

International High School Science Conference Report



"On World Environmental Problems"

*Shanghai Foreign
Language School*

*Shulalongkorn University
Demonstration Secondary School*

Mar, 23rd (Sat.) , 2013

L-Osaka, the 2nd Floor & Large Conference room, 6th Floor

Osaka Prefectural Otemae High School

Preface

Today, I feel truly grateful to you all for participating in the 2nd International High School Science Conference. Our guests come all the way from the People's Republic of China, the Republic of Korea and the Kingdom of Thailand.

In order for high school students of the same generation from different countries to give a presentation on the environmental problems and share their ideas, we had the 1st International High School Science Conference organized by Otemae High School in March of 2010. One of the participants commented with excitement about this Conference, "Working with overseas students was a stimulating experience, it broadened our view of the world and I felt the importance of the English language."

At the Conference in 2010, the students stated a joint declaration: Let's stop polluting the global environment! The future world environment depends on our everyday actions. Do not wait — the future is now

John Lennon of the Beatles sings in the famous song, "Imagine":

*Imagine no possessions
I wonder if you can
No need for greed or hunger
A brotherhood of man
Imagine all the people
Sharing all the world*

I wish this Conference will be an important step to let people share the world and help work out solutions to worldwide problems. With your wonderful help, I'm expecting this session will be a successful one.

Principal of Otemae High School
Kuriyama Kazuyuki

International High School Science Conference

13:30 ~16:00

- 1 Opening Ceremony*
- 2 Research Presentation*
- 3 Joint International Communique*
- 4 Exchange Events*
- 5 Closing Ceremony*

1.About Participating Schools

No.	School Name
1.	Chulalongkorn University Demonstration Secondary School (Thailand)
2.	Hansung Science High School (South Korea)
3.	Shanghai Foreign Language School (China)
4.	Osaka Prefectural Otemae High School (Japan)



Chulalongkorn University Demonstration Secondary School

Chulalongkorn University Demonstration Secondary School (CUD) or Satit Chula for short, was founded on June 20th, 1958 by Professor Thanpuying Poonsapaya Navawongs na Ayudhya, the first Dean of the Faculty of Education, Chulalongkorn University. In 1969 the school was divided into a primary school which takes charge of pre-elementary and grades 1 to 6, and a secondary school which is responsible for grades 7 to 12.

Vision

We aim to be the hub for high-school educational management and the professional training center of excellence.

Mission

CUD has five missions;

1. To serve as the teaching and research laboratory of the Faculty of Education.
2. To educate and develop the students morally, spiritually, physically, and socially.
3. To improve teachers' teaching techniques.
4. To develop educational innovations.
5. To maintain and promote Thai arts and cultures.



Emblem

Prakiew, the royal emblem of King Chulalongkorn, the founder of the university.

School Colour

Pink-Pink signifies Tuesday, the birthday of King Chulalongkorn.

Education Management

CUD, as the laboratory for the Faculty of Education, has two major roles as follows:

1. The school provides basic education for grades 7th to 12th students, according to the National Curriculum 2001, and encourages teachers to do classroom researches along with teaching on the basis of the student-centered approach to enhance effective learning outcome. Our curriculum aims to provide students with:
 - 1.1 Free elective courses relating to students' interest and skills.
 - 1.2 Specially designed programs to serve the needs of the students:
 - 1.2.1 CUD-AP Program for the advanced learners to fulfill and develop their capabilities to the fullest.
 - 1.2.2 Ability grouping to facilitate students' learning pace and style.
 - 1.2.3 Preparation courses for students who join international academic competitions.
 - 1.2.4 Extra courses for fast and slow learners.
 - 1.3 Extra curricular activities such as homeroom, guidance, social service, scout activities, and club.
2. The school also provides university level education. Student teachers who come to intern at CUD will have a chance to practice and prepare themselves to become successful teachers in the future.

Hansung Science High School

Hansung Science High School was founded in 1992 to nurture the development of gifted students in math and science. HSHS selects talented students and provides special programs to help them realize their potential. Since 1992, over 1,600 students have benefited from our education and our school has become a model for the education of gifted students in Korea.

Hansung Science High School encourages students not only to achieve advanced intellectual and academic skills but also to develop their characters as responsible citizens and leaders. HSHS strives to fulfil the following aims as our mission:

To help students grow to be leading scientists in Korea and beyond:

- Students increase their motivation for learning math and science.
- Students promote their creativity and develop advanced research skills.
- Students gain a strong command of English to be global leaders.

To help students build their characters:

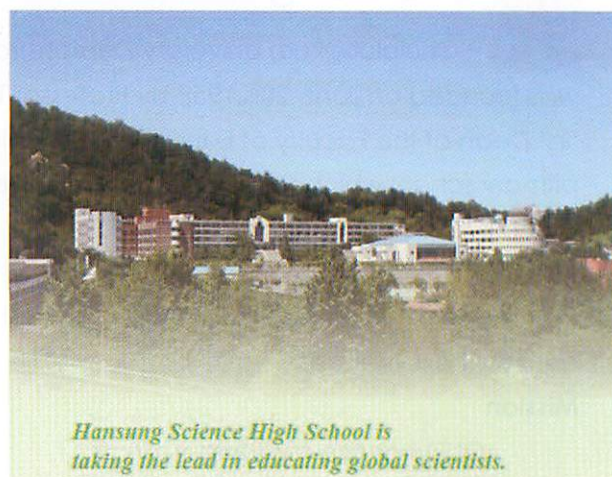
- Students have opportunities to develop their social skills and interests.
- Students contribute to the community by participating in volunteer work.
- Students understand the value of respect and responsibility and develop their ethical and moral awareness.

Hansung Science High School has been designated as a special research school by the Seoul Metropolitan Office of Education and the Ministry of Education, Science and Technology Department. We have carried out various research projects, which help other schools to enhance teaching skills.

Our graduation program allows the students who complete all requirements and finish the evaluation procedure to leave high school and begin college a year ahead of other students. Permission for early graduation is granted by the early graduation board and approved by the school principal.

The purpose of Enhanced Practical English Program is to help students improve their English communication skills, which will support them to become global leaders in science and technology. In addition to the regular English class, the first grade students study three hours per week with native Englishspeaking teachers. Class sizes are kept small in order to enhance opportunities for interaction. Oral and Written tests of English are administered in accordance with the HSHS regular exam schedule. Additionally, students take the English Speaking Proficiency Test(ESPT) three times during the program.

The purpose of the Science Study Tour Program is to increase students' interest in science and technology through visiting prestigious universities, labs and museums, and meeting with notable professors and scientists .



Shanghai Foreign Language School

Shanghai Foreign Language School affiliated to SISU ('SFLS' for short) was founded in 1963 and is one of the first 7 foreign language schools established after the founding of P.R. China. Directly guided by the national educational department, SFLS has taken up the great responsibility of educating elites in the diplomatic and international grounds. Many of our graduates are now studying abroad in Harvard, Stanford, Oxford, Heidelberg, Moscow and Waseda University.

The campus, embraced by trees, provides full school facilities as well as an experienced team of faculties. Shanghai Foreign Language School consists of grades ranging from 6th to 12th, including 31 classes and more than 1600 students on campus (including international students).

Our school is especially famous for its foreign language education. We offer language classes verifying from English, Japanese, Spanish, German French and

Russian in form of 10 to 15 people small group teaching, in order to raise the effectiveness of our education as well as the students' ability of individual thinking and expressing ideas.

A regular school day starts at 7.30 and ends at 4.45. Each of our class periods lasts for about 40 minutes, which means for junior students there are about 7 classes a day and 8 or 9 for seniors. During special activities though, such as the International Week, sports meeting, Cultural Week, Science Week and etc, students are dismissed early and the school takes a Friday off to give the stage to our students for them to shine.



Attending clubs and after class interest courses have long been a tradition among our students. From Chinese folk paper cutting courses to sports classes like basketball and swimming, from school wide psychology clubs to the world known MUN and Roots & Shoots, we have witnessed our students' growth not only academically but also mentally, we have seen them grasp every chance to be balanced and improving.

SFLS is connected with many foreign schools, so we have students from different countries coming over all round the year. It has always been our school's honor to hold exchange programs that enable our students to be more communicative, internationalized and have a broader horizon.

Osaka Prefectural Otemae High School

In 1886 Otemae high school was established as "Osaka Prefectural Girls' School ." Since then, it has produced countless graduates who are to take leadership roles in many fields, and has been widely renowned for it. Making "See yourself, train yourself" our motto, we aim to educate and support our students so that they can grow sound in mind and body, realize their dreams, and contribute not only to the Japanese society but also to the international community.



Otemae High School was originally set up as a girls' school, but after the war, it changed into a coeducational school, as many public school did at that time. Our school has two courses; a full-time one and a part-time (night-time) one. Currently more than 1,000 students study here.

Here, we will give a broad outline of the full-time course.

Our full-time course has a regular stream and a math-science stream. In the math-science, many students show much interest in mathematics or science. In order to develop their scientific talent and personality, we educate them to acquire the ability to find and solve problems by themselves through organized study of natural science. Almost all students hope to go on mainly to national or municipal universities.

School begins at 8:30 and ends at 15:20. Each lesson lasts 65 minutes, and there are five lessons a day. On Saturdays, there is no lesson, but study rooms open. In our school many kinds of events take place, including the cultural festival, the sports competition and school excursions. Especially as the spring chorus competition comes near, students come to the school early in the morning and practice singing eagerly before school.

Like many Japanese schools, our school also has a variety of club activities. For example,



baseball, soccer, judo, kendo (Japanese fencing), tennis, swimming, track and field, rugby, symphonic band, tea ceremony and so on. About 90 % of the whole school join club activities and enjoy their school life to the full.

International exchange

We are in partnership with Penglais High School in Britain as a sister school, and carry out exchange programs every year. Furthermore, Korean high school students visit our school each year, which gives us a good opportunity to deepen the mutual understanding between Japan and Korea.

2. About Research

No. Title

1. Future Alternative Energy : Biogas

Siripong Siwichai, Chayanid Suwannagird
Chulalongkorn University Demonstration Secondary School, Thailand

2. Purify Water

Cho Injoon, Kim Sohee
Hansung Science High School, South Korea

3. Eco-facility

Zhuang Lingeng, Wang Yunqin
Shanghai Foreign Language School, China

4. Drowning in Plastic Bottles

Sota Asami, Soichi Katake, Hiromi Onoyama, Yoshino Shibata, Moe Tanaka
Osaka Prefectural Otemae High School, Japan

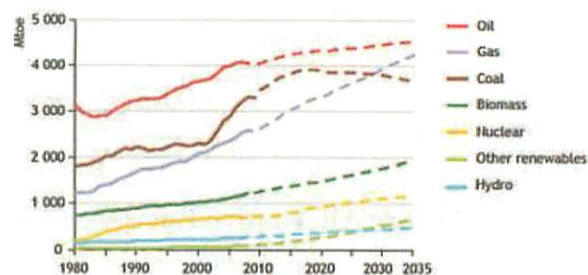
5. Water purification

Kota Azuma, Yasuhiro Okura, Eri Saiga, Tatsuya Takahashi, Momoka Nakura
Osaka Prefectural Otemae High School, Japan

Chulalongkorn University Demonstration Secondary School, Thailand
 Siripong Siwichai, Chayanid Suwannagird
Future Alternative Energy : Biogas

1. Introduction

Energy is essential for humans. Its importance is dramatically increased after the growing development around the world. The International Energy Association (IEA) predicted the energy demand increasing trend for all fuel types especially biogas which is going to surpass the coal and finally will beat the fossil fuel.



World Primary Energy Demand by Fuel Type (IEA World Energy Outlook, 2011)

The use of biogas as alternative energy is rapidly increasing nowadays. This is due to the reason that it is produced without undesirable consequences of burning. There is no carbon dioxide emission, the major contributing factor of global warming and environment impact.

Natural gas is a hydrocarbon consist of methane, ethane, propane, butanes, pentanes etc. Propane and butane removal is called Liquefied Petroleum Gas (LPG)

Due to steadily rising of fossil fuel price, at present LPG is being widely used in Thailand for domestic, industrial and transportation purposes. LPG price in Thailand is lower than that in the world market because of the government subsidized policy. Therefore, LPG demand is higher than its availability. Since 2008, Thailand has imported LPG instead of being the LPG exporting country. To solve this problem, Government thus gradually increases the LPG price of industrial and transportation sectors.

To sustainably solve this problem, this research study is aimed to search for a new alternative of energy or renewable energy in order to decrease the fuel import. It is also expected to promote the energy production in the country.

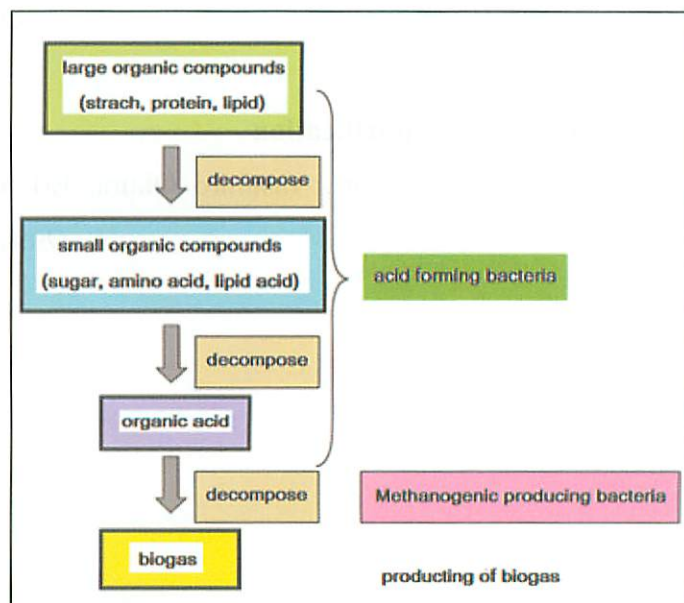
2. Objectives of Study

- To study biogas production to replace the LPG domestic use,
- Create the biomass production model for real use practice

3. Study and Data Collection

Based on the information collected in this research study, it was found that biogas can be used as an alternative to LPG.

Chemical Equation:



Comparison between LPG and Biogas

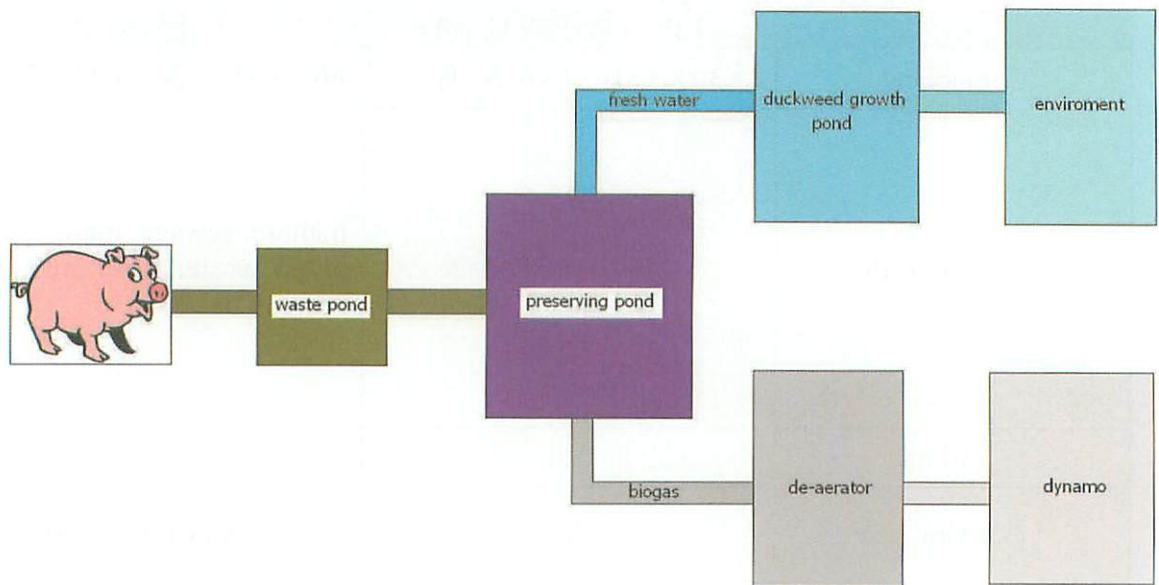
	LPG (TOWN GAS)	BIOGAS
Component	30% C_3H_8 + 70% C_4H_{10}	60% CH_4 + 30% CO_2 + 10% other
Raw materials	Petroleum oil	manure, sewage, municipal waste, green waste, plant material, and crops
Color	No	No
Odor	No	Odor of H_2S and NH_3
Toxicity	No	มีพิษของ H_2S และ NH_3
Weight	Lighter than water but heavier than air	Lighter than water and air
Ignition Temperature	480 °C	600 °C
Density @ STP	0.51 kg/m ³	1.21 kg/m ³
Quality Control	Well control	Quality depends on proportion of CH_4 : CO_2

Agricultural biogas, such as farm waste biogas, has been promoted as renewable energy. Moreover, this system also includes treating waste water, saving energy and being environmentally friendly. At present, there are 4 types of landfill biogas, namely fixed Dome, Channel Digester + UASB, H-UASB and Covered Lagoon.

Covered lagoon landfill biogas in farm



This type of landfill biogas is cheap, simple and easy to operate.

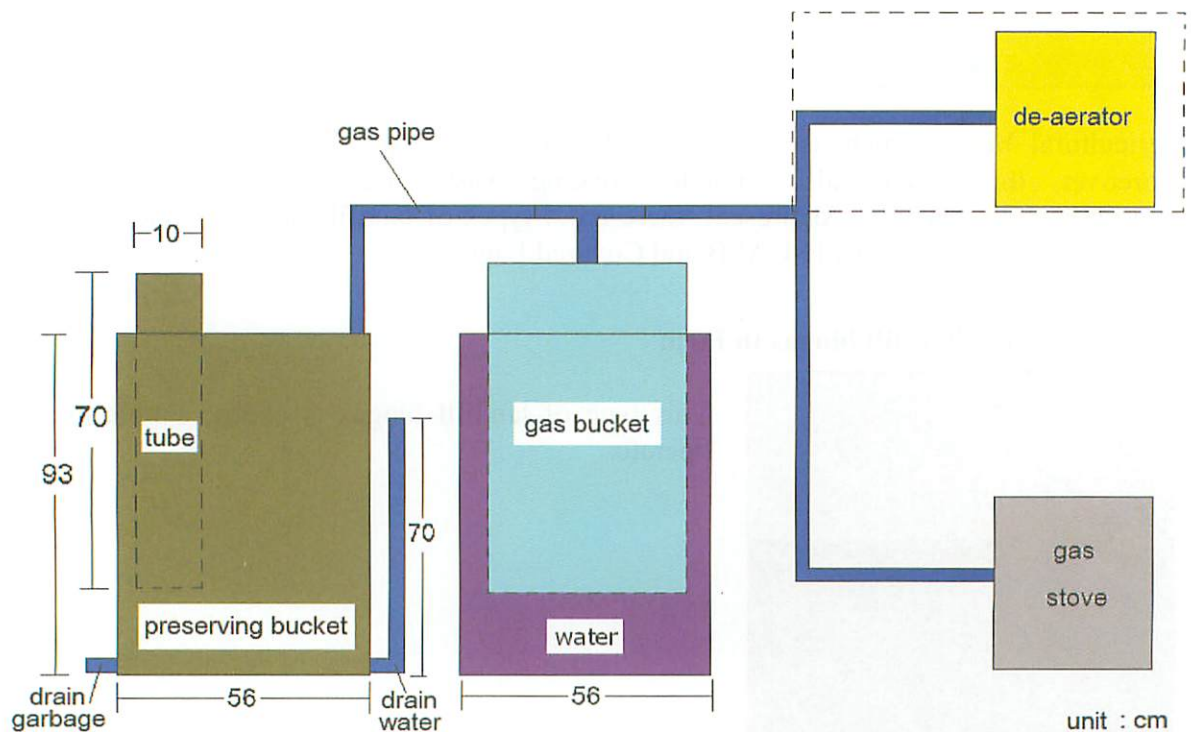


Covered Lagoon Model

Normally, this system has a water flush manure management system, a waste water pond, a preserving pond, using gas system and secondary sedimentary pond.

4. Applying the knowledge

Household biogas system is a model based on the principles of biogas production. This model is easy to build, usable, worthwhile and eco-friendly.



Household biogas system

Principles

- **Preserving bucket**, used for preserving food or dung, producing biogas from the fermentation of bacteria. Beside biogas, liquid fertilizer is a product of this system.
- **Gas bucket**, collecting gas from preserving bucket.

An examples of preserving gas making

1. Mix dung and water together into a preserving bucket (dung: water 1:2). Then wait for a week. This process allows the bacteria to grow the next step.
2. After a week, pour water into a preserving bucket until the brim of it. This process causes gas in the bucket and the bucket will be in a higher level. But this gas is not biogas. So you must release it.
3. After that, notice the gas bucket when it flows up again that means the biogas has been produced. So you have to put 1kg of food for bacteria such as green waste, plant material, crops or organic matter.
4. After a few weeks, you can increase quantity of food in each day for more biogas.
5. Finally you must release all of waste once a year.

Suggestions

1. Sour fruits are not allowed to put into a preserving bucket because they do not produce gas.
2. Full gas bucket is used for 1 hour and is completely filled in 8-9 hours from the reaction.
3. You can add the purify gas system into this model.
4. Purify gas can be packed in the gas tanks.

4. Reference

- World Energy Outlook 2011: <http://www.worldenergyoutlook.org/>
- Handbook the design, production, quality control and the use of biogas: <http://www.diw.go.th>

Purify Water

Hansung Science High School interim report

Cho Injoon / Kim Sohee

Teacher: Byun Taejin

As environmental pollution get worse, the interest on water purification increase. For water is a important factor in our lives, we should do purification carefully.

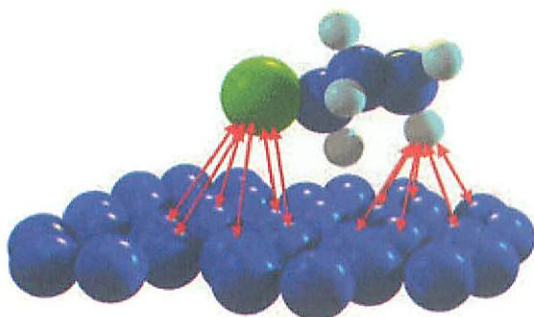
Water purification is the process of removing undesirable chemicals, biological contaminants, suspended solids and gases from contaminated water. The goal is to produce water fit for a specific purpose. Most water is purified for human consumption (drinking water), but water purification may also be designed for a variety of other purposes, including meeting the requirements of medical, pharmacological, chemical and industrial applications.

There are three main ways of purifying water; using chemistry, physics, and biology. We are planning to do some research and conduct an experiment on adsorption method, which is a branch of using chemistry for purifying water. In the experiment, we will use charcoal. Charcoal is the material which has been used for many years for purification. It has been used from the past because the process using charcoal is really simple. And until now, we can find many inventions using charcoal for purification. One of the examples is the bottle with charcoal in it made by Black-Blum, the design group.

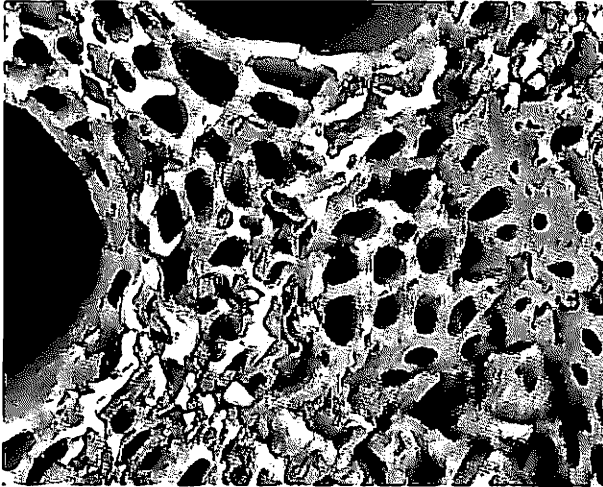


Picture 1: Charcoal Bottle

We can see many fine pores when we split charcoal. When polluted water goes through a charcoal, heavy metal molecules and dissolved organic matters combine inside the pores. They are combined by the Van der Waals force (London dispersion force) between the pollutants' molecules and carbon molecules. In this way, wastewater that went through the charcoal would be removed of its heavy metals and organic substances. This is called adsorption.



Picture 2: Adsorption (Van der Waals Force)

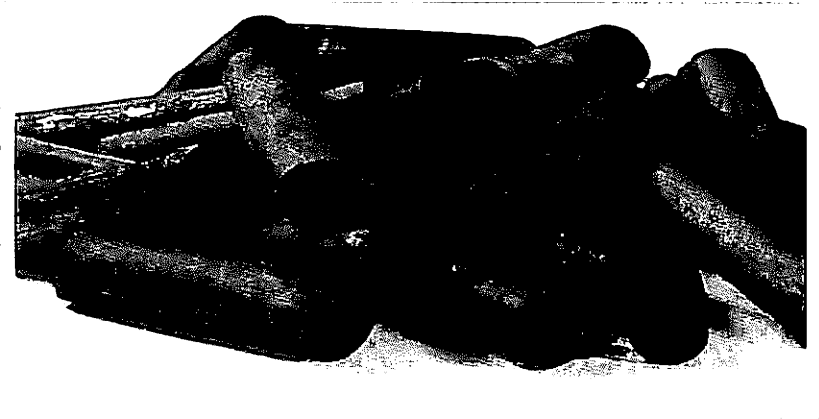


Picture 3: Charcoal pores

Charcoal is defined as a porous black solid, consisting of an amorphous form of carbon, obtained as a residue when wood is heated in the absence of air. Depending on the manufacturing ways, Charcoal is divided into hard charcoal, soft charcoal and activated charcoal. Hard charcoal is created at high temperature (1300°C) and it has strong adsorptive properties due to many fine pores. The next one, soft charcoal, also called black charcoal, is being created at 600°C. After being heated, it is cooled slowly without contact with air. Activated charcoal is the charcoal which is heated at high temperature one more time to increase the number of pores. Its pore is about the size of 1/10,000mm and internal area of 1g activated charcoal is about 80 to 100 square feet. In this way, charcoal has large internal surface area which makes it highly suitable for adsorption.

As we said earlier, we would like to study adsorption with charcoal. The plan of the experiment is as follows.

First, we will prepare charcoal pieces by types. We will prepare hard, soft, and activated charcoal of oak, bamboo, pine, and maple trees. That way we can have twelve kinds of charcoals. Following pictures are bamboo, pine, maple, and oak soft charcoals in order.



Picture 4: Bamboo black charcoal



Picture 5: Pine black charcoal



Picture 6: Maple black charcoal



Picture 7: Oak black charcoal

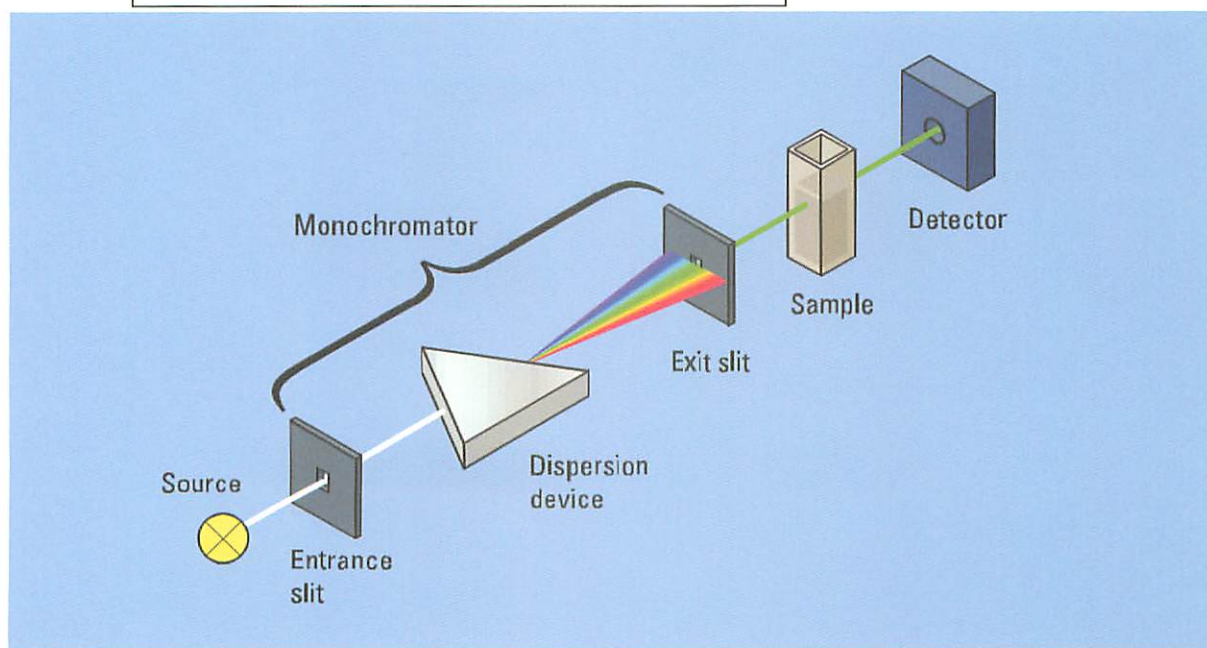
After cutting each charcoal into small pieces, so that we could observe them with scanning electron microscope (SEM), we will compare the structures of the surfaces, and expect the relative purification ability of each charcoal. We expect that the ones with smaller pores and higher density of pores would have stronger adsorption force, because larger internal surface would cause more adsorption.

Next, we will pour the heavy metal solutions: cadmium, arsenic, lead, chromium, zinc, and mercury, and organic matter solutions: organic phosphorus, trichloroethylene, tetrachloroethylene, and PCB, into each labeled test tubes. All the substances mentioned are what should not be contained in water according to water-related environmental standards. After measuring the concentration of all the solutions in each tube, we will put powdered charcoal into the tubes, and then block the tubes with Para films. Of course, we should make 12 tubes for each solution. After a certain period of time, we will measure the concentration of each solution again. Then we will compare the concentration changes in each test tube.

To detect heavy metal solutions' concentration, we will use ultraviolet visible spectroscopy, and to find out organic matters' concentration, we will use volatile organic compounds-purge · trap-gas chromatography. This chromatography is a method that purges the organic matters into inert gas and extracts them to the air. Then the gas would be concentrated and heated to be used in gas chromatography.



Picture 8: UV-VIS(Ultraviolet visible spectrometer)



Picture 9: How UV-VIS works

After all this process, we will compare the results with our expectation.

We want to find out what the best structure to use for adsorption is and what kind of charcoal is the best for adsorption. That way we can create a substance that has an ideal structure to use on adsorption.

1. Introduction

Public facilities include all facilities that are publicly owned, or that are owned by a nonprofit and open to the general public. They remain an essential part of our daily life, and play an important role in the society. As the residents are longing for a higher living standard, they have begun to pay more attention to the public facilities. As far as we are concerned, they haven't come up to our expectations. They can be improved in many aspects, including the efficiency, the convenience, the stability, etc.

Our assessment will give a clear view of public facilities to the masses. we have designed particular checklists to each public place. We believe with the advice gained from our analysis, a better society can be made.

2. Experimental Procedure

We selected four typical sites of public facilities in Shanghai. Fieldwork was carried out on these spots. We made researches through analyzing energy consumption in these places and carefully investigating the several common elements of these places:

- Lighting, varying from light bulbs, automatic lighting system to the use of natural daylight
- Heating & Cooling, mainly air conditioning but also the materials to retard heat transfer
- Washrooms, mechanisms used to save water
- Recycling, how the waste produced is disposed of
- Offices, electricity consumption and habits

We also have given the investigated facilities some suggestions that help reduce energy consumption. These suggestions are incisively researched as well. All the data we've acquired are stored in the database of Shanghai Roots & Shoots for further investigation

3. Results and discussions

1. Staff Survey

STAFF SURVEY	PERCENTAGE ANSWERED YES□
a. Do you routinely print on both sides of the paper for non-official documents?	65%
b. Do you regularly reuse scratch paper?	50%
c. Do you switch off your computer/laptop after work?	60%
d. Do you switch off your extension cords/power strip after work?	20%
e. Do you switch off or stand by your computer/laptop when you go for lunch?	35%
f. Do you use a reusable cup/mug instead of disposable cup?	40%
g. Do you use reusable chopsticks instead of disposable ones?	70%
h. Are you aware of airport environmental policies and procedure and objectives?	95%

II. Infrastructure

A. Lighting

- Basic information:

	Shopping Mall	Library	Airport	Metro Station
Temperature	Moderate	Moderate	Moderate	Moderate
Cybernetic System	HVAC	HVAC	Automatic and artificial combined	HVAC
Heat preservation	Run by fresh air Firm widows	Double-glazed windows used but not effective	Policy established and Double-glazed windows used	No measures taken

-Survey

	LINGHTING	YES / NO
	a. Are LED lights used?	YES
	b. Is natural light used properly?	YES

Shopping Mall	c. Are occupancy and/or daylight sensors used where they are necessary?	NO
	d. Are fluorescent tube and electronic ballast used?	NO
Airport	a. Can most of the terminal's lighting be dimmed?	YES
	b. Do most staff regularly turn off the lights when they leave the staff office?	YES
Metro Station	a. Are T5s used instead of T8s?	YES
	b. Are occupancy or daylight sensors used?	NO
	c. Are some lights turned off when it's not rush hours?	YES
	d. Are energy-saving lights used in this metro station?	YES
Library	a. Are T5s lights used instead of T8?	YES
	b. Do unoccupied rooms have the lights off?	YES
	c. Are occupancy and/or daylight sensors used?	NO

B. Heating & Cooling
- Basic Information

	Shopping Mall	Library	Airport	Metro Station
Temperature	Moderate	Moderate	Moderate	Moderate
Cybernetic System	HVAC	HVAC	Automatic&artificially combined	HVAC
Heat preservation	Run by fresh air Firm widows	Double-glazed windows used but not effective	Policy established and Double-glazed windows used	No measures taken

-Survey

	HEATING & COOLING	YES / NO
	a. Is the mall noticeably or uncomfortably hot or cold?	NO

Shopping Mall	b. Do mall workers use personal heaters or fans at their workstations?	YES
	c. Is the air conditioning system run by fresh air?	NO
	d. Are air curtains installed?	YES
	e. Can you feel any outside air leaking through any of the windows?	NO
Airport	a. Is there a written policy for terminal temperature?	YES
	b. Is there a written policy on energy saving in the airport?	NO
Metro Station	a. Is the metro station noticeably or uncomfortably hot or cold?	NO
	b. Is there air conditioner or other heaters in every service center?	YES
	c. Do people use personal heaters or fans?	YES
Library	a. Is the library noticeably or uncomfortably hot or cold?	NO

III. Washrooms

	Water-saving devices fitted (bubblers and sensors)?	Dual flush toilet system?	Hand dryers provided?	Leaky taps/pipes fixed timely?	Tissue provided?
Shopping Mall	YES	YES	YES	YES	YES
Airport	YES	YES	YES	YES	YES
Library	NO	YES	NO	YES	YES

IV. Recycling

	Recycled paper used ?	Paper/Cardboard recycled ?	Auto-equipment used ?	Unwanted electronic devices recycled ?
Library	No	No	Yes	Yes
Airport	Yes	Yes	Yes	Yes
Railway Station	No	No	Yes	Yes

VI. Conclusions and Advises

—Shopping Mall

1. Fluorescent tube and electronic ballast are widely used in the market and the lighting devices are well arranged. With the usage of glass curtain walls, natural light are used and quite a large area benefits from the natural light.
2. LED lights are still not yet used in the market and we haven't found any occupancy or daylight sensors.
3. Elevators are examined regularly and are used properly, however, they are not of frequency conversion type.
4. In the market, there is a favorable and reasonable temperature. The central HVAC system is cleaned frequently, but air curtains are not installed, thus creates a waste of energy.
5. No measures are taken to reduce the loss of energy of the Freezers.
6. Water-saving toilets are provided in Washrooms, but there isn't a dual flush toilet system, thus, creates a waste of water.
7. Leaky taps and pipes in the market or washrooms can be fixed in time. The market provides hand dryers instead of tissues in washrooms.
8. Though garbage bins are classified, the trash hasn't been disposed of properly and no recycled materials are used in the construction of the mall.

—Airport

We came to the Shanghai Pudong international airport and made some researches about how environmental-friendly the facilities there are.

1. The terminal building is equipped with sound insulation board and soundproof window. Therefore the tourists won't hear the noise given by planes' taking off and landing.
2. No energy-saving device is assembled on the elevators or escalators. Thus it could be really energy-consuming when not in use. However, once a week there will be some examines on these facilities. We recommend that Occupancy sensors be installed in order to save energy.
3. No natural gas (CNG) fueling stations and charging stations for electric vehicles are available, but battery recharge service is provided and energy-saving copiers and printers make it more convenient for passengers who need printing, photocopying and scanning service.
4. For convenience reasons, there is no reusable dishes and cutlery available for staff and guests' use, nor is detergent provided for the staff to wash their utensils and food containers. Yet, there are refrigerators and microwaves provided to store and heat the foods, these equipment's energy efficiency ratings are in the top 2 tiers. Recycling bins are provided for plastic, glass bottles and aluminum cans. And the airport use water dispensers instead of bottled water.
5. The facilities of the washrooms are perfect. It is equipped with both a dual flush water system and hand dryers. The water fixtures are definitely free of leaks, so there will be no water wasted.
6. The staffs' office is fully equipped and the computer to printer ratio is higher than 30:1. Energy saving systems can be seen everywhere.

7. The airport is decorated with many trees and grass around the runway. New trees are afforested every year but we are disappointed to be told that there isn't one plant for every 10 square meters.

—Metro Station

We came to the People's Square metro station, one of the most famous and busiest stations of Shanghai and made some researches about how environmental-friendly the facilities there are.

1. Escalators: Being one of the busiest metro stations in Shanghai, lots of escalators are being used in this station. They're still running when only few people are in the station. To save the energy, we suggest the station to turn some of them off when there aren't many people.
2. Office Equipment: Few computers and printers are used at the service centers of each station, but the service centers use neither energy-saving equipment nor recycled paper.
3. Noise: In a metro station noise surely cannot be avoided, and the station has done many things, which are proved useful to reduce as much noise as they can, for example the installation of insulation board and soundproof window.
4. Plants: The exhausts produced by metro cars do harm to the plants, so there aren't any plants on the platform. In the station we can see several spots of potted plants, but still more plants should be placed there.
5. We are glad to see that most staff of the station have environmental-friendly ideas and have put them into practice. Besides the escalators or lights, things such as printing on both sides of the paper for non-official documents should be popularized.

—Library

We came to Shanghai Library and made some researches about how the environmental-friendly facilities there are.

1. The lighting system in the library is using T5 bulbs instead of T8 bulbs. However, neither occupancy sensors nor daylight sensors are used. So the unoccupied rooms often have the lights on, which wastes a lot of energy.
2. A central HVAC system is used to guarantee an average temperature of 20 degrees Celsius. Office workers don't use personal heaters or fans at their workstations. Double glazed windows are installed to prevent the air inside from connecting with the air outside. However, we can still feel the outside air leaking through the windows.
3. Detergent is not provided for the staff to wash utensils and food containers, neither are refrigerators and microwaves. There are no recycling bins provided for plastic, glass bottles and aluminum cans. The offices use water dispensers instead of individual bottled water.
4. No water-saving devices are fitted within taps of the office kitchen and washrooms. However, the toilet system is dual flush. Hand dryers are provided in the washrooms. Water fixtures are free of leaks. Recycled paper is not provided in these places.
5. There are plants in the library but there is less than one plant for every 10 square meters.

Drowning in Plastic Bottles

1. Introduction

In 2006, 166,500-milliliter plastic bottles were used per person in Japan. And the consumption of plastic bottles is steadily increasing. We wonder how many people are aware of the overuse of plastic bottles and are focused on recycling the plastic bottles we use in our daily life.

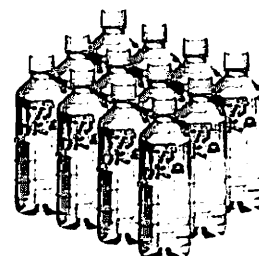
2. Data Collection Process

We gave the following questionnaire to more than 1,000 Otemae students.

I . Questions about how people dispose of plastic bottles
(1) Do you peel the labels off before throwing away plastic bottles?
(2) Do you wash plastic bottles before throwing them away?
(3) Do you separate caps from plastic bottles before throwing them away?
(4) Do you bring plastic bottles to recycling stations?
(5) Do you do nothing before you throw away plastic bottles?
II . Do you think that you have a high awareness about recycling?
III . Do you know about the recycling campaigns by some companies, and have you ever participated in any of these campaigns?
IV . Do you think that it is good for the environment to promote plastic recycling?

3. Results and Analysis

We found that Otemae students, the target of our questionnaire, have some knowledge about recycling, but their awareness is low. We assume that they will need more information about plastic recycling and need to take action to make our society eco- friendly.



4. Conclusion and Suggestion

What we can do now is just a small step, such as displaying posters. We think that kind of recycling activity will spread from our high school to a broader or larger scale of recycling. We hope you have gained even a little more interest in the problem of plastic bottles and the environment, and will try to recycle more from now on.

5. References

- Kazuhiro Sawada; *"Zukai de Wakaru Plastic [Plastic Recycling]"* (in Japanese), Softbank Creative Cooperation, Tokyo, Japan, 2008
- Iwao Omae; *"Plastic Recycle wo Dosuru [How to Recycle Plastic]"* (in Japanese), Kagaku Kogyo Nipposha, Tokyo, Japan, 2000
- The Council for PET Bottle Recycling, *"Reports of PET Bottle Recycling in Japan at POLYESTER & PET CHAIN 2012"* <http://www.petbottle-rec.gr.jp/english/reports.html> (2012-05-24 in English) (accessed 2012-12-10)
- EIC Net *"Risaikuru Bunbetsu Gaido [Recycling Guide]"*
<http://www.eic.or.jp/library/g-guide/sample/lecture/petbottle.html> (2012-2-15 in Japanese) (accessed 2012-2-15)

Water purification

1. Introduction

Japan became industrialized so rapidly that rivers and the sea in Japan were polluted. We got interested in water purification. We tried some ways to purify water, and compared them with various average of clean tap water in Japan, and examined which method is most effective.

We went to look around a water filtering plant, and learned that activated charcoal is used to clean water. We did an experiment to pass milk, Coca-cola, coffee, orange juice, and muddy water through activated charcoal. But it was some color remained and pollutants were not fully removed. Then, we held the following experiment, reducing pollutants with a distillation process, comparing it to the activated charcoal filtration.

2. Experimental procedure

We prepared various solutions which would represent polluted water.

- Muddy water
- Water in the river, which runs near our high school
- Solutions made by mixing various beverages with tap water
(various beverages: milk, Coca-cola, coffee, and orange juice)
- Tap water (as a control)



Figure 1

- (1) We measured the quantity of seven harmful substances, which are contained in various kinds of solution. We measured the seven kinds of substances with a chemical testing instrument called 'pack test.'
- (2) We distilled each solution by using the device (Figure 1) used in the camp and collected each distillate. In regard to each distillate, we performed (1) and compared distillate with the original ones.

3. Results and discussion

In regard to muddy water, most of the numerical values decreased though there were a few errors. But we couldn't find effective change in the other solutions.

In this experiment, though we did only distillation in sealed space, the number of NO_3^- and NO_2^- increased. We guess that such errors were caused when we used pack test for this.

This time, we examined waste water that can come out from kitchens but we couldn't get a good date. So we want to try other used water like that from a washing machine.

4. References

1. *How to examine water quality*
Takahisa Hanya, Norio Ogura (1995) Maruzen corporation
2. *Thw grounding of water investigation*
Yamada Kazuhiro (2009) Ohmsha
3. *The environmental investigation with Pack test*
Okauchi Kanji (2002) Godou corporation

High School International Science Conference

Joint Communique

Water, food and energy are essential for human beings to live. And, we obtain these important things from the earth. If something is wrong with the earth, it will be a bad influence on our life. Nowadays, environmental problems are happening in many areas in the world, and these problems need to be solved as soon as possible. At this conference, like the previous one, for the conference theme, we picked up “environmental problems”, which is an urgent challenge in the world.

People’s Republic of China conducted the facilities assessment and found out how effectively energy or natural resources are used. Kingdom of Thailand studied about the use of biogas as an alternative energy and proposed that households can use biogas energy easily. Republic of Korea did research about water purification using some kinds of charcoal. Japan worked on research about water purification with distillation and filtration and also considered recycling based on the survey that they conducted.

We learned two important things through our researches. The first point is that we have to develop a better technology needed for purifying polluted natural resources like river water or sea water. The second point is that we have to think seriously about how we should use limited natural resources effectively. At the same time, we should consider what can be used as alternative energy, which will be an important theme to discuss.

Every time we see the blue earth on the picture sent from satellites, we feel the earth is more beautiful than any other planet. And, from this beautiful earth, we enjoy countless benefits. It goes without saying that we must save the earth. Like this conference where the students from four countries assembled, if many countries cooperate with one another to work on environmental problems, it will be a huge power and will save the earth.

Through this international high school science conference, we found that we should pay attention to environmental problems. Let’s do what we can do to solve the environmental problems. This concludes the Joint Statement of International High School Science 2013. Thank you.

高校生国際科学会議 共同宣言

我々人類にとって、水、食料、そしてエネルギーは生きていく上で必要不可欠なものです。そして、それらを我々は地球から得ています。その地球が汚染など何らかの問題が発生すると、たちまち我々の生活に悪影響を及ぼします。現在、世界の様々なところで環境問題が発生し、その解決が急務になっています。今回の高校生国際科学会議では、前回と同様に、世界規模での喫緊の課題になっている環境問題を取り上げることにしました。

高校生国際科学会議に向けて、「環境とエネルギー」という共通のテーマの下、中華人民共和国、大韓民国、タイ王国、そして日本の高校生が様々な分野で研究を行いました。中華人民共和国は駅等の施設においていかにエネルギーや資源を効率よく使っているかを様々な観点から調査を行いました。タイは代替エネルギーとしてのバイオガスが一般家庭でも容易に利用できることを提案しました。大韓民国は様々な木炭を利用して水の浄化について研究しました。そして日本は同じく蒸留と濾過を利用して、水の浄化の研究とアンケート調査を基にリサイクルについて考察を加えました。

これらの研究を通じて大切なことを2点学びました。まず1点目は、河川や海洋の汚染に代表されるように、汚染された天然資源をどのように浄化することができるのか、その技術をますます発展されなければならないことです。2点目は、その限られた天然資源をいかに無駄なく活用するかを真剣に我々が考えなければならないということです。また、それと平行して、代替エネルギーとしてどのようなものが考えられるのかも、我々人類が今後研究していかなければならない重要なテーマになります。

衛星写真に写る青い地球の映像を見るたびに、他のどの惑星よりも地球が美しいと感じます。また、その美しい地球から、われわれ人類は、計り知れない恩恵を享受しています。この美しい地球を守らなければならないことは言うまでもありません。4カ国の高校生が一堂に会した今回の高校生国際科学会議のように、世界の様々な国々がお互い手を携えて環境問題に取り組めば、それは莫大な力になり、必ずやこの地球を救えるでしょう。

最後に、今回の高校生国際科学会議を通じて、我々自身が環境に関心を持つことが大切であるとわかりました。自分たちでできることを取り組んでいきましょう。

これで、共同宣言を終わります。

国際科学会議 参加教員・生徒の感想

< 教員 >

Li Yujing (上海外国語大学附属)

23rd: All good!

24th: All good!

(Overall comments): Teachers work very hard and in details. Japanese are very polite. Hope next time we can visit your school building. Thank you very much.

Byun Taejin (漢城科学)

23rd: I was really impressed by International high school Science conference(ISC) because the quality of research was high level and audience participated actively. I could feel the passion of students and teachers. All process of this conference was natural and good.

24th: Kyoto sightseeing was interesting to me. Kyoto has many cultural inheritance places. However, I think that it was very special for foreign students and Otemae students. In reception, I could listen to the feelings of this trip.

(Overall comments): I really thank Otemae principal, teachers, and student for inviting us. I was impressed by the kindness of Otemae people. I think that ISC is one of the best conferences in high school conference. This conference is a very good model for the other SSH. I talked the school teachers about this conference. I could feel that they envied this conference, I hope that I will go to Osaka. Thank you. Bye-Bye

Pitulawan Supa-utumporn (チュラロンコン大学附属)

23rd: The day of students presentation. Each school made a great research. The theme of research is a very hot issue to think about the environment. It's very useful to share the environmental situation from different parts of the world. It will be better if all of the students join to think together and to make something after the conference for applying knowledge.

24th: The day of sightseeing Kyoto. After the conference, everyone should be relaxed and know each other better. This trip led them to it and helped everyone know Japan. It's a very lovely time. I and my students were very happy. Thank you for setting up this trip.

(Overall comments) About the conference. That's a great experience. Before a conference, students and teacher had worked hard and learned together. We want to make a great project to share friends from each country. When the conference finished, I think it's very successful. Everyone learned a lot, had good experiences, and acquired more skills. Moreover, we had good friends. Thank you Otemae High School and people who supported this conference to give a chance for my school to join you. CUD, Thailand.

< 生徒 >

Zhuang Lingeng (上海外国語大学附属)

23rd: Conference this day was awesome. Students from different countries made presentations on different objects through different means. This provided further investigations with a really nice platform. Also, "We are the world." from the orchestra was brilliant. I really hope I could be a member of them.

24th: Kyoto is really an old but appealing city. During the sight-seeing in the castle and the temple. I learned a lot about the Japanese history. Sakura in Kyoto is especially beautiful. I hope I can visit there again

Wang Yunqin (上海外国語大学附属)

23rd: The conference was amazing, and I was deeply impressed by the song performed by the band. All the presentations were wonderful and I benefited a lot from it. Teachers are enthusiastic, and students are nice. I enjoyed it very much.

24th: Kyoto sightseeing is exciting. Kiyomizudera was full of people, but it was really worth visiting. Nijojo is beautiful and consuming. I'm amazed at the sakura blossom, which was breathtaking! We're so lucky to see the sakura at the end of March. The closing dinner was also a great pleasure. I enjoyed taking photos and having dinner with my friends here!

Cho Injoon (漢城科学)

23rd: I think the conference ended successfully. Thankfully, everyone listened to us carefully. I learned many things from the conference and I was happy to share our knowledge with others.

24th: I enjoyed Kyoto sightseeing a lot. I could learn more about Japanese culture. I saw Japanese traditional buildings and other important things and was impressed. I also enjoyed the reception. I ate lots of Japanese food. The friends from Otemae high treated me very well. It was too bad that I couldn't stay in Japan more.

Kim So Hee (漢城科学)

23rd: There was a conference. It was really well-prepared and I also enjoyed lunch! The conference was really smooth and performance from Brass Band was really great. Thank you for great preparation. Everything (including MC and so on great!!)

24th: Great sightseeing at Kyoto. Nice temple & castle. Schedule was not loose & tight. Also, I enjoyed reception. Delicious food!!! I like it. Thank you.

Siripong Siwichai (チュラロンコン大学附属)

23rd: This is a big day. And in this day I have known that Japanese students are so good because when I presented my project, they paid attention to me. It's very impressive.

24th: In this day I was very happy because I had a chance to go sightseeing with my new friends. It was a lot of fun. Moreover in the evening we went to the party and did many activities. It's the most impressive event for me. But it's too short, so I've felt sad.

Chayanid Suwannagird (チュラロンコン大学附属)

23rd: Today is a present day. First I felt very nervous because the theatre that I have to present is very big and lots of people came here. However, everything is prefect. Nothing to comment in the negative side. Everything is fantastic. Thank you!

24th: Today is a sightseeing day. I love Kyoto. The temple is very beautiful. Also the shop on the way to the temple is very interesting. I bought a lot of things. I like it.

大手前高校 発表生徒の感想

文系国際チーム 阿左美草太・鹿嶽壮一・小野山浩美・柴田淑乃・田中 萌

今回の国際会議が私たちを様々な意味で成長させてくれた事は言うまでもない。一連の行事は新しい事を知る喜びと自信、未来への希望や目標を与えてくれた。

私たちの課題研究は、困難の連続だった。アンケートの質問文を作る事の難しさ、1000人以上の結果を集計する事の大変さを知った。話し合いでは多くの意見が飛び交い、初めのうちはそのほとんどが直接結論には反映されなかった。時には結論が見えなくなった事もあった。しかし、同じ目標に向かって5人が努力し、一人ひとりが支え合って納得のいく研究発表をすることができた。この5人のうちの誰一人が欠けても私たちの研究を完成させる事はできなかっただろう。また、初めは人前で話すことが苦手だった人も、最後には大きな舞台で成功する事ができた。それは私たちに大きな自信を与えてくれた。

海外生徒との交流はとても新鮮で興味深く、楽しいものだった。初めて話した時こそお互いに緊張していたものの、すぐに打ち解け、連絡先を交換し、たくさんの写真を撮り、別れる時には皆で抱き合って号泣した。この様に外国人の友人がたくさんできたのは初めてで、とても嬉しかった。海外生徒は、発表において素晴らしただけでなく、意欲的で将来の目標を持つ人が多い事にも驚いた。また、好奇心が強く、日本の事についてたくさん尋ねてくれた。だから私も自分たちの事をもっと知って欲しいと思い、相手の事をもっと知りたいと思った。この様にお互いを知り、協力する事で私たちはきっと様々な問題も解決できると思った。

今回の国際会議は私にとって忘れられないものになった。これからは、今回の経験を糧に目標に向かってあきらめずに進んでいきたい。

理系国際チーム 東 晃太・大倉康裕・雑賀恵理・名倉百華・高橋辰弥

普段授業以外で使わない英語だが今回の国際会議では存分に使うことになった。必死に発音の練習をしたので何とか形にはなったと思うが、海外の同年代は自分の予想の遥か上をいく英語力だった。自分はまだまだだと思うと同時に、いい刺激を貰うことができた。（東）

今回の国際会議は成功してよかったです。準備の段階では、集まりに忘れたり遅れたりしてしまいました。最後の英語の発表には間に合うことができよかったです。海外の生徒と発表ができるという貴重な体験ができてよかったです。（大倉）

この国際会議を通じ強く感じたのは海外との英語力の差です。他国では日本の倍の期間英語を勉強しており、皆とても流暢に話していました。なかには三カ国語を話せる生徒もいて圧倒されました。プレゼン力も積極性も一流な海外の生徒達に多いに刺激をうけ、日本を出てもっと上を目指したいと思うようになりました。また、積極的にコミュニケーションをとることの重要性、そしてその難しさを痛感しました。次に彼らに会うときまでにはもっと英語力を磨いて、より多くの問題について話しあえるようになっておきたいです。研究過程で行き詰まったことが多々ありましたが、最終的にこの国際班の一員として会議に参加できて本当に良かったと思います。言語の違う四カ国の生徒が、英語を使えば理解しあえることに感動しました。これからの人生において、この経験は必ずどこかでプラスになると思います。この会議に関係してくださったたくさんの方々に感謝したいです。（雑賀）

今回の高校生国際科学会議を通じて感じたのは、英語という言語のすばらしさです。各国の高校生が話す母国語ではそれぞれ何を言っているか全くわかりませんが、全員が学んでいる英語を使えばコミュニケーションをとれることに感動を覚え、もっと英語を学びたいと思うようになりました。（名倉）

今回の国際会議を通じて、改めて環境問題の難しさを学んだと同時に、英語の重要性を認識しました。語彙力不足で伝わらない歯がゆさ、伝わった時の達成感、また海外の生徒のレベルの高さに脱帽するばかりでした。この経験を生かし、英語の勉強を一層頑張りたいと思います。企画して下さいました先生方どうもありがとうございました。（高橋）

担当教員 <高校生国際科学会議を終えて>

國津宗幸（国際会議 理系班指導）

課題研究を通しての高度な国際交流になりました。それぞれに新鮮な刺激を感じ新世界を開拓できたはずです。その手助けが少しでもできていればそれに勝る喜びはありません。みんな本当にありがとう！

蜂谷純子（国際会議 文系班指導）

初めはどこに向かっているのかさえ不確かだった課題研究も、回を重ねるごとにしっかりとした内容になり、英語の発音も練習すればするほど良くなってゆきました。参加したメンバーの努力と、その努力を重ねられる才能に大きな感謝と喜びを感じています。今後の糧となることを心から願っています。

文田憲行（国際会議 総務担当）

直接交流できた時間はたった3日間でしたが、学ぶことがとても多かった3日間であったことと思います。高校生たちが国を越えて理解しあい、「環境とエネルギー」という地球規模の問題を議論する姿は、明るい未来を感じさせてくれます。この場で出会った高校生たちが、世界のいろいろな問題を解決する日が来ることを期待したくなる、そんな高校生国際科学会議でした。

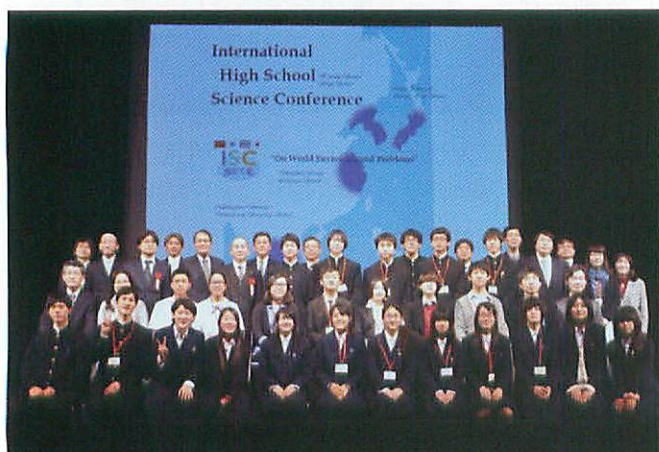
竹田賢司（国際会議 海外生徒・教員 担当）

高校生国際科学会議において、本校生徒は海外生徒・教員と一生懸命英語で交流していました。ただ単に、情報交換だけでなく、お互いにより刺激を受け、ともに高め合い、また、友情をも育んだと強く感じています。私はこのような生徒の姿を見て、この上ない喜びを感じました。

宮城憲博（国際会議 進行担当）

何事も正面から取り組むには多大な時間と努力を要します。それを乗り越えることにより、また次の新たなチャレンジができるものです。今回の会議を一つのステップとして、また大きく夢が広がることを期待しています。

■ 高校生国際科学会議の風景



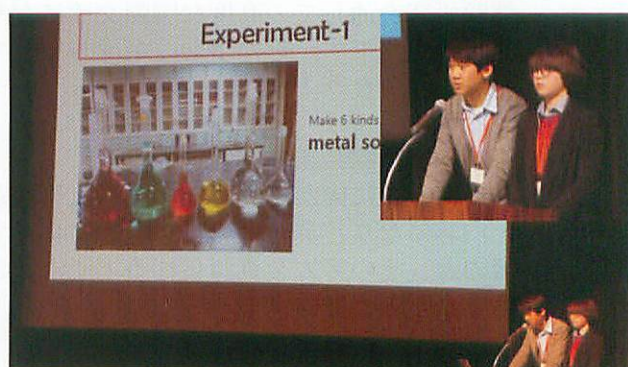
栗山和之
大手前高校校長



恩知忠司
首席指導主事



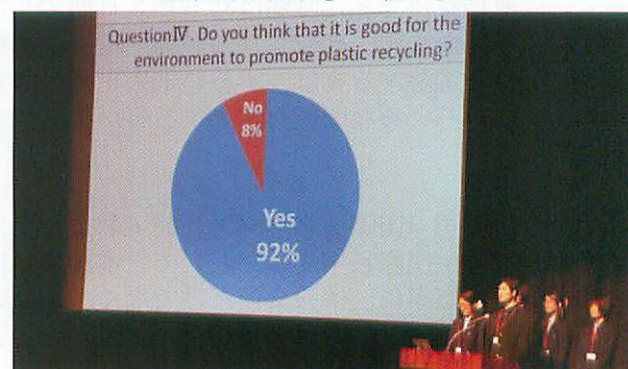
「チュラロンコン大学附属高校」生徒の発表



「漢城科学高校」生徒の発表



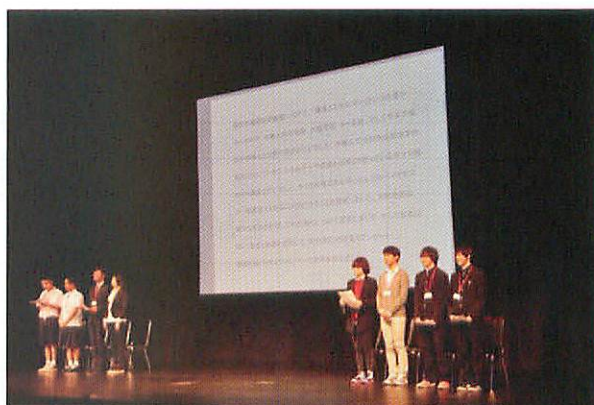
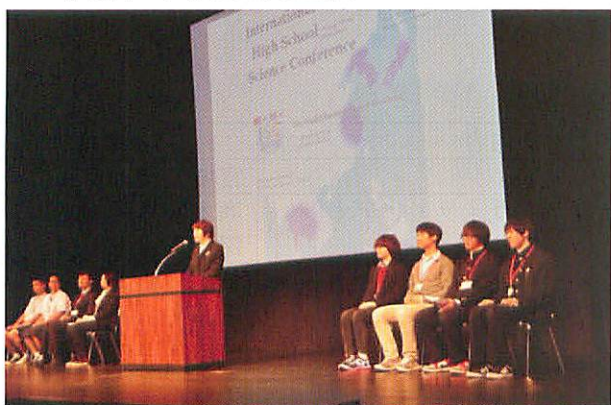
「上海外国語大学附属外国語学校」生徒の発表



「大阪府立大手前高等学校」生徒の発表



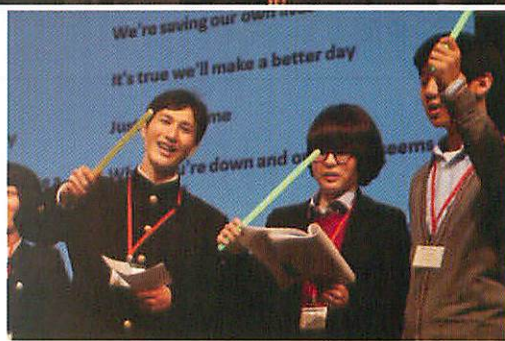
■高校生国際共同宣言



尾鼻靖子
関西学院大学教授



■交流企画 (We Are The World)



●「高校生国際科学会議」校内担当者

1 担当一覧

役割	主担	部会	内容	担当
総指揮	田中仁		全体進行	宮城・竹田・文田
総務	文田	記録・報告	記録・報告書・カメラ・ビデオ	高木・澤井・蜂須賀 深川・藤澤・増本
		渉外	招待・来賓・PTA・金蘭・報道	橋本・田中・中西・ 溝脇・山本・木村・ 植田・奥村・高木晃
国際会議・ 課題研究 発表	佃	会場	会場関連（機材・看板・掲示物）・ ポスター・プログラム・ 参加者募集・名簿・座席・受付	網谷・金・中川・ 荒井・永島・高畑・ 森田・影山・高森・ 中村・西村・藤田・ 富山
		会議	国際会議進行・共同宣言・ 共同研究・ミニ発表会・ ポスターセッション	板口・井上・今西・ 國津・中根・灰原・ 安永・筒井・高木 _三 ・ 金井・山口・馬場・ 石若・垣内・長谷川・ 喜多村
海外 (生徒・教員)	竹田	通信	海外との連絡・協議・ 連絡・移動の手配・ 送迎	伊藤・岡田・川端・ 島田・岡・田頭・早坂・ 島崎・池宮・上田
		ホームステイ	ホームステイ レセプション 教員対応（宿泊その他）	兼崎・鶴元・川口・ 谷・蜂谷・水山・ 深見・中嶋・圓入
会計	平田	会計	予算・決算 費用支払い	藤本・大井・荻州・ 池田
		食料	昼食、飲み物等の手配	葛城・西口
救護	元木	救護全般		元木・大川

高校生国際科学会議 企画書

International High School Science Conference

- 日時 2013年3月22日(金) 14:00～16:00 (プレ会議)
 3月23日(土) 13:30～16:00 (国際科学会議)
 3月24日(日) 研修ツアー・レセプション

●集合 (3月22日)

国名	学校名	便	関空着
タイ	チュラロンコン大学附属高校	JL728	7:50
中国	上海外国語大学附属外国語学校	MU729	21:00
韓国	漢城科学高校	KE2725	10:30

●ホスト

- | | |
|--------|---------------------------------|
| ①小島彩愛 | Cho Injoon (Hansung) |
| ②芦田昇眞 | Zhuang Lingeng (Shanghai) |
| ③信貴栞奈 | Chayanid Suwannagird (Thailand) |
| ④竹内華奈子 | Kim So Hee (Hansung) |
| ⑤呂 印杰 | Wang Yunqin (Shanghai) |
| ⑥高橋辰弥 | Siripong Siwichai (Thailand) |

●高校生国際科学会議

13:30 開会式

- 開会宣言 (田中 仁 教頭)
- 開会の辞 (栗山和之 校長)
- 来賓紹介 (大阪府教育委員会 恩知忠司氏)
- 来賓紹介

13:40 研究発表

- ①チュラロンコン大学附属高校
「Future Alternative Energy : Biogas」
- ②漢城科学高校
「Purify Water」
- ③上海外国語大学附属高校
「Eco-Facility」
- ④大手前高校
「Drowning in Plastic Bottles」
「Water purification」

15:30 国際共同宣言

- 講評 (関西学院大学 尾鼻靖子教授)

15:49 閉会式

- 記念品贈呈・交流企画

16:00 閉会

高校生国際科学会議

報告書



*Hansung Science
High School*

*Osaka Prefectural
Otemae High School*

*Shanghai Foreign
Language School*

*Chulalongkorn University
Demonstration Secondary School*

