Supplementary Material
Group 1 Environmental Project: "Bottles for Luck"
Student Worksheets and Reflective Journals

Group members: S19, S21, S22, S24, S25, S28

Summary of activities:
This group initiated the "Bottles for Luck" project in partnership with the student council. They encouraged students and school staff to exchange five plastic bottles for one raffle ticket, with draws held on the 1st and 16th of every month (coinciding with the national lottery draws in Thailand). Prizes included cash amounts of 20, 50, and 100 baht, with winners announced during the morning assembly. After collecting the bottles, the students sorted out the caps and labels before selling the bottles to a recycling company. The money earned was then used for the raffle prizes, with the final draw taking place at the end of the semester.

Stakeholders: Independent study subject teacher, Teacher responsible for the student council (partner teachers), Student council committee members, Grades 7-12 students who participated in the raffle, Teachers and educational personnel who participated in the raffle

Activity # 1

Surveying Environmental Problems

Instruction for students:

Take photos of **three environmental problems** you have observed during your field investigation in real contexts.

For each problem, write a short caption describing what you observed.

Then, interview relevant people—those affected by the problem or responsible for addressing it—to understand its impacts and related responsibilities.

Finally, discuss as a group to select one environmental problem that your group is most interested in solving, and explain your reason for choosing it.

1. Environmental Problem 1: "Litter scattered beside the trash bin"

1.1 Photo caption:

"Litter scattered around the football field."

1.2 Who is affected and how?

"It affects people living or walking nearby because some garbage gives off bad odors, making the area unpleasant to stay in. Some trash is very dirty, so people don't want to go near it or help pick it up."

1.3 Who is responsible or should be involved in solving this problem?

"The janitors and everyone should cooperate to prevent littering and keep the area clean and pleasant."

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2. Environmental Problem 2: "Uneven and damaged pavement in the garden area"

2.1 Photo caption:

"Damaged and uneven pavement in the garden area."

2.2 Who is affected and how?

"It affects people walking along that path because many use this route, and the uneven ground can cause accidents, such as tripping or falling."

2.3 Who is responsible or should be involved in solving this problem?

"The school, because tree roots in the area have lifted the pavement. We hope the school will repair it to make walking easier and prevent accidents."

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3. Environmental Problem 3: "Unpleasant odor from the restroom near the academic office"

3.1 Photo caption:

"Restroom emitting a strong odor near the academic office."

3.2 Who is affected and how?

"It affects people who stay or pass through the area and those using the restroom. The smell is very strong—it can even cause headaches and reaches the nearby classrooms, making the area uncomfortable."

3.3 Who is responsible or should be involved in solving this problem?

"The school or janitors should find out the cause of the odor and fix the problem at its source."

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4. Group discussion and decision

Discuss all three environmental problems your group has identified and **select one problem** that you are most interested in solving. Explain **why** your group chose this issue.

4.1 Selected problem:

"The problem of litter scattered around the football field."

4.2 Reason for selection:

"This problem occurs because people throw garbage outside the bins and in inappropriate places, causing trash to spread and making the area unsightly. We want to solve this problem the most."

Activity # 2

Questioning and Analyzing the Selected Issue

Instruction for students:

Based on the environmental problem that your group selected as the top priority to solve in Activity#1, each member should formulate **3–5 questions** related to that problem. These questions will guide your inquiry and interviews with stakeholders during the next stage of the project.

Selected Environmental Problem

"Litter scattered around the football field"

Student Questions

Question 1 (Cause of the environmental problem):

"What causes the litter to spread around the area?"

Question 2 (Factors related to the problem):

"What factors contribute to the littering problem in this area, and in what ways?"

Question 3 (Impact of the problem):

"How does the littering problem affect people who live or walk around this area?"

Question 4 (Solutions to the problem):

"How can we solve or reduce the problem of littering around the football field?"

Question 5 (People or organizations involved):

"How can everyone in the school help to dispose of waste properly or take part in solving this problem?"

Group Synthesis and Presentation

Each group should share their members' questions in class, discuss them together, and identify the most relevant question(s) to guide stakeholder interviews.

Example of synthesized question for class discussion:

"Can we solve the littering problem in this area? If so, how can we do it, and in what ways does this waste problem affect us?"

Group Reflective Journal # 1

Instruction for students:
Students reflect on their experiences identifying environmental problems, methods used to collect information and interview stakeholders, and what they learned from sharing and discussing with peers. Record your reflection under the following headings.

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1. Place of practice:
"Area beside the football field."

2. Activity performed:
"Collected litter and interviewed people around the area."

3. Outcome of the activity:
"Most people said the area looked messy and that they did not want to sit near the trash bins beside the football field."

4. Problems or obstacles encountered:
"Some people were not very cooperative during the interviews."

5. Suggestions for future activities:
"Ask for people's consent before conducting interviews and check the area first in case others are using it."

6. What we learned or developed from this activity:
"We became more aware of the importance of keeping the environment clean. We became more confident in approaching others, gained new perspectives from people's opinions, and made new acquaintances through the interviews. We also practiced patience while walking under the hot sun and experienced teamwork and unity among group members."

Activity # 3

Collaborating with Stakeholders to Set Goals

Instruction for students:

Students conduct field interviews with individuals who are motivated to take part in improving the environment by joining the student-led environmental project.

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1. Names of participants (stakeholders) involved in the environmental project:

"Teacher A (Teacher responsible for the student council (partner teacher), Miss A, Miss S, and Miss J (Student council committee members)"

2. Shared goal for creating positive environmental change:

"To make the area beside the football field cleaner and free from unpleasant odors. Everyone should help by putting trash into bins instead of throwing it on the ground. Waste should also be separated properly so that it can be exchanged for coupons in the school's recycling reward program."

3. Agreed-upon actions to achieve the project goal:

"1. Schedule clean-up sessions after school hours.
2. Focus only on the area beside the football field.
3. Conduct activities every Monday and Friday, continuing until the end of February."

Activity # 4

Analyzing the Environmental Problem

Instruction for students:

Students were asked to design a *fishbone diagram* illustrating the relationships among causes, effects, and possible solutions to the identified environmental problem. The diagram should be reviewed by relevant stakeholders to verify the feasibility of the proposed actions.

Students were expected to create the fishbone diagram after learning how to construct it in class, as part of their environmental problem analysis process.

Fishbone problem analysis:

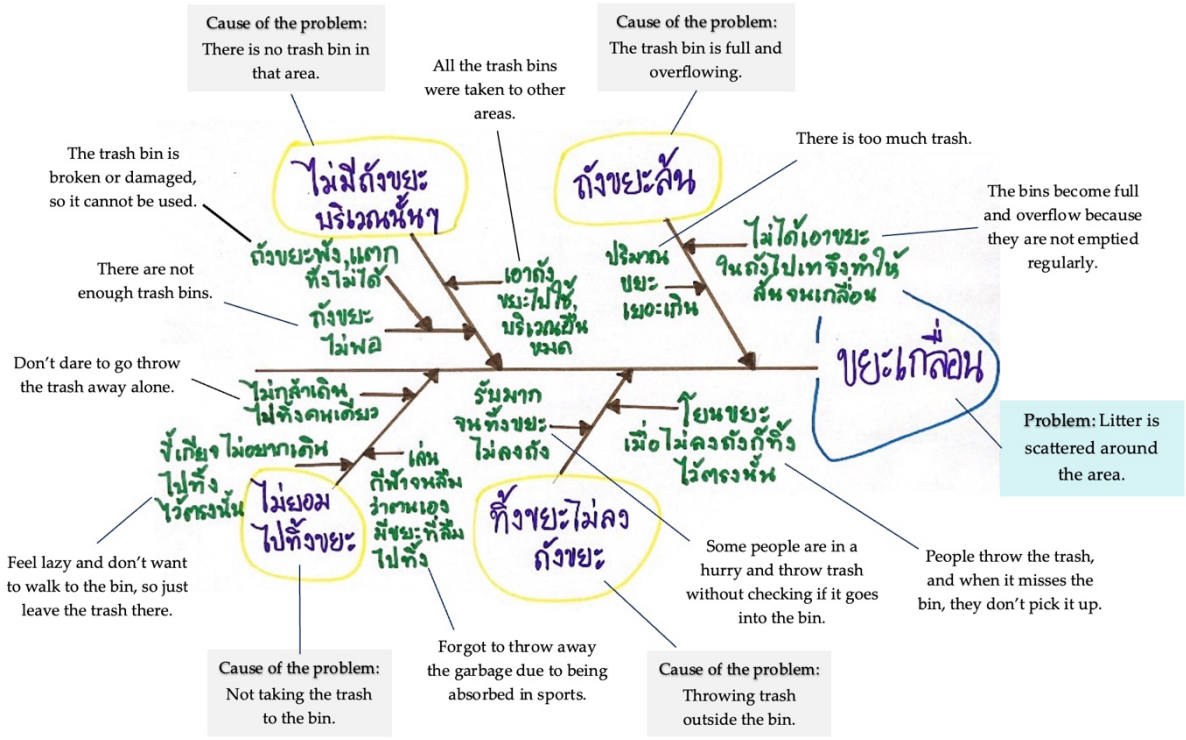

Figure A1. Fishbone diagram of problem analysis.

Activity # 5

Proposing Solutions and Implementation

Instruction for students:

Students and stakeholders in each group reviewed information from the fishbone diagram they had previously developed to propose possible solutions for the identified environmental problem. Students were also encouraged to search for additional information on environmental problem-solving methods from various sources.

Each group then proposed **three potential solutions**, analyzed their feasibility by considering **advantages and limitations**, and finally selected one practical solution for implementation.

1. Information from research on possible environmental solutions

Students may illustrate or write their ideas freely.

1. Clean the area regularly.
2. Increase the number of trash bins.
3. Separate waste before disposal.
4. Ask teachers to announce during the morning assembly to avoid taking food out of the canteen and refrain from bringing outside food into the school.
5. Assign someone to monitor the canteen exit area to prevent students from taking food outside.
6. Place trash bins near the canteen exit so people can dispose of waste properly.
7. Put up reminder signs to encourage proper waste disposal.
8. Participate in the "Bottle for Luck" recycling campaign.

2. Proposed environmental solutions and feasibility analysis

No.	Proposed Solution	Advantages	Limitations	Remarks
1	Separate waste before disposal	Prevents trash bins from overflowing	Some people may ignore or refuse to cooperate	—
2	Put up reminder signs	Encourages people to follow the rules	Some students may remove or damage the signs	—
3	Place trash bins near the canteen exit	Prevents random littering	Some people may still throw trash outside the bin	—

3. Selected solution

"Put up signs and place trash bins in areas with heavy litter, and encourage people to exchange collected waste for lucky-draw coupons."

3.1 Concrete steps for implementation

1. Walk around and identify areas where litter is most concentrated.
2. Place trash bins in those areas and put up reminder signs.
3. Collect any scattered litter and dispose of it properly.
4. Regularly check whether trash bins are being used properly and replace them when full.

5. If improper disposal continues, ask teachers to make announcements and remind or warn those responsible.

3.2 Indicators and evaluation criteria for success

- Has the amount of litter in the area decreased?
- To what extent are people cooperating in waste management?

Additional notes and recommendations from Teacher A (Teacher responsible for the student council):

1. Collect and compress plastic bottles, then exchange them for money or coupons.
2. Post "No Littering" signs in various locations.
3. Add more trash bins in heavily littered areas.
4. Clean up particularly cluttered and messy zones.
5. Assist student council members in collecting or compressing bottles and other recyclable waste.
6. Conduct a follow-up survey on the "Bottle for Luck" project to evaluate its effectiveness.



Figure A2. Collect and compress plastic bottles



Figure A3. Post "No Littering" signs



Figure A4. Draw raffle prizes from the "Bottle for Luck" project box

Group Reflective Journal # 3

Instruction for students:
Students reflect on their environmental improvement activities and record their learning experiences under the following headings.

1. Place of practice:
"Football field and Building 3, areas with large amount of litter."

2. Activity performed:
"Put up campaign posters encouraging proper waste disposal and added more trash bins in areas with heavy litter."

3. Outcome of the activity:
"Learned the results from the fishbone diagram analysis."

4. Problems or obstacles encountered:
"Some people did not cooperate."

5. Suggestions for future activities:
"Persuade and communicate more effectively to encourage everyone's participation."

6. What we learned or developed from this activity:
"We helped make the school cleaner, learned how to work systematically and collaboratively, and developed teamwork and unity. We practiced expressing our ideas, got to know more people, and learned how to conduct interviews and ask questions effectively."

Activity # 6

Summarizing the Environmental Project

1. Project Sites

"Football field, the canteen exit, behind and beside Building 3, and restroom next to Building 3."

2. Background and Rationale

"Because there was a large amount of scattered litter, our group wanted to help reduce waste in the school area. The result may only slightly decrease the amount of trash, but at least it would make the area less messy."

3. Project Objectives

"To help reduce litter in the area and make it cleaner and more pleasant to the eye."

4. Implementation Process

4.1 Target group (stakeholders)

Independent study subject teacher, Teacher A (teacher responsible for the student council, Student council committee members, Grades 7-12 students who participated in the raffle, Teachers and educational personnel who participated in the raffle

4.2 Data collection tools:

"Questionnaires, interviews, and statistical records comparing the number of trash items before and after clean-up."

4.3 Data collection methods:

"Interview people around the area to ask about their level of satisfaction and count the amount of waste to see if it has decreased compared to the first day."

4.4 Data analysis:

"Calculate the percentage of satisfaction among local people and the percentage change in the amount of waste between the first and final days."

5. Expected Outcomes

"The amount of litter will decrease, and people's satisfaction with the area will increase."

6. Project Activities

#	Activity	Responsible Person(s)
1	Create campaign posters encouraging proper waste disposal.	All group members
2	Put up campaign posters in areas with heavy litter.	All group members
3	Add trash bins in areas where posters were put up.	All group members
4	Ask teachers to make school-wide announcements about proper waste disposal.	All group members, Teacher A
5	Monitor and evaluate whether the amount of waste has decreased.	All group members

7. Evaluation of Success (Weekly)

"Use bar charts to illustrate and evaluate changes in the amount of waste."

8. Evaluation Tools

"Interview form for stakeholders about the environmental problem-solving project (social science data)."
"Environmental quality checklist (scientific data)."

Group Reflective Journal # 4

Instruction for students:
Students, together with stakeholders, teachers, and staff at the school, participated in a group reflection following the presentation of their environmental project plans.
The reflection focused on identifying necessary tools and equipment for field implementation, anticipating possible obstacles, and discussing ways to address these issues effectively.
Students recorded their reflections in their journals under the following headings.

1. Suggestions for revising the environmental development or improvement plan:
"Find an engaging project idea that attracts more participants. Add more garbage bags and provide clearer separation of waste types."

2. Anticipated problems or obstacles during implementation:
"Some people might not cooperate in proper waste disposal."

3. Strategies to address possible problems in the future:
"First, identify the reason behind the problem before choosing a solution. If the issue is lack of cooperation, we must create motivation to encourage participation."

4. What we learned that contributes to environmental improvement:
"We've developed the habit of picking up litter whenever we see it on the ground. It now feels natural to throw trash into the bin."

5. What we learned that contributes to my personal growth:
"We learned how to separate waste properly and realized that we shouldn't ignore litter. We now understand that every piece of waste has value because it can be sold or reused."