

Hazard Literacy Center

Hazard Literacy Education Program

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Why Does the City Get Hotter as We Use More Air Conditioning? Saving the Earth Together



1. Program Overview

This participation-based hazard literacy program builds on the scientific principles of urban heat islands and heat waves learned in the previous theme and is designed to help students plan and carry out practical responses to heat waves in daily life. Heat waves are disasters directly related not only to individual health but also to community safety, while urban energy consumption and everyday lifestyles can increase or reduce their impacts. The program therefore allows students to apply scientific knowledge to real-life problems and explore practical solutions for schools and homes.

Centered on the question, “What can we do to reduce the impacts of heat waves?”, students examine energy use and everyday habits at school and at home. Based on their findings, they select practical actions such as maintaining an appropriate cooling temperature, closing doors and windows while air conditioners are running, turning off unnecessary lights and electronic devices, holding an Earth Hour activity in the classroom, and using public transportation. Using PBL (Project-Based Learning), students identify problems themselves, design solutions, and develop specific goals and action plans for a group heat-wave response campaign.

The campaign continues for one week rather than ending as a one-time activity. Students record their actions and reflections each day and share difficulties and possible improvements with group members. They then present the campaign results and connect problems that cannot be solved through individual effort alone to solutions involving school facilities, institutions, and the local community. Students also examine how the ability to respond to heat waves may differ depending on age, health, economic circumstances, and living conditions. Through this process, they explore heat-wave response as a shared community task that requires sustained participation while respecting different circumstances. The program is directly connected to the 2022 Revised National Curriculum achievement standards [9과22-01] and [9과22-02].

Grade Level	Grades 6–9	Instructional Methods	Project-Based Learning (PBL)
Learning Environment	Science Lab	Duration	90 minutes (45 minutes × 2 class periods)
Required Materials	Worksheet, textbook, laptop, writing materials		

2. Learning Objectives (Hazards Literacy Framework)

① Scientifically understand the causes of heat waves and urban heat islands and explain how people's lifestyles and energy use affect the urban environment.

② Explore practical heat-wave response and energy-saving measures for schools and homes, and plan and carry out a group campaign based on scientific evidence.

③ Reflect on the campaign results, understand that heat-wave response is a community issue requiring action by individuals, schools, and local communities, and develop an attitude toward practicing sustainable living.

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

3. Key Concpets

· Heat Waves and Urban Heat Islands

· Heat Absorption and Release

· Energy Use and Electricity Consumption

· Principles of Air-Conditioning Cooling (Moving Indoor Heat Outdoors)

· Climate Disaster Response and Sustainable Community Participationand Action

4. Program Sequence

		Learning Activities
Lesson 1	Introduction	·Ask: "Air conditioners keep us cool, so why does the city get hotter?" ·Watch a news video on heat waves and urban heat islands (double-dome phenomenon) https://youtu.be/bTATYWYKEJU?si=8RmCeZsj_27Ym1hU ·Share students' personal experiences
	Inquiry 1	·Understand urban heat islands and how air-conditioner use affects the urban environment · Identify examples of energy waste in school life
	Inquiry 2	·Select a group heat-wave response campaign topic ·Set campaign goals and develop an action plan
	Inquiry 3	·Carry out the group campaign ·Record actions, difficulties, and possible improvements
Lesson 2	Conclusion	·Present and reflect on campaign progress ·Discuss improvements at the school and community levels

5. Theoretical Background and Activity Design for Disaster Education

Heat waves are among the most frequent climate disasters in Korea, and their impacts are increasing as climate change and urbanization progress together. In cities, artificial surfaces such as asphalt and concrete absorb solar energy during the day and continue to release heat at night, causing temperatures to remain higher than in surrounding areas. Heat released from outdoor air-conditioning units, vehicles, and buildings can also further worsen urban thermal conditions.

However, responding to heat waves is not simply a matter of reducing air-conditioner use. Air conditioners are essential cooling devices that protect people's health and lives during extreme heat, particularly for people vulnerable to heat waves. Students therefore need to consider ways to reduce unnecessary energy consumption while maintaining appropriate cooling for health and safety, and to explore practical solutions that can be implemented at school and in the local community.

Based on these ideas, the program applies PBL (Project-Based Learning). Students investigate heat-wave and energy-consumption issues in their school lives and design a group heat-wave response campaign. They then carry out the campaign for one week, record and analyze the results, and reflect on difficulties and possible improvements. Through these activities, students apply scientific knowledge to real-life problem solving and gain experience taking action as members of a community.

6. Instructional Considerations

Students may understand heat waves simply as "hot summer weather" or explain urban heat islands through a single cause, such as "cities get hotter because people use air conditioners too much." Teachers should therefore explain that urban heat islands result from the combined effects of various factors, including artificial surfaces such as asphalt and concrete, lack of green space, dense buildings, and human energy use. Teachers should also clearly explain that air conditioners are important devices for protecting health and life during heat waves so that students do not reach the simplistic conclusion that "air-conditioner use should always be reduced." Appropriate cooling during heat waves is an essential safety measure, especially for people vulnerable to extreme heat and those at high risk of heat-related illness.

In the PBL activity, students should be encouraged to explore practical solutions for school and home rather than simply following answers provided by the teacher, and to explain the scientific basis for their choices. They should also understand that not everyone can take the same actions. Children, older adults, people with disabilities, and people with chronic illnesses may require sufficient cooling, while economic conditions and living environments may limit the range of actions available. Students should therefore be guided to respect different situations and perspectives and to find actions that are feasible within each person's circumstances rather than simply evaluating or comparing individual efforts.

The campaign should not focus only on whether students completed each action. Teachers should guide students to explain scientifically why particular actions can contribute to heat-wave response and energy conservation. Students should also share difficulties and limitations encountered during the campaign and connect problems that cannot be solved through individual effort alone to community-level solutions such as improving school facilities, local policies, and urban environments. Through this process, students can understand that responding to heat waves is not a problem to be solved through individual sacrifice, but a shared task requiring sustained participation from all members of society.

7. References

- Ministry of Education. (2022). 2022 Revised National Science Curriculum.
- YTN Science. Hot Urban Heat Islands: How Can They Be Reduced?
- Korea Foundation for the Advancement of Science and Creativity. [Collaborative Inquiry] Advanced Inquiry – Why Do Urban Heat Islands Occur? Find the Causes of the Heat Island Effect and Design and Analyze an Investigation by Controlling Variables.
- Intergovernmental Panel on Climate Change. (2023). Climate Change 2023: Synthesis Report. IPCC.
- UNESCO. (2020). Education for Sustainable Development: A Roadmap.
- World Health Organization. (2021). WHO Guidance for Climate Resilient and Environmentally Sustainable Health Care Facilities. WHO.

THEME 05

Why Does the City Get Hotter the More We Use Air Conditioners?

Saving Our Planet Together — Heat-Wave Response Campaign Worksheet

Theme	Heat Waves, Urban Heat Islands, and What We Can Do
What Will We Learn?	① Explain the causes of heat waves and urban heat islands scientifically. ② Plan and carry out a heat-wave response campaign that can be practiced at school and at home. ③ Reflect on the campaign and understand that responding to heat waves is a community issue.

1 Let's Think!

"Air conditioners keep us cool, so why does the city get hotter?"

- Think about the question above and write down what you think the reason is.

- Summarize how heat waves affect our daily lives.

2 Look at Energy Use in Our School

Find examples of energy waste in our school.

- ☐ Doors are left open while the air conditioner is running.
- ☐ Lights are left on in empty classrooms.
- ☐ Electronic devices are left on.
- ☐ Direct sunlight enters the classroom.
- ☐ Other : _____

3 Plan a Group Campaign

Campaign Title _____

Campaign Goal _____

Actions

_____

_____

Roles

Name	Role

Expected Effects _____

4 One-Week Action Record

Day	What You Did	Completed?	What You Felt
Monday			
Tuesday			
Wednesday			
Thursday			
Friday			
Saturday			
Sunday			

5 Reflection

① What was the most difficult part to put into practice?

② Which activity do you think was the most effective?

③ What problems were difficult to solve through individual effort alone?

④ Is there an action you would like to continue after this activity? Share it.

Rather than ending the reflection with simply, "What did I do?", think about the following questions.

① Could everyone take part in the campaign our group planned?

② What should we consider from the perspective of people vulnerable to heat waves, such as older adults, children, people with disabilities, and people with chronic illnesses?

③ Which activities might be difficult depending on a person's economic situation or living environment?

④ What support could schools or local communities provide so that everyone can participate?

⑤ What do you think your small actions mean for the community?