

School behavior in the 2011 off the Pacific coast of Tohoku Earthquake in the northern part of Miyagi Prefecture

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1. Introduction

The purpose of this study is to define what we should do in schools when attacked by strong ground motion. Mainly, inquiry of what schools should have prepared for earthquakes and what they should prepare at present, including viewpoints of school education under normal conditions and safety education, were investigated.

For these reasons, this survey was conducted in primary and lower secondary schools, located northern part of Miyagi Prefecture, which suffered from forceful ground motion in the 2011 off the Pacific coast of Tohoku Earthquake (hereafter 3.11eq).

2. Investigation

55 and 20 municipal primary and lower secondary schools were targets of the investigation, respectively. These schools are located in Osaki District, including in Osaki City, Wakuya Town, Misato Town, Shikama Town and Kami Town, of Miyagi Prefectural Board of Education. Almost all region of this district were recorded JMA's seismic intensity between five lower and six upper according to the estimated seismic intensity distribution by JMA(2011).

The questionnaire survey was carried out for all the principals in the Osaki District at the meeting of Principals' Association held on August 19, 2011. 75 sheets of ones were prepared, and 66 ones were submitted to us, as some principals were absent from the meeting that day. All 66 sheets were valid responses, and response rate was 100 percent.

The questionnaire surveys consist of 47 Multiple Choice Questions and 11 Short Answer Questions. It was mainly made up by following four categories;

1) Before 3.11eq

the situation of education for disaster prevention, and preparation of emergency supplies for post-disaster

2) The day of 3.11eq

school behaviors at the occurrence of the strong ground motion

3) After the 3.11eq

progresses until resuming classes at schools

4) Considerations in school education

through 3.11eq experiences, ideal education for an earthquake learning, and educational reviews to prevent disasters

3. The results of questionnaire surveys and its discussion

According to the survey, most characteristic results and its discussion are as bellow;

- BOUSAI ZUKIN, which is roughly safety hoods, and/or disaster-preventive helmets at schools, approximately 80 percent of them had not prepared them at all.

As the schools in Osaki District ever experienced strong ground motion by Iwate-Miyagi Nairiku Earthquake in 2008, it was naturally expected that most schools, especially primary schools, must have prepared BOUSAI ZUKIN and/or disaster-preventive helmets, which has been already furnished schools in Shizuoka and Kanagawa Prefectures. This result shows that those safety items need to be prepared for strong ground motion by sudden earthquakes at schools nationwide.

As the result of asking future involvements in Short Answer Questions, almost schools recognized the necessities of reviewing schemes for education for disaster prevention, and also their complementary safety education, including emergency evacuation practices as special activities. On the other hand, a quarter of them only acknowledge the necessity of enhancing earthquake education in a subject of RIKA, which is roughly a subject of natural science.

Several other characteristic results are as below;

- Approximately five percent of schools had never carried emergency evacuation practices for earthquake.

- The usage of school broadcasting equipment at schools immediately after the earthquake, approximately 90 percent of them could not use their appliances, including emergency broadcasting systems.

4. Conclusions

Many valuable findings, through school's experiences by 3.11eq, were provided. Remaining problems to be solved in this study will be proposed how countermeasures should be reflected on school education near future.

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We would like to express my appreciation for the principals of primary and lower secondary schools in Osaki District on carrying out this investigation.

Keywords: The 2011 off the Pacific coast of Tohoku Earthquake, The 2011 East Japan Earthquake Disaster, Primary School, Lower Secondary School, Miyagi Prefecture, Education for Earthquake Disaster Prevention

Investigation on the behavior of schools in Tochigi prefecture on the 2011 off the Pacific coast of Tohoku Earthquake

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1 Introduction

The 2011 off the Pacific Coast of Tohoku Earthquake (simply refer as The Tohoku Earthquake hereafter) occurred on 14:46 JST, when students and pupils were still in school at most schools. It is very important for future consideration on disaster prevention in schools to investigate and record the behavior of schools at the occurrence of the Tohoku Earthquake. The committee of school education, Seismological Society of Japan carried out the investigation on the behavior of school when the Tohoku Earthquake occurred in several regions in east Japan. We report here about the result of the investigation in Tochigi prefecture.

2 Outline of the Investigation

We have produced a questionnaire that consists of about 50 questions in order to investigate school behavior on the earthquake. In Tochigi prefecture, since the Board of education supported us, we have sent questionnaire to all public schools from elementary school to high school and obtained answers from 89 % of them, that is 567 schools. The survey carried out from September to October, 2011.

3 Results of the Investigation in Tochigi Prefecture

When the Tohoku Earthquake occurred, 60% of schools lost the electric supply and 18% of schools have damaged seriously. About half of schools failed to make contact to the local board of education which governs the school. Therefore teachers must make decision by themselves in most schools without any suggestions from the local board.

In 86% of schools students have been evacuated from buildings to school yard. The evacuation has performed within 30 minutes in most schools.

95% of schools changed the time tables by the occurrence of the earthquake and let students go home early. They waited parents to come to take their children and did not release students alone in most schools.

4 Problems on the plan of disaster prevention in school

All schools must have the disaster prevention plan. However, the occurrence of the Tohoku Earthquake made clear some problems on the disaster prevention plan of schools.

First of all, although it is planned to evacuate students from buildings when large earthquake occur, there is no plan after evacuation to school yard in most schools. It means that most plans didn't assume what happens after large earthquake accurately.

Second, there is no plan about the method to go back students to home when large disaster happened in more than 60% of schools.

5 Discussions

We have many earthquakes in Japan and have experienced many disasters by earthquakes historically. Nevertheless, preventive measures against large earthquakes are generally considered not enough in Japan except for some limited areas.

Through our investigation it makes clear that the preventive measures in schools also aren't enough. We must discuss about the evacuation from buildings, method to let go back students home, the role of decision making about release students from school, and many other matters. Most important policy is to improve individual ability to act correctly against earthquake disaster. It is necessary to include education for disaster prevention into school curriculum much more than present situation.

Keywords: Off the Pacific Coast of Tohoku Earthquake, disaster prevention in schools against earthquake, Tochigi prefecture, behavior of schools in huge earthquake

Development and Practice of Venus,Sun,Moon Live Telescope as Teaching Material

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In junior high school science, changes in sunspots, changes in the shape of the learning phase of the moon and Venus. However, these observations are difficult with the naked eye, binoculars or a telescope is needed. The time allocation and observation, there are constraints such as safety. In school, astronomical observations, "continues" It is difficult to do.

Imaged through a telescope, you can deliver real-time images on the monitor, you can continue to observe and think.

The school set up, implement, it is necessary for recovery from, "one history SkyPod" (Vixen) was used. Telescope used to observe Venus "SE-120" (Kenko) it. The digital imaging eyepiece "NexImage" (Celestron) was used. "Barrow Lens 2" (Vixen) was extended to 1200mm focal length. "Zoom eyepiece 8 ~ 24" (Celestron), "flip mirror" (Vixen), "Motor Focuser" was used. Indoor reception of images, the telescope can be controlled.

Sunspots, the observation of the moon "miniBorg 50" (Tommy Tech) was used. 50mm diameter, 250mm focal length is. "Pow-ermate 5-fold" (the Review) was extended by 1250mm focal length. The digital SLR camera imaging "EosKissX4" (Cannon) was used. Connected to a PC via a USB cable, the software comes with "EosUtility" in the display on the monitor.

Is the practice in 2010 and losing the school by 3.11 earthquake, there were unexpected problems. Delivery is difficult. Still, two months after the May 15 earthquake could resume imaging of Venus. Temporary prefabricated school building was completed, although a small number of solar (sunspot) could be made to deliver. Want to continue.

Keywords: ScienceEducation, LiveStreamTelescope, JuniorHighSchool, Venus, Sun, Moon

A significance in education of Earth science using animations of crustal deformation in Japan

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After 3.11 earthquake in Tohoku, Japanese people realize that they do not know much about crustal deformation in Japan continuously occurring and they do not know how to prepare for big earthquakes. One of the reasons of this problem is the fact that the crustal deformations in Japan are not taught properly in elementary schools. If these things are properly taught, the preparation for big earthquakes would be much easier to do in the near future.

In this study, we created 3D animation for Japanese crustal deformation using GPS data obtained by Geographical Survey Institute of Japan(GSI), and make it easier for school children to understand the Japanese crustal motions. The GSI already had created 3D animation of Japan for only limited time and area, whereas we can make animations for any given time and area of available GPS data. The newly created animations helped to understand the detailed crustal deformation in Japan.

Using these animation in elementary school education, we hope people change their attitude toward the nature, especially toward the earthquakes, and fewer people lose thier lives in big earthquakes like 3.11 tohoku earthquake.

Keywords: GPS, crustal deformation, education, animation

G03-P01

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Development of the prefabricated tsunami laboratory equipment for the disaster education at the elementary school

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We developed a simple water tank for tsunami experiment using PVC plates with plastic sheeting for agriculture (4.5m long, 30cm high, 30cm wide). It was filled by fresh water. If we pull up the other end of the plastic sheet to resemble seafloor uplift due to the earthquake, the water was pushed up to propagate, tsunami wave run up a slope and splash out the water tank. Our prefabricated tsunami laboratory equipment is a good for the disaster education at the elementary school.

Keywords: prefabricated tsunami laboratory equipment, development and practice, disaster education, elementary school, huge tsunami, great earthquake



Proposed materials for primary school Earth and Planetary Science based on the new national curricula

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The Ministry of Education, Culture, Sports, Science and Technology in Japan announced of the renewal of national curricula standards for primary schools on 28 March, 2008. The 2008 curricula had been applied to primary schools since 2011 school year introducing the new six types of RIKA's textbooks, RIKA is roughly a subject of natural science, for each grade by six publishers.

First, we have investigated by studying the experiments, exercises, and practices related with the earth and planetary sciences in each textbook. Secondly, we tried to modify, develop and/or create experiments, exercises and practices based on the philosophy of Kitchen Earth and Planetary Sciences. Thirdly, we have used them at classes in order to verify the efficacy of the new one in the school education. Finally, we made the recipes how to make and use new one.

Six types of RIKA's textbooks published by six publishers which are made under the 2008 curriculum have been used since April 2011 for primary school students were used in the study. As a result of analysis in these textbooks, we found that some experiments, exercises, and practices are difficult to carry out not only for students but also the average teachers at primary schools. One of the reasons is some experiments need to use specific experimental materials and/or experimental equipments which have not usually hold at primary schools. Next reason is some experiments require high skills and/or technique which the average primary school teachers do not have. Therefore, we noticed that we need to modify and/or develop some experiments from current/recent version in the textbooks.

We collected many raw materials such as tea strainers to be used as sieves, dried wheat gluten as a substitute for volcanic ash, jellies for use in place of the flimsy ground, and so forth. We obtained all these at 100yen shops (one dollar shops), supermarkets, and DIY stores in order to modify, develop and/or create experiments, exercises and practices. Subsequently, we have had several classes to use our proposing materials in order to verify whether the average primary school teachers and/or students will be able to use or not. When we found new problems from the proposed materials, we modified using them trial and error method. We made the recipes of how to make and use the proposed materials before and during the RIKA's classes after we finished the modified new one.

Nemoto et al. (2011) reported the results of case study for the first grade students in lower secondary schools using hard and soft jelly are used in order to understand the occurrence of different ground motion on hard and soft grounds with the same input motion, respectively. We modified the experimental materials and the recipe for lower secondary schools to primary school teachers and students after the class. Using the modified materials and the recipe by teachers for the sixth grade students classes at primary schools, the students could understand the difference in damage that occurred between hard and soft grounds.

In this presentation, we will report the results in detail and clarify remaining problems in order to further develop the curriculum in future.

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Keywords: new national standard curriculum, primary school, RIKA, natural science, earth and planetary science, materials