



## **"TUTTI GIÙ PER TERRA" ("ALL FALL DOWN") - AN ACTIVE COURSE TO DISCOVER EARTHQUAKE'S TOPICS**

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### **SUMMARY**

Teaching topics involving risk and safety, and earthquake, requires a full involvement. Otherwise, it can be useless. A full involvement means an experience rewarding the person in his/her integrity, starting from practice to go beyond it, understanding phenomena not using science as a form of rational believe, working on the different ingenious idea that everyone has of the earthquake, staying related to the social connections of the learning group. ConUnGioco developed, starting from these objectives, "Tutti giù per terra", an active course for discover, for the Italian INGV: the course, whose title is inspired to the last line ("All fall down", in Italian, "Tutti giù per terra") of the child singing game "Ring a ring'o roses" (in Italian: girotondo), is based on an interactive and participative approach. Following the active course, participants can experiment feeling and emotions related to the experience of an earthquake (through simulation tools). Therefore, starting from the questions that the simulated experience raised in everyone, the group will search its own answers, investigating theoretical knowledges with scientific experiments and games, staying in touch with explanations coming from legends, history and religion. The course will end in the area of concrete actions and possible reactions to an earthquake, talking about preventions and solutions, individually and as a community.

### **1. FOREWORD: EARTHQUAKE RISK IN ITALY**

Italy has a very high seismic risk due to its substantial seismic activity with frequent damaging earthquakes. The Italian catalogue of past earthquakes contains around 2600 damaging ( $M \geq 4.5$ ) earthquakes for the past 1000 years, and this fact must be considered a conservative estimate due to the catalogue incompleteness. It also includes an average of one destructive earthquake ( $M \geq 6.5$ ) every 15 years for the past 400 years. Italy has also a very high-density population and a very vulnerable national heritage, with many valuable historic and cultural sites. Following the 23 November 1980 earthquake in Irpinia ( $M=6.9$ ), which caused the death of almost 3000 people, there has been a number of minor earthquakes. Amongst these, particular significant are the 26 September 1997 ( $M=6.0$ , 11 fatalities) earthquake in Umbria-Marche and the San Giuliano di Puglia earthquake on 31 October 2002 ( $M=5.6$ , 29 fatalities). The latter although representing a minor event in the Italian historic seismic record has highlighted the problems of the high building vulnerability in Italy, in particular for schools, and the need for more modern preventive measures and a higher level of preparedness amongst the population. The collapse of the school building in San Giuliano, which caused the death of 26 children and one teacher, has prompted the Italian government to introduce remedial measures with a revised seismic classification of Italy. This has classified all the 8106 Italian municipalities (an increase of 5135 municipalities compared to previous classifications) as seismic and as such, subjected to appropriate regulations.

### **2. STRATEGIES FOR RISK MITIGATION: THE EDURISK PROJECT**

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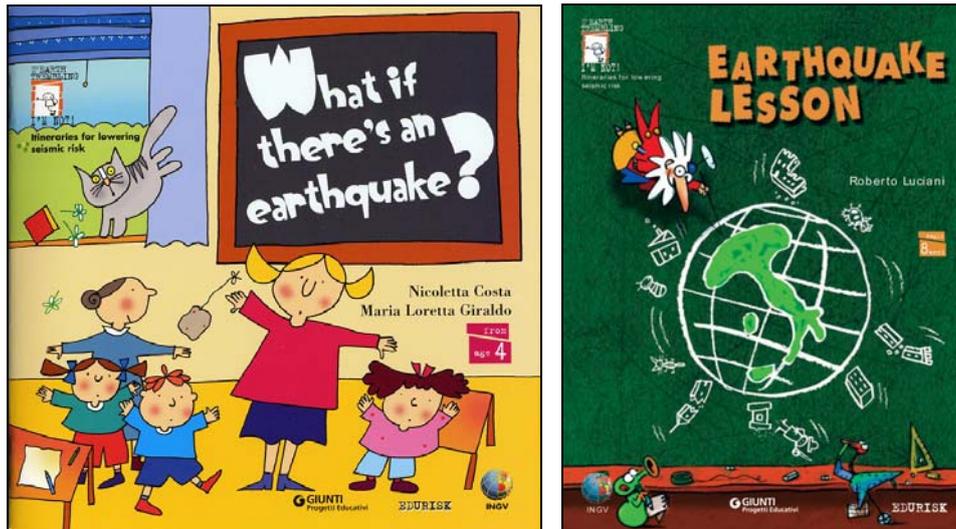


Figure 1: Educational tools published by the EDURISK project

Awareness towards risk and the implementation of mitigating individual and collective behaviours is a cultural problem that requires the development of educational processes aimed at gaining a complete understanding of the personal consequences and interactions between a physical or geological phenomenon such as an earthquake and the social-human environment affected by it.

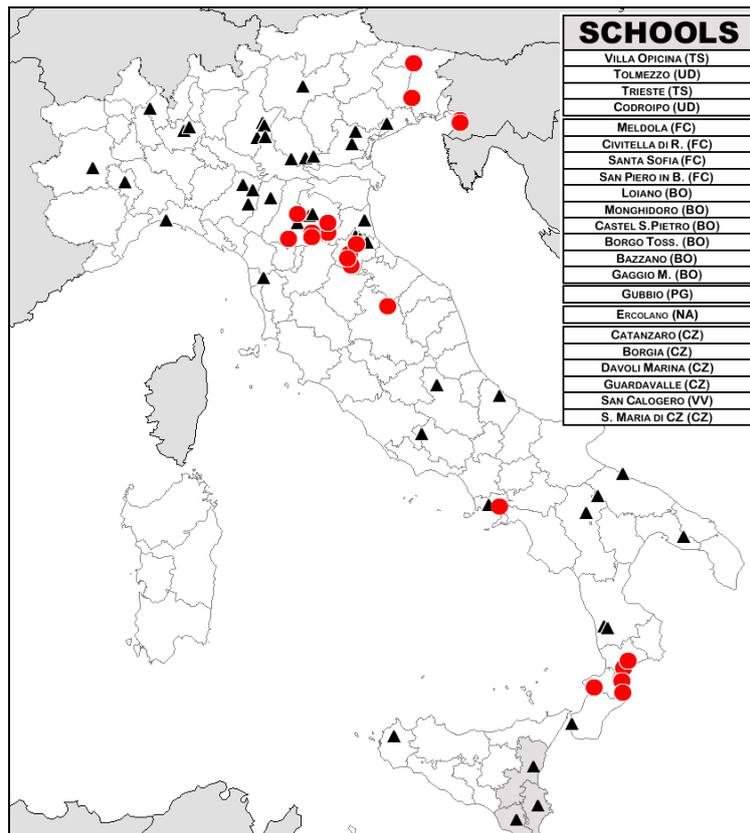


Figure 2: Italian schools participating (red balls) or connected (rhombs) to the EDURISK project

To this purpose, the EDURISK project (Earthquake Education: a journey for risk reduction [www.edurisk.it](http://www.edurisk.it)) has devised and implemented, since 2002, a number of educational projects aimed at the mitigation of risk, with specific seismological, geological and engineering resources and the support of competences from the educational (GIUNTI Educational Projects, Florence) and the editorial sector (authors of children's books, artists and illustrators) [Angiolino, 2003; Luciani, 2005; Costa et al., 2005]. These educational projects have been

developed with particular emphasis towards the analysis of the overall impact of earthquakes on their physical, natural and human environment, as the main objective is the ultimate modification of individual and general behaviours.

The project has implemented, since 2002, a number of articulated educational initiatives on the mitigation of risk in several Italian schools, with the participation of around 500 teachers and 15000 students. It has also developed training courses for teachers, some of them available also as distance learning courses, and class learning activities based on a multidisciplinary approach [Sidoti, 2005], which takes into account the specific environment of each school and its knowledge of the local environment in its physical, historic and cultural characteristics [Camassi et al., 2005].

A subsequent phase of the projects has been dedicated since 2005 to the development of educational projects in new areas, within secondary schools (the previous phase concentrated only on pre-school and primary education) and will include volcanic risk. A distance-learning course for teachers is also being implemented along with a hands-on course for 8 to 13 year olds in the form of an interactive exhibition developed in collaboration with 'ConUnGioco', a team dedicated to the development of educational projects and play activities.

### 3. THE INTERACTIVE COURSE "WE ALL FALL DOWN"

EDURISK and 'ConUnGioco' have developed an interactive learning experience on geologic risks, earthquakes and volcanoes named "**We all fall down**". This learning experience has been conceived with the aim of prodding participants to formulate questions and seek answers on those phenomena that, although at times unpredictable and uncontrollable, can result in being less damaging and harmful, and even harmless, if understood and dealt with in the most appropriate manner.

"*We all fall down*" is intended primarily for schools (primary and secondary schools, for 8 to 13 year olds) but also for individual visitors (informal users: adolescents and adults).

This interactive exhibition, designed to be easily assembled and transported, is based on a strongly interactive approach. The participants are more than mere spectators. They can experience in the form of simulations the feelings and emotions that can be felt during an earthquake and investigate through scientific experiments the principles that explain how earthquakes and volcanic eruptions are generated.

"*We all fall down*" is therefore composed of a hands-on *interactive exhibition* and a number of *workshops* aimed at the analysis of specific subjects. The main objective of the exhibition is the use of play activities designed to cover each one of the subjects that constitute the exhibition itself. The visit is organised in two moments: an interactive itinerary and a learning induction.

#### 3.1 The interactive itinerary

##### 3.1.1 *Experiencing Area: "the earthquake house"*

The first area, called The Experiencing Area, is a house built to contain replica of common furnishing items with six interactive areas on the outside that give visitors the possibility to reproduce inside the house experiences and phenomena felt during an earthquake.

##### 3.1.2 *Learning Area: Asking questions*

The simulated experiences encourage visitors to ask questions and seek answers within the itinerary. On the basis of their knowledge, interests and experiences, visitors are prompted to put together a personalised itinerary. The basic idea is that the initial faked earthquake experience can trigger varying questions with specific and stimulating answers along the guided itinerary. After The Experiencing Area, accessing the Learning Area is therefore the result of a wish and a choice: the visitors themselves delineate together what earthquake aspect they wish to investigate and choose together what itinerary to follow amongst those available in the exhibition. Along the learning itineraries, there are areas explaining how earthquakes occur and illustrating myths and legends, as well as areas with simulations and practical activities where to explore the geological and physical mechanisms generating seismic events.

It is therefore possible to connect personal experiences with memories, recollections and traditions. Learning experiences are also carried out, using tools easily available at home or school, to understand the earthquakes fundamental scientific concepts, such as their origins and dynamics, instruments and recording devices, seismic characteristics of the individuals' areas, geophysics and volcanic notions to help in the understanding of this phenomenon.

The area dedicated to questions on the origins of the phenomenon is divided into three sections. The *Why* area contains scientific explanations compiled throughout the course of history by humankind in different world

regions as well as their beliefs and myths on seismic events. One therefore has the opportunity to challenge his or her beliefs and attitudes and seek answers forming personal accounts or visual representations that can explain, often through vision and imagination, the phenomenon just experienced. Summaries of personal answers and assembled explanations are added to the materials in the itinerary and are available to future visitors.

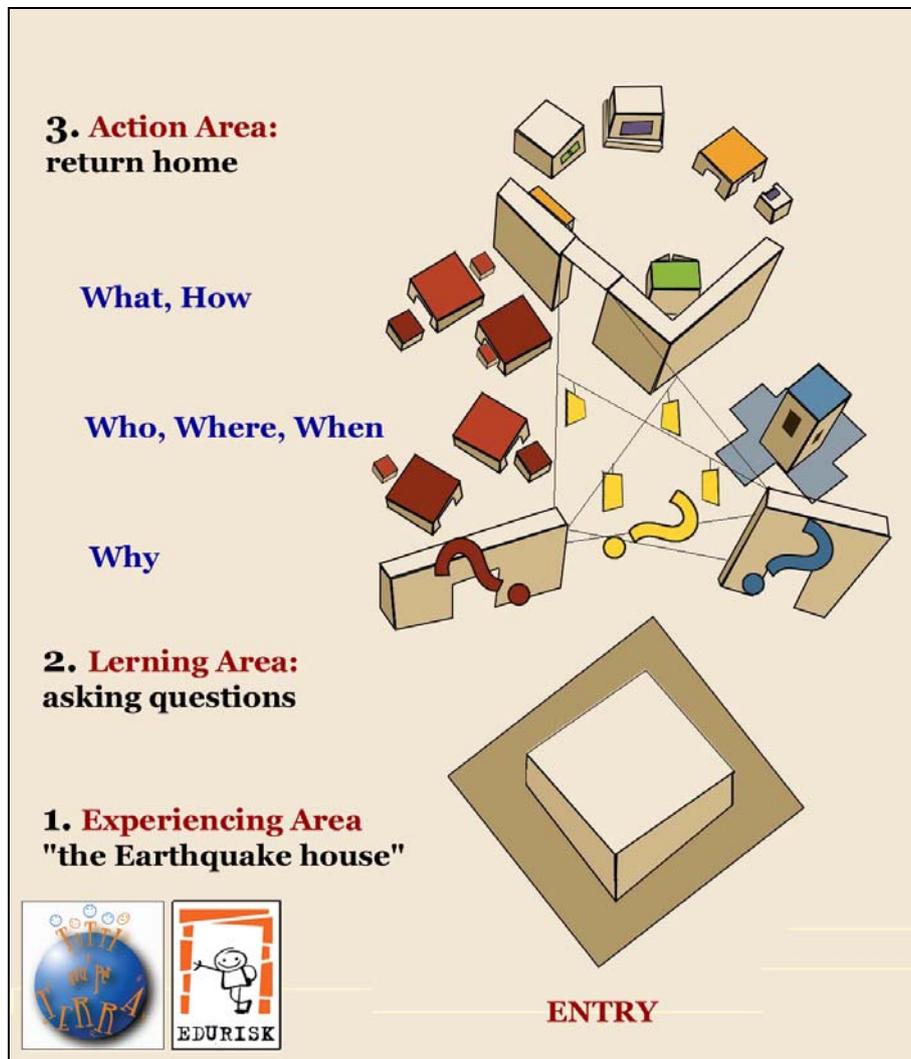


Figure 3: Simplified scheme of the interactive itinerary

The second section includes the *What* and *How* and follows the Science journey and its attempts to explain a phenomenon that until only the past century was still a mystery. An introduction to the Wegener theory is presented followed by the theory of plate tectonics and detailed analysis of specific earthquakes mechanisms. Attention is also given to monitoring methods, analyses and mitigating measures.

The participants have the opportunity to work together around each workstation putting together simulations and observing representations that will prompt them to ask further questions and seek appropriate answers.

This section like the previous one does not present precompiled answers but urge participants to formulate hypotheses and verify them to

A third section describes the *Who*, *Where* and *When* and includes a summary of the seismic knowledge collected in various places and verbal accounts presented as collections of images and descriptions of earthquakes and their related phenomena. In this section, it is also possible to learn about earthquake events occurred in the specific area where the exhibition is being held inside a smaller parallel exhibition, assembled in collaboration with schools and local institutions.

Participants' memories and experiences on earthquake events will be collected and added to the materials presented in the itinerary.

### 3.1.3 Action area: return home

The third area presents the best behaviours to follow both individually and collectively when reacting to an earthquake. As earthquakes cannot be predicted, preparedness to their possible occurrence and preventive measures to reduce their effects represent the best approach.

This principle is symbolically represented as a return home in the form of an additional domestic reproduction where it is possible to verify the lessons learnt in the previous areas through objects and simulations. The exhibition can therefore include a second house similar to the first one where each workstation controls a piece of furniture in the house.

## 3.2 Learning workshops

The visit, as anticipated, is organised in two moments: the interactive itinerary and the knowledge workshop. The latter constitutes of learning group activities, lasting approximately one hour in a dedicated area.

These activities cover various subjects in different formats: all the themes proposed in the interactive itinerary can be expanded in workshops following different designs. For instance:

- Practical workshops, where replica of the models in the itinerary can be built (earthquake machine, seismic station, volcanoes...) and their functioning is analysed with additional experiments on the topics under investigations.
- Practical workshops on earthquake-proof buildings.
- Reading and creative workshops (on the origins of myths, memories...)
- Body expression and visioning workshops
- Emotions workshops
- Playing workshops

## 4. CONCLUSIONS

The ultimate objective of projects aimed at environmental education is the modification of individual and group behaviours. This can be an ambitious objective, but it cannot be ignored when dealing with natural risks and their likely destructive effects. The epistemological distinction so well represented in English by the words *hazard* and *risk*, but not so clear in Italian with the words *pericolo* and *rischio*, suggests that risk is determined by man actions. Education about risk involves the acceptance of risk as part of every day's life. Knowledge of the vulnerability of the physical and built environment, acquired through experience, is the key to promote positive individual and collective attitudes and risk mitigation.

To conclude, "We all fall down":

- Isn't simply an earthquake knowledge itinerary, but is a discovery itinerary, to find meaning and improve attitudes. Its entertaining and stimulating activities generate curiosity and questions beyond the confining of the exhibition. Its design, in the form of a journey from experience to action through knowledge, depicts earthquakes as a phenomenon that is present, how they affect us, and teaches us what can be done effectively to be prepared.
- Isn't a single itinerary but a multitude of diverse and individual itineraries. It offers a learning experience, not a univocal learning itinerary, with a multitude of directions to follow one's interests and desires (where entertainment is conceived as diversion, an abandonment of the known route to explore further possibilities).
- Analyses topics using a hands-on approach, in itself vastly more efficacious than any oral explanation, and goes beyond it. Through the itinerary, hands are used to experiments and play, but the mind and soul are exercised too, and one is prompted to raise questions and seek answers, make connections, formulate hypothesis, as well investigate feelings and emotions in order to become responsible of one's actions and prepared when an earthquake occurs.
- challenges participants in their knowledge and curiosity and motivates them to achieve a more profound learning experience. The initial experience brings the participants to question themselves and seek personal answers, experiment solutions – in the centre is the individual not the theory.
- Further more, tests the participants' convictions and expectations in a group and not individually. Several elements in the itinerary stimulate the exchange of ideas and experiences, solutions and answers via the sharing of activities and plays. The educational benefit that derives from sharing experiences and communicating is augmented when participants become aware that an earthquake is a common phenomenon that must be understood and tackled together.

- Analyses topics from different perspectives and in different forms of interactions between the visitors and exhibits – such as games, experiments, scientific facts, legends, myths, reading activities, building activities...
- Is an open itinerary: the participants not only search for a meaning but are also invited to leave personal accounts, artefacts and suggestions. Further more, the itinerary is designed to generate afterthoughts both on a personal level, spurring on participants the curiosity to collect information and adapt suitable behaviours, and on a collective level, acting as a collection point for ideas and knowledge.

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