

# Environmental Education and Information Technology

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## Introduction

### Why an environmental education course is in a university of education?

In order to keep good environment, personal activities on the basis of environmental knowledge play an important role. Environmental education helps establishing such motivation. And I think it is important that knowledge and experience on environment have to be taught by teachers who had learned at an environmental education course.

### What can be done while sitting in front of a computer?

In environmental education and environmental learning, actual experiences are the most important. Information technology can not contribute directly to them. In fact, however, there are qualitative differences between actual experiences and computer works.

### Information technology may support environmental education

As a member of System Research of EEC, I provide web contents and biological and environmental-related database for environmental education. The purposes of providing database are to share more information and to use them effectively. I think that database is a basic tool for an analysis on a huge amount of information in environmental science.

Environmental problems, which sometimes are to worldwide, can not be discussed within a limited region. Every student can not join in various actual nature activities. Although it is virtual, additional experiences can be provided by using Web or new technologies. These information technologies might help learning information and acknowledgment in environmental education. In this time I will introduce you some examples that I had produced.

### Example of support

#### Bulletin Board System for a school class, “Are fallen leaves garbage?”

It is just a season of fallen leaves. Sendai is called a city of forest. Fallen leaves from roadside trees cover roads and sidewalks so that many efforts have to be made for cleaning them. In this city, fallen leaves are gathered into plastic bags and finally burned. In a forest, on the other hand, fallen leaves are bearing an important role to become a home of living things and to give nutrition for the next year.

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In 1999, a lesson program. “Are fallen leaves garbage?”, was proposed at an elementary school of Sendai. This program aimed children to aware that fallen leaves might not be garbage where they could return to the earth, and to provide a chance to think about the natural environment.

In Japan, “an Integrated Course” was newly introduced, in which teachers could deal with a theme without limited in a specific field. Some schools adopted that program on fallen leaves as an integrated course.

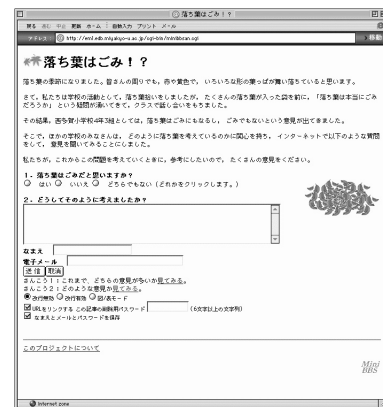
In 2000, another program, “Save fallen leaves”, was planned at another school. These two programs gave children a chance to study whether fallen leaves are garbage, to find their effective use, and to face to the nature.

For student classes of these programs, we proposed the use of computer networks to be able to ask for responses of many other persons on their studying matters and opinions. At the time, a bulletin board system was required for the expression and exchange of their opinions, at which EEC provided a server and technological support.

The BBS were produced through many tests from the stage of planning in order to enable the improved exchanges of opinions by introducing the ideas of teachers who actually need for their students.

At that time, Internet had just been introduced to the schools and E-mail was rarely used for students.

The use of BBS on a Web browser, which can be used easier than E-mail, enables students to have unusual experiences, such as having responses from far countries and a message directly from the Mayor of Sendai.



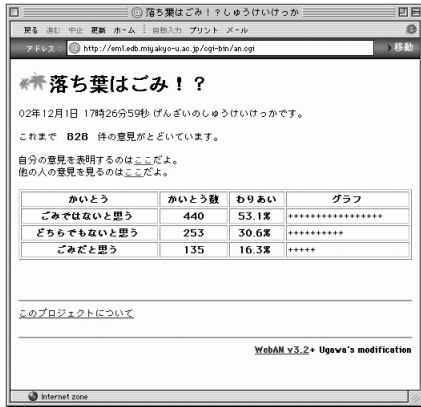
1. Explanation of a bulletin board

Ask for opinions about whether fallen leaves are garbage, and its reason.

In this figure, a question is proposed to ask for an opinion and its reason about whether fallen leaves are garbage.

BBS is seemed to be easy to operate, however, it is hard for children to follow an opinion thread since opinions written through the network are not led in time order.

It is difficult for school sites to maintain such BBS. However,we could contribute only in providing the server for the program. Actually, we would not be able to maintain all Buss for increased number of schools with different requests.

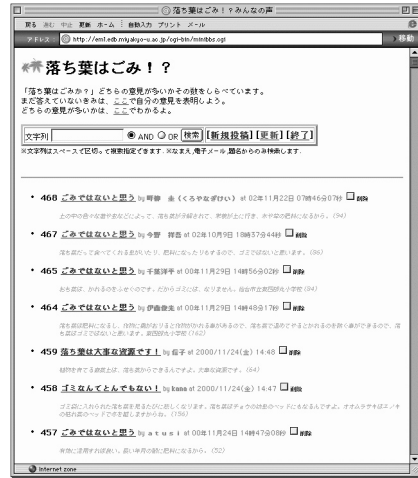


## 2. Result by graphics.

it is not garbage. 53.1%

It is not which, either. 30.6%

it is garbage 16.3%

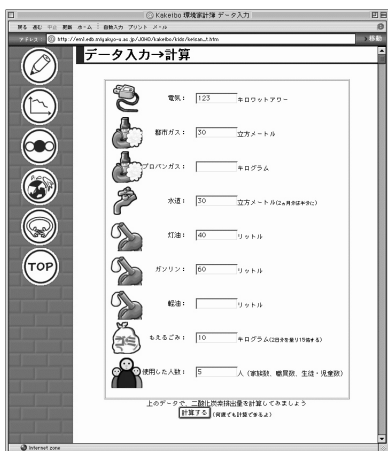


## 3. Reason and comment can be seen at a same time.

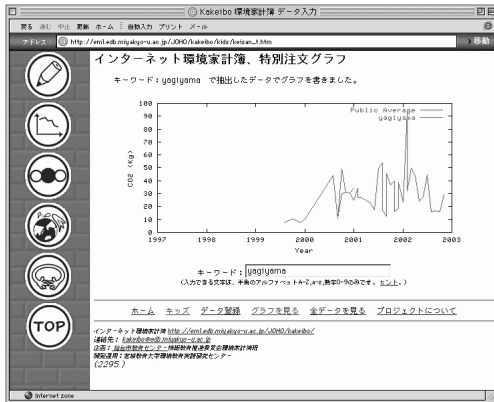
## Environmental Balance Sheet for Kids

In Japan, there is a program of environmental education, called “Environmental housekeeping book”(An Environmental Balance Sheet). It consists of the estimation of CO<sub>2</sub> gas emission from daily activities and the learning of opportunities to reduce emission and to save energy and money.

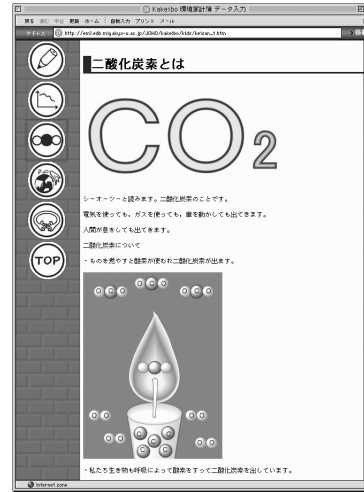
To utilize the program, a spreadsheet software was needed in the former state, but it was difficult for children. Then we provided a Web site for children in which estimation can be used in a class.



After entering data into a box besides an icon, the data will be converted into the volume of CO<sub>2</sub> gas emission. The volume is expressed not in liter but in the number of 20-liter tanks, which is a special idea proposed by school teachers. I remember that children were surprised and shouted at the number of tanks.



4. Graph can be produced on the basis of entered data.



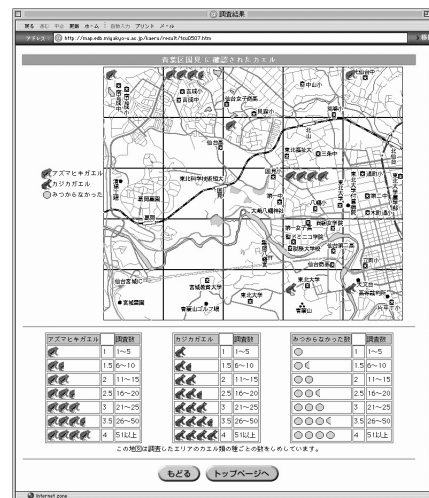
5. Reference materials relating greenhouse effects are prepared.

## Map system for environmental education

### Cooperation of Survey on living thing in Sendai

Environmental education involves complicated study research fields. It is typical in a map information which includes accumulated location data of different studies.

EEC has been cooperated with Sendai Science Museum in the surveys of some living things in Sendai.



## Survey on Frogs in Sendai for Kids

Survey of a familiar animal, frogs encouraged kids in interests in environment. Results were shown realtime. In 2000, the survey of frogs in Sendai had been performed on the basis of maps we produced.

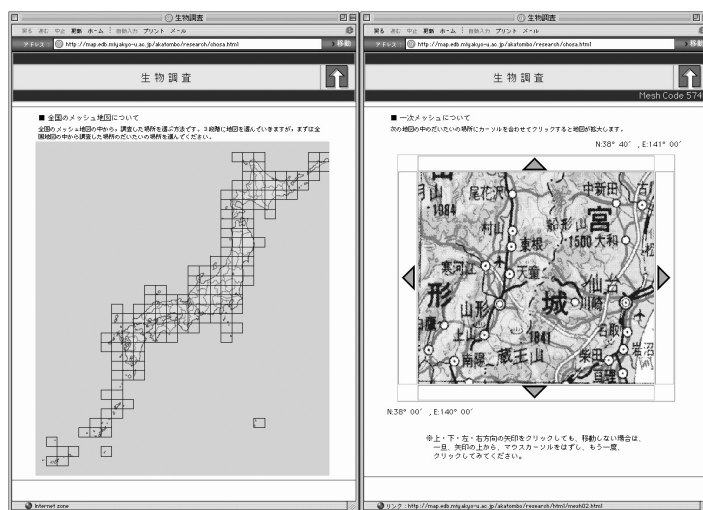
In a series of this surveys there was a special advantage that never seen before. The former surveys conducted by the government, the Ministry of Environment, are only paper based studies. When children would return their survey paper back to its conducted organization, the results of these data would be announced only in the next year. After so prolonged time, the children might graduate from their schools or lose their interests in it. On the other hand, our survey can be displayed in real time through the Internet, so that children can find their plots on the screen.

Besides, there is another profit, which indicates differences between town areas where no frog was found, town areas where several frogs were found and suburb areas where the nature remains, through the study of two typical frog species, *Bufo japonicus formosus* (Eastern-Japanese Common Toad) that can live in a town area and *Buergeria buergeri* (Kajika Frog) that can live only in a suburb area where the nature remains.

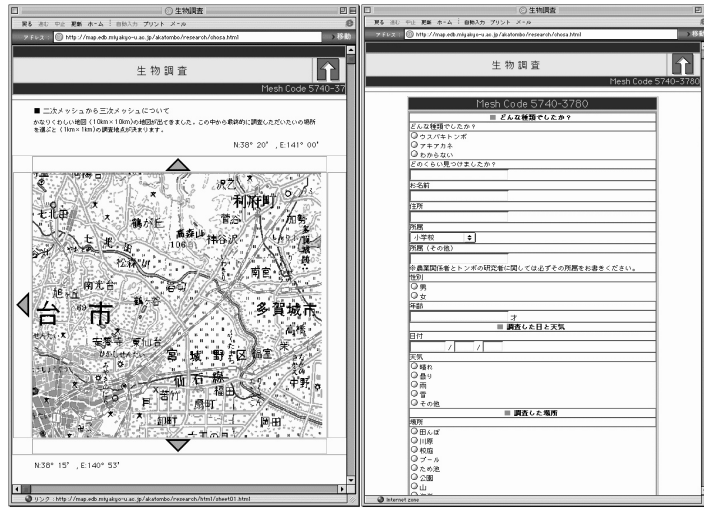
## Survey map on living thing in Japan

The frog map covers the area of Sendai. We have a plan to extend the map coverage to all of Japan.

There is a survey map on bloom of cherry trees in Japan. Apart from the announcement by the Authority of the Government, we intend to produce a bloom map which is made by children. The map would show the transition of bloom points from the south area to the north. Besides, another survey is conducted on red dragonflies.



The first map consists of 80 Km mesh and the second consists of 10 Km. In 10 Km mesh map, data can be entered in 1 Km unit.



**Map for field works**

Besides, we produced a cyber-map of Aobayama-mountain, which is located behind our University, as a map for surveys of living things, environmental studies and fieldworks within a smaller area. In this map, the smallest mesh is 50 m which can be grasped at a glance, various data including texts, pictures and moving images can be stored.

**Map for a school**

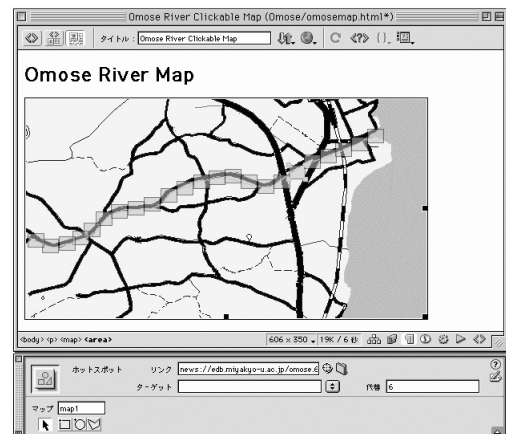
We also produced sample maps for teaching programs in environmental class.



In corporation with Omose Elementary School in Kesenuma city, in later a member of this school will appear on the stage, we attempt to provide a regional map near the school. Apart from the former maps, this map utilizes a simple clickable system for Web browser so that school teachers can edit by themselves. And this map uses a link to BBS system of “network news” which can easily be used through a mail client such as Outlook Express or Netscape Communicator.

The submission of a test message and another message attached with images was succeeded.

This shows an editing process to produce a clickable map by using a Web page editing software. URL of BBS is written in a window which enables the operation of map-linked BBS.



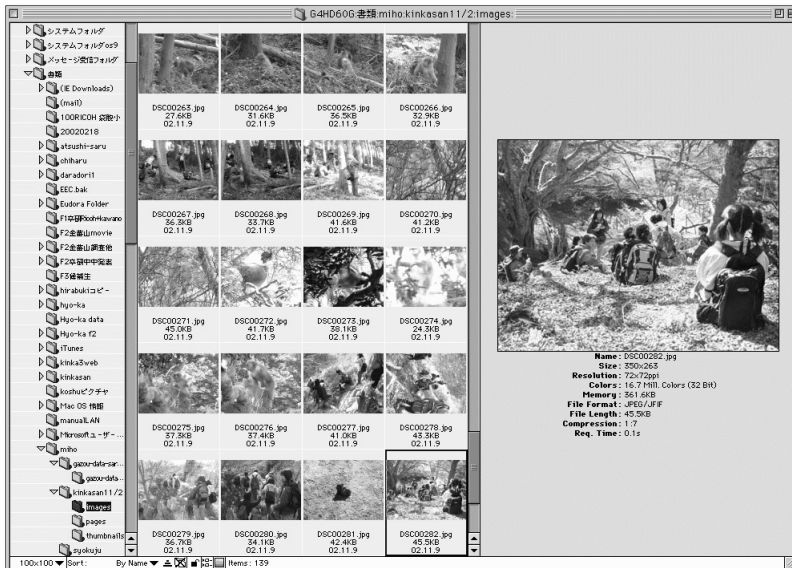


Submission by Becky Rosenberg and attached image are shown.

### Taking records of activities on environmental education

In joined in the activities on environmental education, and in accompanied with the field works of EEC, I attempt to leave these records on the web.

In the activities including friendship activity at Kinkasan-Island, exploration of Aobayama-mountain and driving monkeys out of the west region of Sendai, the records and documents have been accumulated through video and picture images and written texts.



Fieldwork of Kinkasan, Aobayama

## **Conclusion**

### **What have performed**

Improvement of the communication and sharing of information through computer network

Bulletin Board Systems, Map Systems, Environmental Balance Sheets

Creation of the Web based teaching materials which can be used easily

Environmental Balance Sheets, Map Systems

### **Evaluation and advice are required.**

These activities have begun just a few years ago. I have had no evaluation on these systems about their usefulness, and no opportunity to talk about them among EEC. In this time, I hope to know what evaluation would be made for my activities by many specialists gathered from the world. In addition, I want to know hints or opinions that guide me to more effective use of computer, network and information.