



## **Earthquake Drill using the Earthquake Early Warning System at an Elementary School**

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Japan frequently suffers from many kinds of disasters such as earthquakes, typhoons, floods, volcanic eruptions, and landslides. On average, we lose about 120 people a year due to natural hazards in this decade. Above all, earthquakes are noteworthy, since it may kill thousands of people in a moment like in Kobe in 1995. People know that we may have “a big one” some day as long as we live on this land and that what to do; retrofit houses, appliance heavy furniture to walls, add latches to kitchen cabinets, and prepare emergency packs. Yet most of them do not take the action, and result in the loss of many lives. It is only the victims that learn something from the earthquake, and it has never become the lore of the nations.

One of the most essential ways to reduce the damage is to educate the general public to be able to make the sound decision on what to do at the moment when an earthquake hits. This will require the knowledge of the backgrounds of the on-going phenomenon. The Ministry of Education, Culture, Sports, Science and Technology (MEXT), therefore, offered for public subscription to choose several model areas to adopt scientific education to the local elementary schools. This presentation is the report of a year and half courses that we had at the model elementary school in Tokyo Metropolitan Area.

The tectonic setting of this area is very complicated; there are the Pacific and Philippine Sea plates subducting beneath the North America and the Eurasia plates. The subduction of the Philippine Sea plate causes mega-thrust earthquakes such as the 1923 Kanto earthquake (M 7.9) making 105,000 fatalities. A magnitude 7 or greater earthquake beneath this area is recently evaluated to occur with a probability of 70 % in 30 years. This is of immediate concern for the devastating loss of life and property because the Tokyo urban region now has a population of 42 million and is the center of approximately 40 % of the nation's activities, which may cause great global economic repercussion.

We provide the school kids with the “World Seismicity Map” to let them realize that earthquake disasters take place unequally. Then we let the kids jump in front of the seismometer with projecting the real-time data to the wall. Grouped kids contest the largest amplitude by carefully considering how to jump high but nail the landing with their teammates. Their jumps are printed out via portable printer and compared with the real earthquake which occurred even 600km away but still huge when printed out in the same scale. Actually, a magnitude 7 earthquake recorded 600km away needs an A0 paper when scaled with a jump of 10 kids printed in an A4 paper. They've got to understand what to do not to be killed with the great big energy.

We also offer earthquake drills using the Earthquake Early Warning System (EEW System). An EEW System is officially introduced in 2007 by JMA (Japan Meteorological Agency) to issue prompt alerts to provide several to several ten seconds before S-wave arrives. When hearing the alarm, school kids think fast to find a place to protect themselves. It is not always when they are in their classrooms but in the chemical lab, music room which does not have any desks to protect them, or in the PE class. Then in the science class, we demonstrate how the EEW System works. A 8m long wave propagation device made with spindles connected with springs is used to visualize the P- and S-waves. In the presentation, we would like to show the paper materials and sufficient movies.