

Disaster risk reduction curricula in primary and secondary schools across the European Union: a review

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Abstract. The purpose of this paper is to give an overview of the disaster risk reduction (DRR) curricula at primary and secondary schools in the European Union (EU) member states. This overview deploys a two-step approach: (1) a rapid review of 20 curriculum indicators from the Hyogo Framework for Action (HFA) progress reports to identify trends and limitations of the DRR education across the EU, and (2) an overview of national curricula and other relevant resources to understand the educational process and the development of DRR skills in different European educational settings. Thematic analysis was used to conduct an overview of formal primary and secondary curricula in relation to DRR. The study revealed a wide variety of creative and efficient approaches to implement DRR into the school curricula, and, hence, a lack of standardized approaches. While in some member states, teaching focuses on disseminating safety knowledge, in others, teaching highlights the mechanisms behind disasters. Due to the great diversity regarding structure and content of the examined materials, a systematic review was not possible. Therefore, an overview was considered the most appropriate choice. The results of this study might contribute to a better understanding of the gaps and limitations in developing formal curricula in the EU member states.

Key Words: disaster risk reduction, school curricula, risk education, preparedness, community resilience, capacity building.

Introduction. One of the most efficient long-term strategies for Disaster Risk Reduction (DRR) is education because it provides societies with the necessary tools (information, skills and knowledge) to cope with hazards and risks (Bernhardsdottir et al 2015). These tools help building community resilience towards disasters, being the main intended outcome and goal of the Sendai Framework for Disaster Risk Reduction, set for the next 15 years. Education plays a crucial part when speaking about DRR as it is an important approach to attaining the expected outcomes of the Sendai Framework. Moreover, there are currently very few studies in the published and gray literature addressing school-based disaster education programs (Johnson et al 2014a, b).

Building human capacity can be achieved by incorporating disaster risk knowledge in formal and non-formal education and in civic education at all levels, starting with the youngest members of the society, that are children. Capacity building in the field of DRR education deals with promoting positive attitudes and practices leading to a better management of emergency situations. This can be carried out at individual, community and institutional level. At an individual level, risk education aims at gaining knowledge and skills to act properly in emergency situations and furthermore, to be able to critically analyze information. In this regard, tailoring DRR education to the needs of specific social groups to achieve efficient knowledge transfer is extremely important.

This is particularly relevant relating to children, as they are among the most vulnerable social groups in case of a disaster (Mudavanhu et al 2015). This was proven by recent disasters, such as the 2005 earthquake in Pakistan, when more than 16,000 children died under collapsed school buildings (Asian Disaster Preparedness Centre 2007) or by the 2001 Gujarat earthquake in India which affected 3 million children (United Nations Centre for Regional Development 2009). However, children's vulnerability can be mitigated by preparing them from an early age (Rajib el al 2011). Children and teenagers also contribute to social changes and influence their surroundings, passing on information to adults around them. Therefore, attention should be given to provide them with space and modalities to contribute to DRR, in accordance with legislation, national practice and

educational curricula (United Nations 2015), with the final goal of raising responsible citizens (Komac et al 2010).

To achieve efficient capacity building in risk education, three important stages need to be addressed, developed and improved. The first step is to improve knowledge and skill transfer (educational methods). The second step is to improve the results in the education systems (evaluation). Finally, the third step is to address the issue of program management (curricula) (Komac et al 2010).

Most of the European Union (EU) member states have embedded risk-related subjects in their school curricula so far after implementing the 2005-2015 Hyogo Framework for Action (HFA). The paper presents a brief review of trends, practices and limitations in regards to formal disaster risk education across the EU according to the last HFA progress reports. The implementation of a risk-related curriculum is a long-term process and can take some 10 years in a well-developed education system (IFRC 2011). Therefore, it is important to monitor achievements and shortcomings, as well as to compare results in order to improve risk education practices. Hence, the findings of the paper highlight the formal educational trends and practices for disaster risk reduction at primary and secondary school level across the EU.

Material and Method. For the purpose of this research, a twofold method was used. First, a quick overview of the curriculum indicators in the HFA was conducted to highlight trends and limitations of formal disaster risk education across the EU. The second methodological approach employed within the paper implied the EU member states national and local curricula scan. Moreover, educational practices in the field of DRR were identified and analyzed.

The overviewed items were collected in three phases. First, national curricula were requested from the national authorities operating in disaster management in the EU member states which declared having a curricular arrangement in the HFA final reports. After that, official websites of national educational entities from EU member states were subject to a search identifying subject matters where DRR topics were covered at primary and secondary educational level. Lastly, scientific papers and grey publications dealing with this topic were collected and included in the overview. A thematic analysis of the selected items was conducted to understand the educational process and the development of skills in different educational settings.

The 2005-2015 Hyogo Framework for action approach. In 2015, the 10-year international Disaster Risk Reduction Plan, Hyogo Framework for Action (HFA), came to an end and the majority of the member states having employed the framework reported on the progress they made during these 10 years. Twenty (20) progress reports from the last reporting cycle (2013-2015), submitted by the EU member states were gathered from the preventionweb.net portal and the curriculum indicators in Priority for action 3, Core indicator 2 were analyzed for each country. Progress reports from Belgium, Cyprus, Estonia, Ireland, Latvia, Lithuania, Luxembourg and Malta were not available on the prevention.net. Thirteen (13) out of the 20 countries submitted their final reports and stated they had national risk-related curricula by the end of 2015. Austria, Finland, Hungary, Bulgaria, Czech Republic, Croatia, France, Greece, Slovenia, Spain and the Netherlands declared having curricula for primary, as well as for secondary schools, while Poland stated having a primary school curricula and Portugal a secondary school curricula. The remaining 7 countries out of the 20, namely Italy, Romania, the United Kingdom, Denmark, Germany, Slovakia and Sweden announced not having a national curricular arrangement for risk-related subjects in their formal education system (Figure 1).

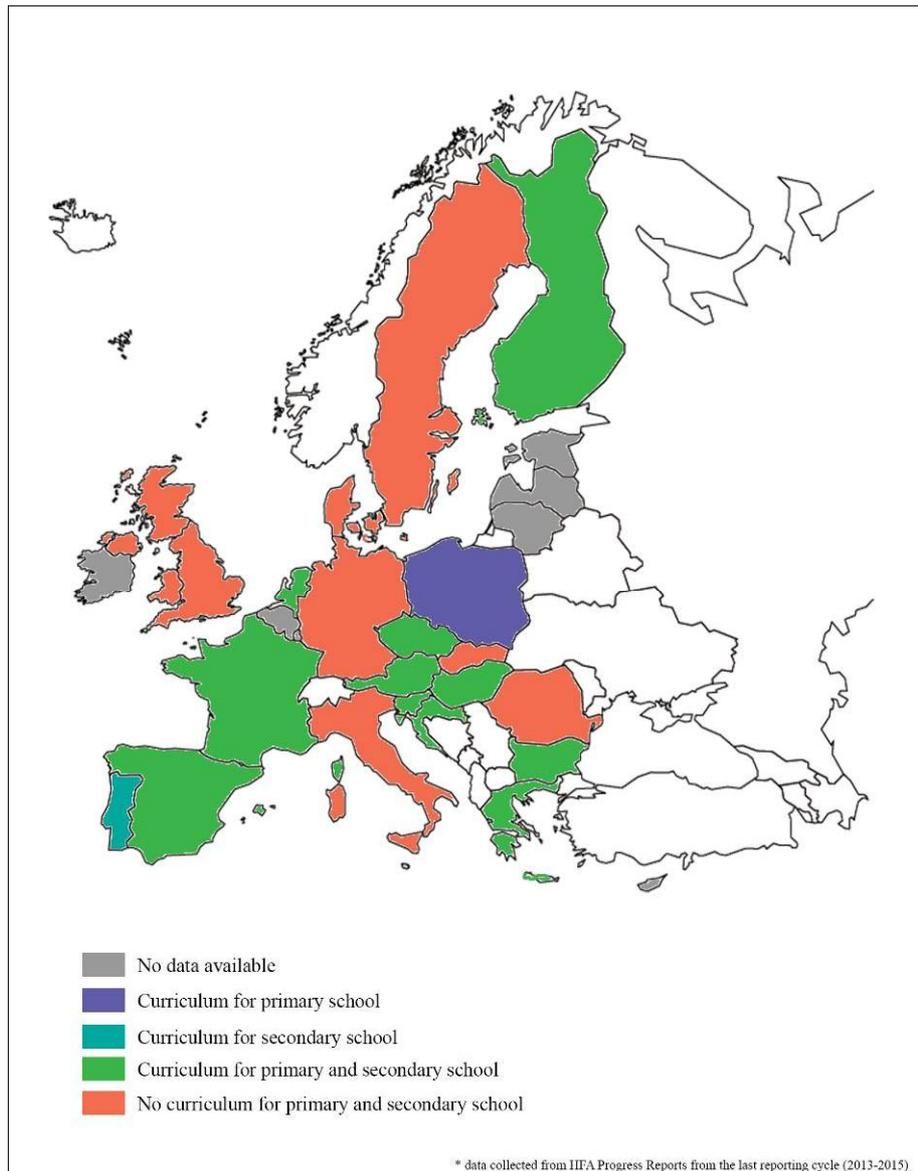


Figure 1. The availability of risk-related primary and secondary school curricula in the EU Member States according to HFA progress reports.

Curricula analysis approaches. The variety of methods used to integrate DRR topics within the school curricula deterred the authors from making a systematic review. Therefore, the authors conducted a curricula scan focusing on several approaches most frequently used in DRR education. The aspects considered while making the analysis were:

- integration of DRR topics as parts of specific school subjects (most often Geography and Natural Sciences);
- lifelong learning approach by integration of disaster management issues at all levels of education;
- autonomy of schools in making their own curricular arrangements;
- horizontal synergies between the subjects taught within the same educational level (social, environmental, art studies, computer science and language classes);
- vertical reinforcement of DRR education. Reinforcement focuses on implementing efficient and energizing strategies to address particularly correct behavior and motivating the pupils to learn (Laza & Lotrean 2013), while the vertical approach deals with the gradual buildup of knowledge and skills from one educational level to another;

- other less usual methods to embed DRR topics in school subjects, such as mass-media dissemination of knowledge;
- development and transfer of specific skills related to disaster risk reduction.

Results and Discussion. According to the last HFA reports, there are many creative and efficient approaches to integrate risk-related topics to EU school curricula. Risk-related topics included in national curricula depend on the availability of financial, material and human resources, national needs, safety culture and political setting of each Member State.

Disaster risk reduction program management across the EU according to HFA.

DRR program management in primary and secondary schools seems to have a tradition across the EU. Some of the EU member states had risk-related subjects embedded in their school curricula before the HFA started awakening a general interest among the EU member states for implementing DRR education, either in their formal or non-formal education system, to build human capacity in face of disasters. For example, in Greece, special information classes were organized in elementary schools to raise pupils' awareness and to develop their preparedness and response skills towards hazards like earthquakes, severe weather conditions, floods and forest fires. These information classes focused on basic response guidelines and prevention activities (Alexandris 2005). Even if there is no specific DRR curricular arrangement in place at national level in some of the EU member states, topics on risk prevention and response are addressed at school. In Germany, primary schoolchildren were taught in fire protection and first aid (German Committee for Disaster Reduction 2005). In some cases, DRR education at primary and secondary school level is not compulsory - optional informational education and training programs regarding preparedness for kindergarten and elementary schoolchildren were available in Slovenia in 2004. Schools that opted for implementing this program were given help by the Administration for Civil Protection and Disaster Relief (Ministry of Defense of the Republic of Slovenia 2005).

Member states that declared having national curricula on the subject have different approaches to implement DRR curricula in schools. For example, in Croatia, there is a National Curriculum Framework for primary and secondary school education. Topics included in the framework are:

- safety measures to mitigate and limit the impact of natural disasters and threats;
- the role of technology in DRR;
- social and environmental responsibility to mitigate the disaster risk;
- and how to act in case of disasters.

In France, it is compulsory for every student to learn about risk prevention, the mission of emergency services and the basics of first aid according to the educational code. In Hungary, the DRR curriculum has been integrated at national level into the school curricula as independent subjects since 2011. Slovenia introduced the elective subject Protection against Natural and other Disasters for primary schoolchildren.

In Spain, the Ministry of Education promotes the inclusion of practical training for the topics related to the appropriate behavior in case of disasters. In some of the member states, like in the United Kingdom or Germany, schools are in charge of deciding whether to include risk-related subjects in their curricula or not. Usually, schools from risk prone areas opt for embedding DRR topics in their program. This great variety of approaches to disaster risk education points to the fact that, despite the willingness of governments to adapt DRR curricula to their formal educational systems, some member states are still struggling to achieve sustainability in this regard (Selby & Kagawa 2012).

According to the HFA progress reports, there is also a wide range of educational tools to support knowledge transfer (United Nations Office for Disaster Risk Reduction 2015). Tools to support formal DRR education, such as textbooks or teacher manuals, were also created prior to the beginning of the HFA. For example, in Hungary, the National Directorate General for Disaster Management published a teacher's guide that supported elementary school teachers in giving lessons in civil defense and fire protection

(Ministry of the Interior Hungary 2005). The aim of the Directorate was to make schoolchildren aware of daily routine risks. And, in their view, the teacher interacting with the children every day was the most certified person to introduce these subjects to the class. In addition to the teacher's guide, the Directorate General for Disaster Management also published worksheets for children.

School competitions are a preferred educational tool used by some EU member states to make children familiar with DRR subjects. For example, the Austrian Civil Protection Association has been organizing the yearly competition Children's Safety Olympics-Safety Tour since 2000 to teach children preparedness and knowledge through game and sports. The National Training Centre of the Ministry of Emergency Situations from the Republic of Bulgaria in cooperation with other organizations is responsible for the annual competition the National Children's Drawing Competition "MISSION: RESCUER", a competition addressing to children's creativity to promote safety measures. Drawings submitted by children should be based on preparedness and adequate response to emergency situations to promote the image of the Ministry of Emergency Situations rescuers who fight disasters in daily routine. The Hungarian Civil Protection Association in cooperation with professional rescue workers organizes team-competitions for the 10-18-year-old members in primary and secondary schools, associations, organizations, and clubs every year. The competitions are organized at local, regional and national level and their aim is to get pupils trained on Disaster Risk Reduction throughout the year. This includes age-related skills in self-rescue and rescue of fellows, physical preparedness in theory and practice.

Governmental or non-governmental experts are sometimes also included in the teaching process. In Greece, for example, experts from the General Secretariat for Civil Protection train secondary schoolchildren in self-protection. Volunteers from the Hellenic Red Cross provide nationwide classes for primary and secondary schoolchildren on disaster prevention and preparedness at individual and household level. The German Red Cross offers national training classes regarding Disaster Risk Reduction for schoolchildren and teachers.

Besides educating the children on risk-related matters, teachers receive training classes in some EU Member States to get familiar with these subjects. The teachers learn interactive and appealing teaching methods and become efficient multipliers for risk-related knowledge. For example, Hungarian authorities organize disaster management training classes for teachers twice a year. Participants gain insights on disaster management, teaching methodology, environmental protection, consumer protection, energy security, first aid and panic treatment. In Slovenia, teachers can find useful materials in an e-classroom and they also have an e-book on methodical teaching at their disposal.

Formal educational trends and practices for disaster risk reduction in the EU.

The curricula scan revealed the absence of a standardized approach regarding the information included in the educational curricula related to DRR at EU level. Each member state of the EU addresses the issues of program management differently. In some member states, DRR education is guided along a well-defined national curriculum. For example, in Hungary after the implementation of a nationwide action plan to involve disaster management issues at all levels of education and integration of disaster risk related topics into the school curricula, a lifelong learning approach was promoted through the curricula proposal, highlighting age-appropriate teaching objectives. Slovenia was also among the member states that included a non-mandatory subject regarding the protection against natural and other disasters. The subject provides knowledge and skills how to identify and mitigate threats involving particularly environment issues.

In other member states, schools have the autonomy to make their own curricular arrangements. Malta is a good example because each school has the autonomy to design its own curricula as long as the learning outcomes specified by the National Curriculum Framework are reached. Disaster risk-related learning aims are stipulated in the Maltese National Curriculum Framework and these include: to develop children's necessary skills to keep themselves safe and secure from hazards with a significant emphasis on safety at

home, in the street and playgrounds; to identify and mitigate hazards at first in their immediate surrounding; and to develop self-protection skills. But having the autonomy to adapt curricular arrangements at school level, without specific core curricula regarding risk-related subjects, can lead to gaps and inconsistencies in DRR education – in Poland, for example, since the curriculum is written in a general manner, and the textbook texts are selected very independently, information on dangerous natural events is presented very differently in nearly each of the many textbooks (Rucińska 2011).

In addition, curricular arrangements sometimes differ at national level depending on the administrative organization of a member state. This is the case in Germany, where each of the 16 federal states has its own educational requirements and learning objectives. Teachers must comply with the instructions regarding didactic and methodical implementation offered by the curricula for each subject in each federal state, but they can decide in many cases what they teach if the learning objectives are met. In this way, Disaster Risk Reduction topics vary from one federal state to another.

In some cases, safety issues are not explicitly mentioned in most of the school subjects like in Luxembourg. The curriculum written by the Ministry of Education in Luxembourg refers in some degree to health and safety issues to be taught to schoolchildren. Standardized life-skills education helps children to get informed, to communicate effectively, and to develop self-protection skills. A similar case is present in Italy where DRR education is not included in school curricula. National guidelines for the formation of curricula are provided, but 'risk' is not mentioned at all. Therefore, the initiative of risk education activities related to natural hazards is left to initiatives of schools. The Italian Civil Protection Department offers DRR education activities to be integrated to school curricula. Volunteers of the local civil protection units help promoting these (Komac et al 2010).

Organizations operating in national disaster management are involved in the transfer of risk knowledge to pupils in a more informal way in other member states as well. For example, in Slovakia, where DRR education is not included in the national educational curriculum at primary and secondary school level, public education campaigns for enhanced awareness on disaster risk management and prevention are organized by authorities to transfer safety skills to children.

Methods to integrate disaster risk reduction topics in school subjects. DRR topics are most frequently found as parts in specific school subjects. DRR topics and issues are usually found in science subjects (emergency-, safety-related, and healthy life skills, human impact on nature, and environmental impact of disasters) and social sciences (humans and nature, sustainable development). In Ireland, for example, aspects related to personal safety and environmental issues are addressed in the subjects like Social, Environmental and Scientific Education and Social, Personal and Health Education. The first one pursues children's abilities to build environmental awareness and care, based on knowledge of natural, environmental features in their local and wider environments, weather phenomena and the setting of the Earth in space. The latter subject is intended to nurture the children's respect and care for their bodies and an appropriate concern for safety (Government of Ireland 1999). In Austria, safety related topics at primary level are present in the curricula for general science. Children learn about the bodies of public order and security and correct behavior in emergency situations (to make an emergency call, to give basic first aid, and to secure a scene of accident).

At the secondary level, DRR topics and issues are also found in Geography (hazards, their causes and effects), Civic Education (active participation for a secure environment), and Natural Sciences (ecosystems, environment and health). In France, pupils are taught about the following risks: daily routine risks, major natural and technological risks, as well as health risks in the subjects Life and Earth Sciences, Geography and in the multidisciplinary topic of "security" ("sécurité"). Topics related to natural hazards are addressed in a similar way in Geography classes in other member states, but, in many cases, the focus is on the mechanism behind such incidents. Finland focuses the impact on society with its national educational curriculum that does not systematically include natural risks. Various types of hazards are addressed in the Finish

primary and secondary school curriculum, but the focus is more on the generation mechanism of these hazards rather than on prevention and reduction measures. However, other member states seem to use this pattern as well where children enrolled in secondary educational cycle are also taught in the consequences of natural hazards – in Maltese Geography classes, children are made aware of volcanos and floods, the risk of living in a volcanic area and about the effects and responses to floods at local and global level.

Horizontal synergies between subjects are achieved in some member states, as in Hungary. In their national curricula proposal, beside DRR learning objectives, teachers can also find methods how to implement DRR topics in classes for different subjects such as social, environmental, art studies, and computer science or language classes. Furthermore, suggestions on how to integrate age-appropriate activities of civil protection agencies are also emphasized in the proposal to support teachers in teaching disaster management. The Hungarian curricula proposal is also a good example for a vertical reinforcement of DRR education. Similarly, horizontal synergies between subjects (within the same educational level) and vertical learning reinforcement are achieved in Lithuania by the Human Safety Program of the Ministry of Education and Science. Human Safety Education should teach children, along with first-aid and traffic safety skills, with the following special competencies: understanding the importance of human safety and secure conduct principles, developing a strong sense of self-protection, preparing psychologically proper behavior in dangerous situations, and being able to identify, assess, avoid and mitigate the most important risks in daily routine.

In addition to embedding DRR topics to specific subjects, there are some more unusual approaches to address the 'risk' topic. For example, in some Danish schools, children develop skills to exemplify how mass-media disseminate knowledge on nature, weather, and natural disasters.

The European curricula deploy a wide range of interactive methods: role-playing, case studies, field trips, interactive presentations, mini-lectures, learning by doing, discussions, brainstorming, and critical thinking. School exercises are a common method. Bulgarian schools must implement two all-school exercises in their disaster protection plan every year (EUR-OPA 2009), but also other EU member states have similar obligations.

Specific skill transfer throughout disaster risk education across the EU. The DRR skills intended for primary and secondary schoolchildren are related to daily routine risks, natural risks and health risks. In most EU member states, the daily routine risks are addressed first, starting with household risks, accident risks, and finally disaster risk.

Health education is also considered important by most EU member states. The Estonian curriculum aims at developing pupils' skills on health and safety, their ability to pursue healthy lifestyles, and developing a health-promoting environment. Among the general competencies aimed by the Estonian education system, we mention the "self-management" skill – the ability to understand and evaluate oneself, one's weaknesses and strengths; to analyze one's behavior in different situations; to behave safely and adhere to healthful lifestyles" (Republic of Estonia Ministry of Education and Research 2014).

Road safety is another common topic addressed by formal risk education. Many EU member states have stipulated road safety knowledge transfer in their core curricula, but teaching aims can be slightly different from one member state to another. In Denmark, for example, road safety education has two teaching aims: children have to learn appropriate traffic behavior and accident handling. Traffic behavior teaches children how to move safely in traffic and what their responsibilities are in traffic, while accident handling teaches children how to help when someone is injured in their immediate surrounding; they also learn life-saving first aid techniques.

Whilst health and road safety education are not classical examples of DRR education, there are shared teaching objectives, such as the transfer of first-aid and self-management skills. The identification of these objectives is important to design an

integrated management of risk-related topics, and to achieve horizontal synergies between the various subjects.

In some member states, skill building and transition from one grade to the next - accomplished by vertical reinforcement of risk-related learning - helps children to develop and deepen personal and social risk-related skills. Primary schoolchildren in Lithuania learn to ask for help in dangerous situations and to make an emergency call. Furthermore, effects of natural disasters on human life are also taught. The children are made familiar with basic safety measures in case of severe weather conditions and floods. Later, in secondary school, children learn to take responsibility for their actions, their own safety, to control their possibly harmful emotions and to take effective safety measures during their daily activities. Children do not just learn how to behave to protect themselves, but also how to protect others and how to mitigate the consequences of disasters. Such educational programs are designed to empower children and to raise resilient citizens.

Gaps and constraints regarding the implementation of national DRR curricula.

One of the most important holdbacks, when it comes to the sustainable implementation of a national risk-related curriculum, is the lack of sufficient financial resources. Member states reporting limited financial resources for curricula implementation are Bulgaria, Poland and Slovenia. The lack of human resources can prevent the implementation of sustainable curricular arrangements as well, like France reported.

Some EU member states regard lack of necessity as a restricting factor. In some cases, there is no program established for natural DRR in primary and secondary schools at all. In Sweden, teaching young children in risk-related subjects in a formal educational setting is not a priority because the occurrence of a life threatening incident is unlikely in Sweden. In Finland, there is a risk-related curriculum, but it mainly covers the mechanism of different types of hazards, but possible safety and prevention measures are not systematically included.

Another restricting factor is a weak safety culture. For example, in Romania, some teachers tend to neglect risk-related subjects in favor of other subjects they consider more important. Restrictions can have political reasons, such as the change of government (Czech Republic) or difficulties with national or local coordination (Croatia, France).

Another gap is the lack of cooperation between the EU member states when it comes to curricula development. Few educational approaches mentioned in the HFA progress reports from 2013-2015 have international scope, such as the International Children's Drawing Competition "MISSION: RESCUER" (EUR-OPA 2009).

In this regard, it would make sense to advance cooperation across EU member states to share best practices, creative and innovative approaches. Teaching resources should be exchanged in order to establish standardized disaster-related curricula at EU level.

Conclusions. With the increasing number of natural and man-made disasters, people are facing worldwide, efficient DRR measures become necessary even in the most developed countries. Education is - in the long run - one of the tools to prevent and/or mitigate the effects of natural or man-made disasters. Moreover, if education is carried out in a formal framework, supported by practical exercises and extra-curricular activities, there will be many useful benefits for the community resilience.

This overview reveals a wide variety of creative and efficient approaches to implement Disaster Risk Reduction topics in the EU member states school curricula. DRR education has a tradition in most of the EU member states and safety notions are usually present across the curricular arrangements. But there is no general consensus on the topics covered. This variety of methods indicates that there is a lack of understanding - not only of the complex development and integration of a school-based curriculum, but also of the amount of resources needed to achieve a long-term progress.

Curricula vary mostly in terms of content and teaching methods from one member state to another. It is very difficult to make comparisons. Some of the curricula only

contain a few pages, while others cover several dozen pages. This leads to a lack of a standardized approach to embed risk-related topics into school curricula in a systematic and vertical (across the educational levels) manner. The aim is to achieve sustainability in DRR education at EU level.

The level of school autonomy to adapt curricular arrangements also varies from one member state to another. Having no or very basic risk-related curricula can be a problem for the schools with a high level of autonomy to address the topic in a systematic and complex manner. However, it offers them the possibility to tailor creative and efficient teaching approaches together with competent authorities to transfer DRR knowledge and skills to the children. To do this, the training of teachers is of utmost importance.

DRR topics are scattered through various subject matters in most of the member states. This approach can have benefits when learning objectives are linked among subjects. But for this, teachers have to understand the complexity and multidisciplinary of the subjects.

Dissimilarities appear in specific risk-related topic approaches throughout different national curricula. These differences are also intensified by the lack of sufficient cooperation between the EU member states when it comes to curricula development. There were few formal educational approaches that supported international cooperation to exchange DRR educational practices or to take common actions.

Some other drawbacks in developing and/or embedding DRR education in school curricula may include, but are not limited to: lack of sufficient financial and human resources, deficiency of safety culture at individual level, lack of continuous funding to support curricula development, lack of political commitment from the key stakeholders, failure to conduct the comprehensive research required for curricula development, isolated initiatives not capable of creating the necessary synergy to bring relevant changes or the unsuccessful cooperation between the main partners.

Nonetheless, there is a silver lining in all. Significant benefits can be accomplished by horizontal synergies and vertical reinforcement of risk-related learning. Building children's knowledge and skills on DRR, making them understand the causes, and effects of extreme incidents is therefore crucial for a correct behavior in emergency situations, empowering them and turning them into resilient and responsible citizens.

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References

- Alexandris D., 2005 Report and information on disaster reduction for Greece for the World Conference on Disaster Reduction (Kobe-Hyogo, Japan, 18-22 January 2005). Available at: <https://www.unisdr.org/2005/wcdr/preparatory-process/national-reports/Greece-report.pdf>. Accessed: May, 2016.
- Asian Disaster Preparedness Centre, 2007 Child focused disaster risk reduction, module 6: Community disaster risk reduction implementation. 16th Community Based Disaster Risk Management Course, Bangkok, Thailand, 16-27 July 2007, Participants Workbook. Available at: http://s3.amazonaws.com/inee-assets/resources/doc_1_Child_Focused_Disaster_Risk_Reduction.pdf. Accessed: February, 2017).
- Bernhardsdottir A. E., Musacchio G., Ferreira M. A., Falsaperla S., 2015 Informal education for disaster risk reduction. *Bulletin of Earthquake Engineering* 14(7):2105-2116.
- European and Mediterranean Major Hazards Agreement (EUR-OPA), 2009 Republic of Bulgaria Ministry of Emergency Situations - National Training Centre. Available at: https://www.coe.int/t/dg4/majorhazards/ressources/Apcat2009/APCAT2009_10_Bulgaria-NationalTrainingCentre_EN.pdf. Accessed: May, 2016.

- German Committee for Disaster Reduction, 2005 Outline for national reporting and information on disaster reduction for the World Conference on Disaster Reduction (Kobe-Hyogo, Japan, 18-22 January 2005). Available at: <https://www.unisdr.org/2005/wcdr/preparatory-process/national-reports/Germany-report.pdf>. Accessed: May, 2016.
- Government of Ireland, 1999 Department of Education and Science, National Council for Curriculum and Assessment, Primary School Curriculum: Introduction. Available at: http://www.curriculumonline.ie/getmedia/c4a88a62-7818-4bb2-bb18-4c4ad37bc255/PSEC_Introduction-to-Primary-Curriculum_Eng.pdf. Accessed: May, 2016.
- IFRC, 2011 Public awareness and public education for disaster risk reduction: a guide. International Federation of Red Cross and Red Crescent Societies (IFRC) Geneva. Available at: http://www.ifrc.org/Global/Publications/disasters/reducing_risks/302200-Public-awareness-DDR-guide-EN.pdf. Accessed: May, 2016.
- Johnson V. A., Ronan K. R., Johnston D. M., Peace R., 2014a Evaluations of disaster education programs for children: a methodological review. *Int J Disaster Risk Reduct* 9:107-123.
- Johnson V. A., Ronan K. R., Johnston D. M., Peace R., 2014b Implementing disaster preparedness education in New Zealand primary schools. *Disaster Prev Manag* 23(4):370-380.
- Komac B., Ciglič R., Erhartič B., Gašperič P., Kozina J., Orožen Adamič M., Pavšek M., Pipan P., Volk M., Zorn M., 2010 Risk education and natural hazards. CapHaz-Net WP6 Report, 'Anton-Melik' Geographical Institute of the Scientific Research Centre of the Slovenian Academy of Sciences and Arts, Ljubljana. Available at: http://caphaz-net.org/outcomes-results/CapHaz-Net_WP6_Risk-Education. Accessed: May, 2016.
- Laza V., Lotrean L. M., 2013 Reinforcement strategic program in environmental education. In: *Procedia - Social and Behavioral Sciences*. Odabasi H. F. (ed), 3rd World Conference on Learning, Teaching and Educational Leadership – WCLTA, 25-28 October 2012, Brussels, Belgium (Vol. 93), Elsevier Science BV, Amsterdam, pp. 437-443.
- Ministry of Defense of the Republic of Slovenia, 2005 National report and information on disaster reduction for the World Conference on Disaster Reduction (Kobe-Hyogo, Japan, 18-22 January 2005). Available at: <http://www.unisdr.org/2005/mdgs-drr/national-reports/Slovenia-report.pdf>. Accessed: May, 2016.
- Ministry of the Interior Hungary, 2005 National Directorate for Disaster Management Budapest, National Report of the Republic of Hungary for the UN/ISDR World Conference on Disaster Reduction (Kobe-Hyogo, Japan, 18-22 January 2005). Available at: <https://www.unisdr.org/2005/wcdr/preparatory-process/national-reports/Hungary-report.pdf>. Accessed: May, 2016.
- Mudavanhu C., Manyena S. B., Collins A. E., Bongo P., Mavhura E., Manatsa D., 2015 Taking children's voices in disaster risk reduction a step forward. *Int J Disaster Risk Sci* 6:267-281.
- Rajib S., Takeuchi Y., Gwee Q. R., Shiwaku K., 2011 Role of education in disaster reduction. In: *Disaster education (community, environment and disaster risk management, Vol. 7)*. Rajib S., Shiwaku K., Takeuchi Y. (eds), Emerald Group Publishing Limited, UK, pp. 1-22.
- Republic of Estonia Ministry of Education and Research, 2014 Regulation regarding national curriculum for basic schools, 6 January 2011, Last amendment 29 August 2014. Available at: https://www.hm.ee/sites/default/files/est_basic_school_nat_cur_2014_general_part_1.pdf, 2014. Accessed: June, 2016.
- Rucińska D., 2011 Social education on extreme natural events in view of extreme floods and landslides in Poland. *Prace i Studia Geograficzne* 48:173-185.

- Selby D., Kagawa F., 2012 Disaster risk reduction in school curricula: case studies from thirty countries. United Nations Children's Fund, Geneva. Available at: www.unicef.org/education/files/DRRinCurricula-Mapping30countriesFINAL.pdf. Accessed: May, 2016.
- United Nations Centre for Regional Development, 2009 Reducing vulnerability of school children to earthquakes: a project of school earthquake safety initiative (SESI). Available at: http://www.preventionweb.net/files/2951_SESIOutcomeallfinal.pdf. Accessed: May, 2016.
- United Nations Office for Disaster Risk Reduction, 2015 Hyogo Framework for Action. National Progress Reports. Available at: http://www.preventionweb.net/english/hyogo/progress/reports/index.php?o=pol_year&o2=DESC&ps=50&hid=0&cid=rid3&x=10&y=3. Accessed: May, 2016.
- United Nations, 2015 Sendai Framework for Disaster Risk Reduction 2015-2030. Available at: <http://www.preventionweb.net/files/resolutions/N1516716.pdf>. Accessed: May, 2016.

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