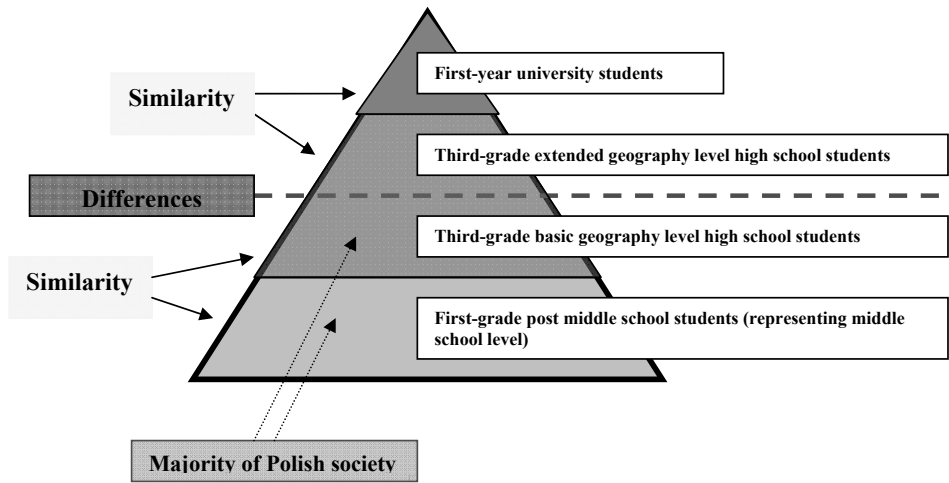


Fig. 1. Similarities and differences in respondents' knowledge and attitudes

selecting the contents of study programmes, it is also necessary to take into account the possibility of migration or temporary migration from safer areas to those exposed to the occurrence of dangerous events. The choice of studied area was intentional due to the easy access to sources of information and possibility of education for teenagers. Hence, a lower level of respondents' knowledge may be expected in most other areas. At the same time, it can be assumed that the average level of geographic knowledge of Poland's residents will be close to the knowledge and attitudes of respondents representing third-grade basic geography high school level. According to the analysis, their level of knowledge and attitudes is very similar to that of graduates of middle schools (fig. 1), which is not satisfactory in case of natural hazards. Such a situation results in lack of ability to take responsible decisions and actions in the face of a hazard, leaving people to their intuitive reactions. In this case, the relationship between geographic knowledge, attitude and abilities (e.g. observing the environment, preparing for a hazard, recognizing the hazard, minimizing negative effects, reaction) is visible. Therefore, developing attitudes in the process of school geography education is extremely important and geography, both as science and as a school subject, has a clearly practical use in case of extreme natural events. Although the newly introduced (2009) subject in middle schools *Education on safety* will be helpful in developing behaviours (in post middle schools it will be a modified subject *Civil defence training*), when separated from contents of geography curriculum, it will not replace education at geography classes.

The period of system transformation in education, which was started in 1990, is sometimes perceived as the beginning of educational revolution, ana-

logical to the one which occurred in 1970s in West Europe (Marody 2004). However, it did not change significantly the attitude to teaching about natural hazards. The vagueness of curricula as well as differences in study programmes still make it difficult for teachers to choose textbooks and geography atlases for students. They still find it necessary to repeat significant parts of material due to the introduced division into middle school and post middle school level (element of reform of education system in 1999). The moment of changing the education level by the student usually breaks the continuity of curriculum. Although many publishing houses prepare coherent study programmes for middle and high school, and there are institutions comprising both middle and high schools, most teenagers change school and begin studying according to a new study programme. Moreover, reducing the number of geography lessons at school significantly decreases the possibility of covering many topics and complementing the contents of lessons with visual presentations, films or time-consuming analyses of maps. In the face of intensifying floods and landslides in Poland and the occurrence of whirlwinds, the question arises how effective the education about these hazards is. Hopefully, the introduced new curriculum will change a lot in this respect.

In the previous decade, the state's activity to limit the effects of natural disasters was growing. There were new acts, first regulations for state's financing of relocating people affected by 2010 floods to safe areas, regional projects, Flood Directive is being implemented imposing an obligation to create maps of flood risks and hazards. The losses resulting from the flood of 2010 amount to EUR 2.9 bn. Social life in vast areas has been destabilized. The knowledge of endangered areas should allow people to make conscious choices concerning their presence in the area. However, currently, *landslide amnesia* is a common term among geologists, which describes the fact that people do not remember previous landslides in the areas inhabited by them. Many people heroically attempt to rebuild their houses in the flooded or landslide area. We have lost oral tradition, while at schools the subject of dangerous events is not particularly discussed. Considered to be a fact, the *amnesia* becomes an important argument in favour of intensifying school education with regard to natural hazards. Monitoring the flood wave in 2010 showed that alarm levels were exceeded in a greater part of Poland. Unfortunately, the Dutch concept *More space for rivers* is little known in Poland, and expenses to remove damages are much higher than those intended for preventive actions. The state of society's preparation for dangerous events is demonstrated by people's reactions during the natural disaster, which were broadcast live by mass media: social dissatisfaction, collective lawsuits against state administration, late alarm warning and delayed rescue action, lack of awareness of flood or landslide occurrence, surprise with the event, reluctance to evacuate and excessive delay or even refusal to evacuate.

The presented results of research in comparison to the events of 2010 in Poland demonstrate the need to intensify preventive actions, one of which is e.g. social education through teaching geography at schools. Changes in school education about the protection of natural environment have led to improvement in social awareness in recent years. Currently, there is a discernible need for analogical actions in teaching about dangerous natural events. These issues are naturally related to the subject of geography and environment-man relationships. The research shows that students look for answers to the following questions: how to avoid a hazard, how to recognize it, how to behave, how to act and cooperate in the face of the hazard. Besides academic works (monitoring, analyses, hazard and risk evaluation) as well as administrative actions and decisions, it is also essential to ensure flow of information from scientists to state administration and organizations and then to society. However, if this information is to be used with understanding, the society needs to be prepared to receive it first of all.

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