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PROACTIVE VS. REACTIVE LEARNING ON BUILDINGS RESPONSE AND EARTHQUAKE RISKS, IN SCHOOLS OF ROMANIA

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INTRODUCTION

In the general context of a sustainable society development process, the disaster perspective has shifted from reactive to more proactive framework (from reactive emergency management to disaster risk reduction). To be proactive means acting in advance to deal with an expected severe earthquake disaster, to think ahead and as results to be able to have a correct behaviour, take charge of situation, face it and to create means to deal with it, and do not blame the society for your lossess at disasters. To be reactive, on the other hand, means being always affected by the environment and the natural disasters, these sources of lossess and negative effects acting as stimuli to which respond after. Preparedness involves measures taken in anticipation and highlights the permanent need for organized disaster activities and the significant role of basic seismic education in schools.

EDUCATION PROGRAMS AND PROJECTS CARRIED OUT IN TIME OR ONGOING IN ROMANIA

Since 2009, URBAN-INCERC prepared a study for a center for education, training and public communication concerning safer earthquake behaviour (Meita et al, 2011). The center for education, training and public communication concerning safer earthquake behaviour, associated with a special facility – a demonstrative platform will develop and use specific hardware and software, didactic equipment, earthquake simulators and mass-media tools for knowledge transfer. The new approaches take into account the need to use reliable earthquake engineering researchers for training, to identify the gaps in present public information and to cover all age and professional categories of population and public authorities, to teach them practical approaches to protect and cope with disasters impact. From all above, it can be seen that all programs and projects have intended to change the situation described in the following scheme, Fig. 1. Knowledge and resources have been invested to explain the origin and nature of seismic events, but specific situations that require taking effective measures to prevent and mitigate the effects of earthquakes or disseminated knowledge or involvement of the population (pupils, students, adults) are not enough supported, encouraged, motivated.

Figure 1. Queries on proactive-reactive situation in the seismically protection

Taking into account all positive and practical results of Educational Seismological Project (EDUSEIS) launched in 1995 as an EU-supported partnership (through Erasmus), with specific support in France, Italy, Germany and Portugal (European Commission, 2013), and of another good example EDURISK of Italy (Camassi et al, 2005), a new integrated and interactive approach is "Educational Seismic Network in Romania" (ROEDUSEIS-NET).

In this project (Roeduseis-Net, 2011), NIRD-URBAN INCERC is partner with National Research Institute for Earth Physics (NIRDEP), as project coordinator, and Babes-Bolyai University of Cluj-Napoca and Beta Sofware Management Company SA. Proactive educational objectives refer to: training of students and teachers in the record, analysis and interpretation of data recorded using dedicated seismometers installed in schools, the development of practical skills to work with seismic waves and other earthquake parameters. Scientific objectives relate mainly to introduce knowledge on Earth and earthquakes, understanding the natural environment patterns and attract students to geosciences, but also aim to create a database of seismic records from equipments installed in schools. The schools from 9 cities throughout the country (Bucharest, Brasov, Focsani, Iasi, Constanta, Sibiu, Timisoara, Zalau, Cluj-Napoca) are involved (Roeduseis-Net, 2011).

EDUCATIONAL DEVICES, DEVELOPED TO FACILITATE AND IMPROVE KNOWLEDGE ON BUILDING OSCILLATIONS WITHIN "EDUCATIONAL SEISMIC NETWORK IN ROMANIA" (ROEDUSEIS-NET)

Some of the teaching materials developed in this project by NIRD URBAN-INCERC team are exemplified further, beeing shown/demonstrated on the fundamental aspects of the building oscillations, their response and damage, aiming especially behavior of the slender tall buildings in order to be able to understand the role of bracings and the structural walls. We choose to make models of simple buildings structures, Fig.2, and seismic simulators, Fig.3, 4, in school laboratories or in one of the "Pilot Centers - SeismoLabs". The new proactive approach is that students are the makers of models and simulators, using them to understand the concept and make real observations. Frame models are made of cardboard and infilling walls of polystyrene and may show the fundamental aspects of the buildings oscillations, when shaken. Their response aims especially to understand the behavior of the slender tall buildings vs. stiff and low structure, deformation of soft-story structures, and to understand the role of bracings and the structural walls.

Figure 2. Simple models of buildings that can be achieved by students

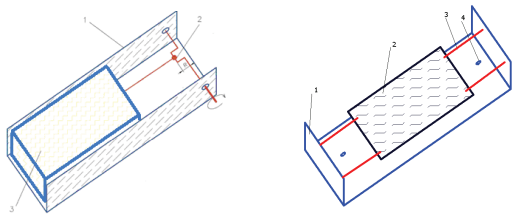

Figure 3. Models of seismic mini-simulators that can be achieved by students
a.Hand powered cranks mechanism: 1-channel profile of tin; 2-hand powered cranks mechanism; 3-mobile platform of polystyrene, for fixing models, acted by hand crank and rod. b.Platform and elastic bands/springs: 1- metal profile support; 2- cardboard platform; 3- elastic bands /springs; 4- hole screw fixing device.

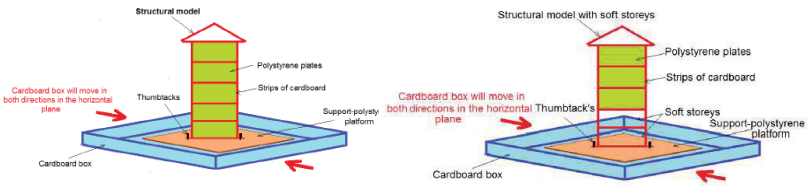

Figure 4. A. Simulator and seismic-resistant structural model; B.Seismic simulator to be made by students and a structural model with soft / weak or flexible story. The frame infilling is removed in the second phase of experiment; Simulator and structural model with flexible floor

CONCLUSIONS

Given the area exposed to strong earthquakes in Romania, the programs and new ways of earthquake awareness and education of students should be a national priority and needs to be supported by a coherent and comprehensive legal framework strongly correlated with, but different from existing laws on civil protection.

A realistic awareness of potential hazards is critical to motivate preparedness. Perceptions of the incidence of a major seismic event and beliefs about one's ability to survive and cope with a disaster are linked to an understanding of the nature of a disaster and to levels of preparedness.

A critical evaluation of activities in Romania proves that the period 1990-2012 allowed the development of printed materials and seminars in schools, covering a combined preventive and reactive learning, being a close-to-proactive approach, using Japanese mini-simulators.

The ongoing proactive approaches in Romania within the Project Roeduseis-Net and the use of locally made models, for earth and structures, are in line with other European, USA and Japan projects and represent a new paradigm in earthquake education, extending approaches of proactive preparedness by learning, creating building models and making experiments, under Romanian seismic conditions. After each stage of the project, students realize that almost all territory is strongly seismic and they must cope with this, but they became self-confident because of participation and self-involvement.

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