

Hazard Literacy Center

Hazard Literacy Education Program

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Are All Earthquake Disasters the Same?



1. Program Overview

This program helps students understand earthquakes not simply as natural phenomena, but as hazards whose impacts are shaped by disaster vulnerability. Students explore how earthquake impacts can vary depending on natural and social conditions, such as building structures and seismic resistance, regional characteristics, and living environments. Students compare earthquake cases from South Korea and other countries to understand why impacts differ across people and places. Through a model experiment comparing basic and earthquake-resistant structures, they investigate how structural characteristics can influence earthquake damage. They also consider people who may be more affected by earthquakes and explore preventive measures and practical actions to reduce earthquake risks. Through these activities, students learn that earthquake impacts are influenced not only by the magnitude of an earthquake, but also by the interaction of building structures, living environments, and social conditions. The program aims to strengthen students' understanding of disaster vulnerability and their capacity to take action to protect themselves and their communities.

Grade Level	Upper Elementary Students	Instructional Methods	Lecture, Inquiry, and Discussion
Learning Environment	Classroom suitable for group activities	Duration	One 40-minute lesson
Required Materials	Building structure comparison experiment kit (earthquake-resistant structure experiment), worksheets		

2. Learning Objectives (Hazard Literacy Framework)

① Students will be able to examine earthquake cases in South Korea and other countries and analyze data from the Pohang earthquake to understand how earthquake impacts can vary depending on different conditions.
② Students will be able to explore how shaking and potential damage can vary depending on building structures through a model experiment comparing different building structures.
③ Students will be able to explain how earthquake-resistant design can help reduce earthquake damage and identify buildings in their surroundings that may require seismic retrofitting.
④ Students will be able to understand disaster vulnerability by considering people and living environments that may be more affected by earthquakes and propose preventive measures and practical actions.

Learning Objectives	Knowledge & Understanding		Reasoning & Skills					Values & Attitudes			Psychology & Emotion			Behavioral & Practical Engagement		
	A1	A2	B1	B2	B3	B4	B5	C1	C2	C3	D1	D2	D3	E1	E2	E3
Objective ①	O	O		O												
Objective ②				O	O											
Objective ③		O													O	O
Objective ④		O								O					O	O

3. Key Concepts

- Earthquakes and Their Global Distribution
- Hypocenter and Epicenter
- Spatial and Environmental Differences in Earthquake Impacts
- Building Structures and Earthquake-Resistant Design
- Disaster Vulnerability and Living Environments
- Earthquake Response and Community Resilience

4. Program Sequence

	Activity Sequence
Problem Recognition	-Review recent earthquake news from South Korea and ask, “Do all earthquak es have the same impacts?” to encourage students to recognize that earthquake impacts can vary. -Discuss different factors that can influence earthquake damage.
Understanding the Hazard	-Explore the basic concepts of earthquakes, including the hypocenter and epicenter.-Compare earthquake cases in Japan, Türkiye, and Pohang, South Korea, to understand how earthquake impacts can vary depending on different conditions.
Exploring and Understanding Disaster Vulnerability	-Conduct a model experiment comparing different building structures to examine differences in shaking and potential damage. -Examine earthquake-resistant design cases from Lotte World Tower and other buildings in South Korea to understand how earthquake-resistant design can help reduce earthquake damage. -Explore the school environment and discuss how building structures and living environments may influence earthquake damage.
Exploring Responses and Practical Actions	-Understand disaster vulnerability by considering people and living environments that may be more affected by earthquakes. -Propose preventive measures and practical actions that individuals, families, communities, and the government can take to reduce earthquake risks.

5. Theoretical Background and Activity Design for Disaster Education

Earthquakes are natural phenomena caused by sudden movements within the Earth that generate seismic waves and ground shaking. However, earthquake impacts are influenced not only by earthquake magnitude but also by building structures and seismic resistance, living environments, and regional and social conditions. Earthquake cases in South Korea and other countries show that earthquake magnitude does not necessarily correspond to the level of human and economic losses.

These differences are closely related to disaster vulnerability. Vulnerability is shaped by environmental, structural, social, and economic conditions, which can lead to differences in impacts and recovery across people and places exposed to earthquakes (Füssel, 2006; Kee, 2022).

Understanding earthquakes therefore requires considering not only the characteristics of the hazard itself, but also the conditions that can increase or reduce its impacts. Based on this perspective, the program follows four stages: Problem Recognition, Understanding the Hazard, Exploring and Understanding Disaster Vulnerability, and Exploring Responses and Practical Actions. Students compare earthquake cases, conduct a model experiment comparing basic and reinforced truss structures (Figure 1), examine examples of earthquake-resistant design, and explore buildings that may require seismic retrofitting. They also consider people and living environments that may be more affected by earthquakes and propose preventive measures and practical actions. Through these activities, students develop an understanding of disaster vulnerability and explore ways to reduce earthquake risks.

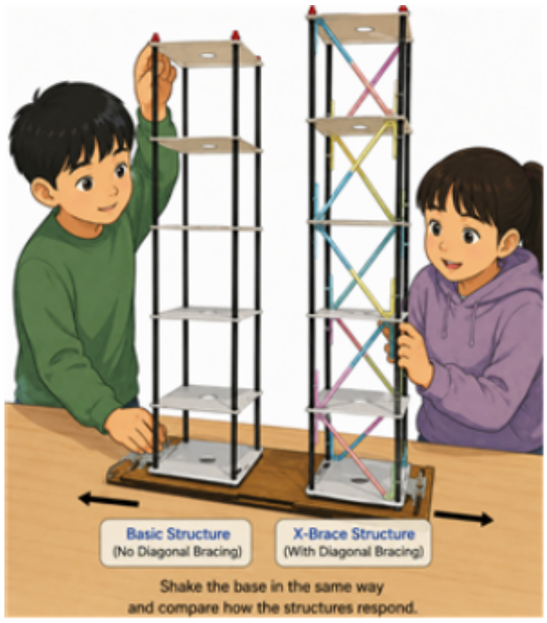


Figure 1. Comparison of Basic and Reinforced Truss Structures

6. Instructional Considerations

Guide students to understand that earthquake impacts are influenced not only by earthquake magnitude, but also by building structures, earthquake-resistant design, and living environments. During the building structure comparison experiment, encourage students to use evidence from their observations to explain how building structures and earthquake-resistant design can help reduce earthquake damage. Use examples of actual buildings to help students understand the need for seismic retrofitting. Encourage students to consider people and living environments that may be more affected by earthquakes and explore how preventive measures and practical actions for reducing earthquake risks can be applied in their daily lives.

7. References

- Füssel, H.-M. (2007). Vulnerability: A generally applicable conceptual framework for climate change research. Global Environmental Change, 17(2), 155–167.
- Kee, K. D. (2022). Natural hazards as the subject of geography education. The Journal of the Korean Association of Geographic and Environmental Education, 30(1), 105–122. https://doi.org/10.17279/jkagee.2022.30.1.105

	Are All Earthquake Disasters the Same?
What Will We Learn?	① Students will be able to examine earthquake cases in South Korea and other countries and analyze data from the Pohang earthquake to understand how earthquake impacts can vary depending on different conditions. ② Students will be able to explore how shaking and potential damage can vary depending on building structures through a model experiment comparing different building structures. ③ Students will be able to explain how earthquake-resistant design can help reduce earthquake damage and identify buildings in their surroundings that may require seismic retrofitting. ④ Students will be able to understand disaster vulnerability by considering people and living environments that may be more affected by earthquakes and propose preventive measures and practical actions.

1 Let's Think

- Look at earthquake cases from different parts of the world and think about the questions below.

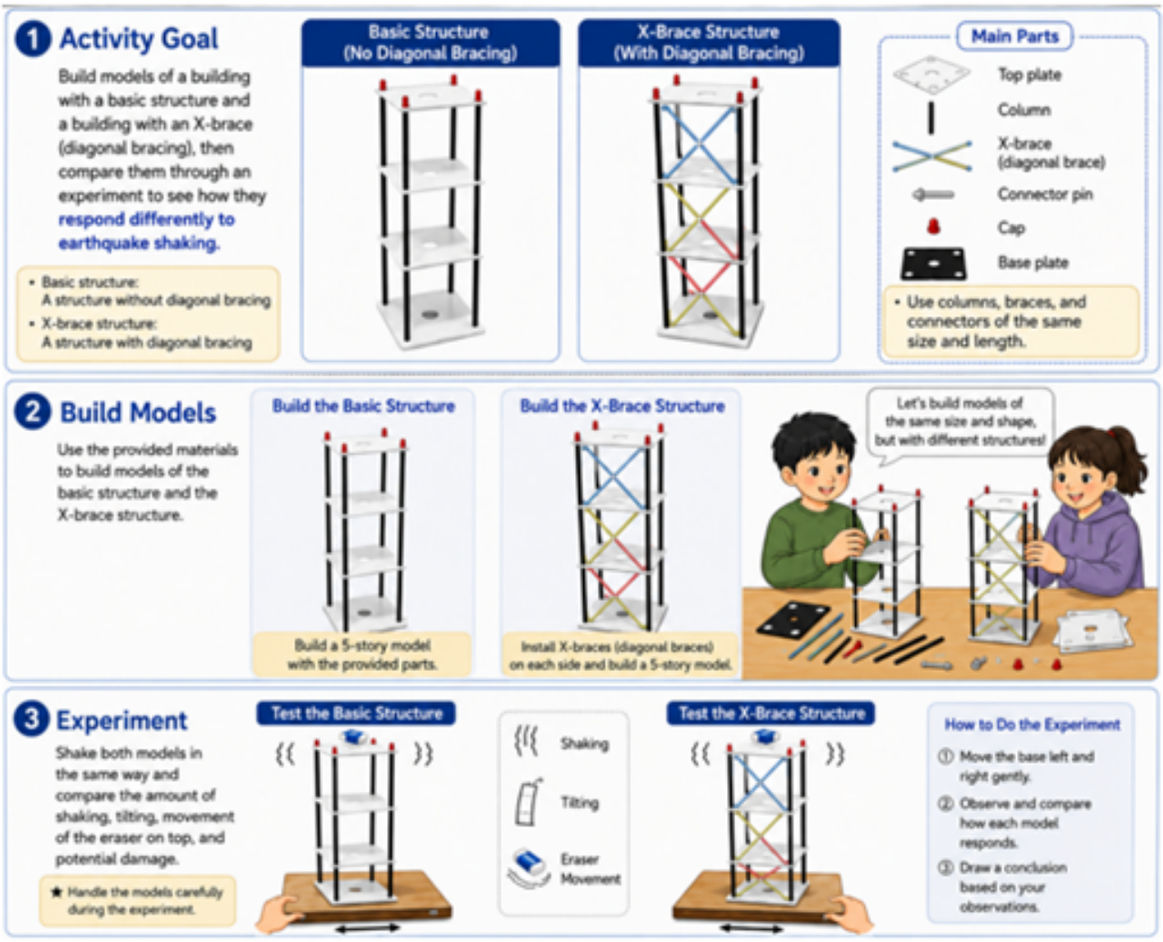
1) Compare the earthquake cases in Japan, Türkiye, and Pohang, South Korea.

	Japan (2011)	Türkiye (2023)	Pohang, South Korea (2017)
Magnitude (M)			
Human Impact			
Economic Impact			

2) What factors do you think can cause earthquake impacts to vary?

2 Which Building Structure Is Safer?

- Conduct an experiment to explore how building safety can vary depending on building structure.



1) Shake the basic structure and the earthquake-resistant structure in the same way. Compare the shaking of the building, tilting of the building, movement of the eraser, and potential damage, and record your observations below.

Comparison Item	Basic Structure	Earthquake-Resistant Structure
Building Shaking	☐ Large ☐ Moderate ☐ Small	☐ Large ☐ Moderate ☐ Small
Building Tilting	☐ Large ☐ Moderate ☐ Small	☐ Large ☐ Moderate ☐ Small
Movement of the Eraser	☐ Large ☐ Moderate ☐ Small	☐ Large ☐ Moderate ☐ Small
Potential Damage	☐ Large ☐ Moderate ☐ Small	☐ Large ☐ Moderate ☐ Small

2) What differences did you notice when comparing the basic structure and the earthquake-resistant structure?

3) How might these differences help reduce earthquake damage?

- Earthquake-resistant design is also used in important buildings in South Korea.



1) Lotte World Tower uses earthquake-resistant design. What types of earthquake-resistant design do you think are used to prepare the building for earthquakes?



2) Look at different buildings in your surroundings and write down a building that you think may need seismic retrofitting.

4 Let's Review

- Even during the same earthquake, the level of impact can vary depending on place, time, and living environment.

  1) Think of two people who may be more affected by earthquakes and explain why they may be more affected.

① _____

Reason:

② _____

Reason:

2) What efforts are needed to help people who may be more affected by earthquakes stay safe?

① What can you do?

② What can people around you (family, friends, teachers, and neighbors) do to help?

③ What can the local community do to help?

④ What can the government do to help?