

Chapter 14

The Learner Becomes the Teacher

Field of Expertise: Cognitive Science

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Summary

The Great East Japan Earthquake revealed the strength of human cognitive bias that tends to underestimate risk. In order to promote accurate decision-making and rapid evacuation in the event of a disaster, it is essential to provide disaster risk reduction education in advance. However, the who, what, and how of such education is still in a state of trial and error. We started a project in which students who did not experience the disaster learn about it in the affected areas and pass their knowledge on to those in the next generation and in other regions.

Keywords: disaster information, evacuation behavior, cognitive bias, disaster learning, disaster risk reduction education, disaster transmission

Introduction

In order to protect our lives in the event of a disaster, we must make accurate decisions and take prompt action to evacuate. However, it is clear from past disasters that this is not always easy. What do we need to learn in order to prepare for disasters? What kind of disaster risk reduction education is necessary?

1: Problems Revealed by the Great East Japan Earthquake

What happened?

At 14:46 on March 11, 2011, a massive magnitude 9 earthquake struck off the Pacific coast of the Tohoku region. This was followed by a huge tsunami that hit the Pacific coast of the Tohoku and Kanto regions, killing many people. It is estimated that more than 18,000 people were killed or are missing, 90% of which were caused by the tsunami.

The reality of the damage

The shaking caused by the earthquake was bigger than anything the residents of the affected areas had ever experienced before. Despite this, the percentage of people who evacuated

quickly was not high. According to a joint survey conducted by the Cabinet Office, Fire and Disaster Management Agency, and the Japan Meteorological Agency immediately after the earthquake, 57% of 870 disaster victims in the coastal areas of the three affected prefectures (Iwate, Miyagi, and Fukushima) responded that they evacuated immediately after the tremors stopped, while the remaining 43% did not take prompt evacuation action.

One of the reasons why it is difficult to evacuate quickly during a disaster is the existence of human cognitive bias. Cognitive bias refers to the distortions and biases that occur when we perceive and judge information. There are various types of cognitive biases, but one example of a cognitive bias that is particularly likely to occur in times of disaster is normality bias. This bias is a cognitive tendency to interpret the situation within the normal range, instead of perceiving abnormalities during a disaster as abnormalities. It has also been pointed out that optimism bias, which is the tendency to think that no disaster will happen to you, as well as majority synching bias, which is the tendency to act in the same way as others around you (Muramoto, 2017).

2: Paradigms Destroyed by the Earthquake

Conventional wisdom and necessary responses

It was known even before the Great East Japan Earthquake that seeing and hearing information that calls for evacuation at the time of disaster does not necessarily lead to evacuation. Table 14-1 shows the rate of evacuation and rate of disaster information recognition when tsunami warnings were issued before the Great East Japan Earthquake. It does not mean that the information did not reach the residents. It means they did not evacuate even though they heard and saw the information.

Table 14-1. Evacuation rate and information recognition rate when tsunami warnings were issued before the Great East Japan Earthquake

	Tokachi Earthquake (2003)	Kuril Islands Earthquake (2006)	Kuril Islands Earthquake (2007)	Chile Earthquake (2010)
Evacuation Rate	55.8%	46.7%	31.8%	37.5%
Percentage of people who saw and heard tsunami warnings	86.8%	82.2%	81.2%	98.4%
Percentage of people who heard and saw evacuation orders	81.0%	78.3%	65.3%	84.9%

The Great East Japan Earthquake is often referred to as being “unexpected”. In addition to the scale of the disaster, the robustness of human cognitive biases was also beyond expectation. After the Great East Japan Earthquake, disseminating information at the time of disaster in a way

that overcomes such cognitive biases began to be discussed. As a result, in 2013, the wording of tsunami warnings was revised, and in 2017, information on heavy rain and flooding was revised. Even now, discussions are underway to consolidate evacuation advisories and orders.

However, there is a limit to the ingenuity of disaster information alone. Despite the various innovations and revisions, the characteristics of human evacuation behavior remain the same, and delays in evacuation due to cognitive bias are often pointed out. For example, delays in evacuation became an issue during the torrential rains in western Japan in 2018.

There is no way to escape the curse of cognitive bias. Rather, we should learn about biases and think about how we can live with them. In order to do so, we must share awareness of the existence of bias, and then build a disaster risk reduction education system that will enable people to act appropriately in times of disaster.

3: A New Approach

An obstacle to passing on the memories and lessons of disasters is the "lack of reality" and "sense of otherness" on the part of the story recipients. This is especially problematic when trying to pass on memories and lessons from disasters to people who live in areas that have not experienced them, or to the next generation of children who have not directly experienced them.

In order to experience the reality of a disaster, for example, it is effective to use virtual reality (VR) to experience a disaster simulation, but above all, it is important to actually visit the disaster site and feel the atmosphere firsthand.

In addition, there is a big difference in how people perceive and understand what they learn, depending on whether or not they feel that what they are learning is relevant to them. In other words, the key to disaster reduction education is to make people think of disaster reduction as something that affects them personally, something that could happen to them in the future, rather than as someone else's problem.

4: Achievements and the Future

A new approach to disaster science

Since 2015, the authors have been conducting educational activities to have students visit the areas affected by the Great East Japan Earthquake, listen to storytellers, visit cenotaphs and archives, and interact with disaster victims to discover issues related to reconstruction and explore ways to solve them. Since most of the students have not experienced the disaster directly, practical training in the disaster area is intended to make them feel the reality of the disaster. It also gives them an opportunity to think about the disaster as something that affects them by letting them explore how to solve the problems by themselves.

From the reports submitted at the end of the seminar, it is clear that the students have gained new insights and new perspectives on learning. Common answers include the significance of independent and active learning and collaboration with others, the importance of looking at things from multiple perspectives, and the value of visiting and experiencing affected areas. There were also many comments about the necessity and determination to pass on the disaster and lessons learned to other regions and the next generation.

In order to fulfill the wishes of the students, we have started to further develop and expand the seminar in 2019. Specifically, we started a practical research project in which students themselves plan and organize events to convey what they have learned about the earthquake to

elementary, junior high, and high school students in other regions (Figure 14-1). This initiative aims to develop an effective disaster transmission and disaster risk reduction education system through learners creating educational events from their perspectives, and accumulating these types of examples.

Learning in Disaster-stricken Areas



Disaster Prevention Education

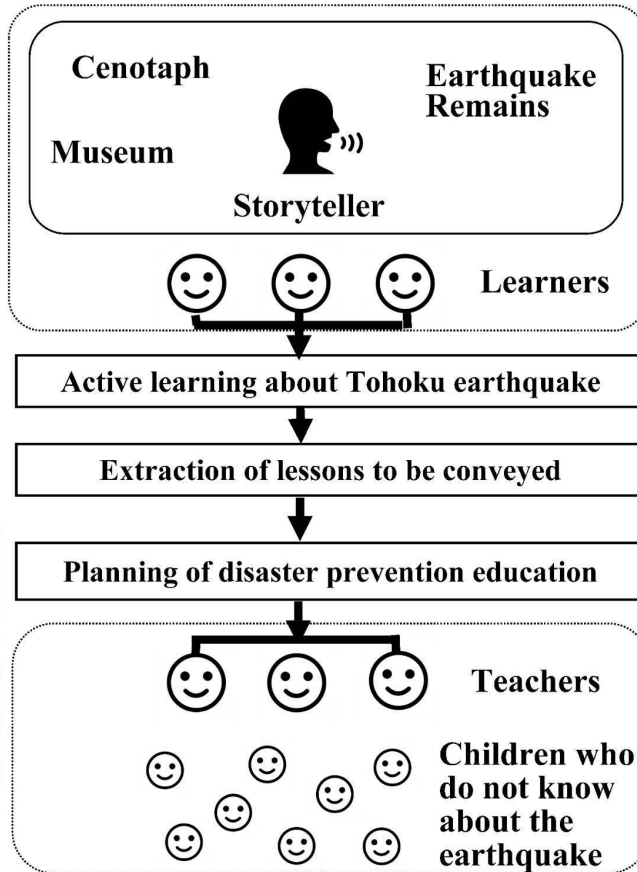


Figure 14-1. Disaster risk reduction education system where learners become the teachers

In 2019, university students designed three types of disaster risk reduction education classes for junior high school students, and implemented them at junior high schools in Tokyo. The class for first-year junior high school students was called "Let's learn about emergency kits while having fun!", first year junior high school students were divided into groups of 5-6 and asked to collect items to keep in their disaster prevention backpacks and compete for points based on their importance. The game was a fun way to think about what kind of disaster prevention goods are available and what measures are necessary in case of disaster. In the "Preparing for future disasters based on the lessons from the Great East Japan Earthquake " class for second year students, they learned about the problems that occurred during the Great East Japan Earthquake and discussed how to prepare for future earthquakes based on the estimated damage of an earthquake occurring directly below the Tokyo metropolitan area. One of the features of the class was that it focused on disasters specific to the Tokyo area, making the students more aware of disasters as a problem that could affect them. For third year junior high school students, "Learning psychology in preparation for disasters!" was a class designed to learn and think together about what kind of psychological states people would be in when a disaster occurs and what they should do to protect themselves in times of real danger. In the class, a quiz was given to show that cognitive bias can occur in our daily lives. The goal of the class was to help students learn about

cognitive bias as a personal matter, and to develop a mindset that would enable them to shake off that bias in case of emergency.

Through activities like this, learners see disasters as something that can affect them personally, and through this, their desire to pass on what they learn grows, leading to them taking action to do so. We can see the change within individuals, from knowing nothing about disasters, to actively thinking about what it is they need to know, and sharing what they learn with others as educational content. This cannot be achieved through teacher- or expert-led disaster education. This kind of learning and education, in which the learner becomes the teacher, is truly a continuous learning process for society as a whole. I hope that such a system of disaster transmission and education will be recognized and expanded in the future.

Conclusion - from the author

The attempt to create a circle of learning throughout society about the memories and lessons of disasters has only just begun. We need to learn about disasters as though they are personal matters. We need to communicate the existence of cognitive bias. Learners need to communicate what they have learned with others. I sincerely hope that the younger generation of junior and senior high school students will carry on and develop these efforts.

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