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Spring 2022,Vol.2 No.1

Asia & ASEAN Center for Educational Research
Faculty of Education, Chiba University

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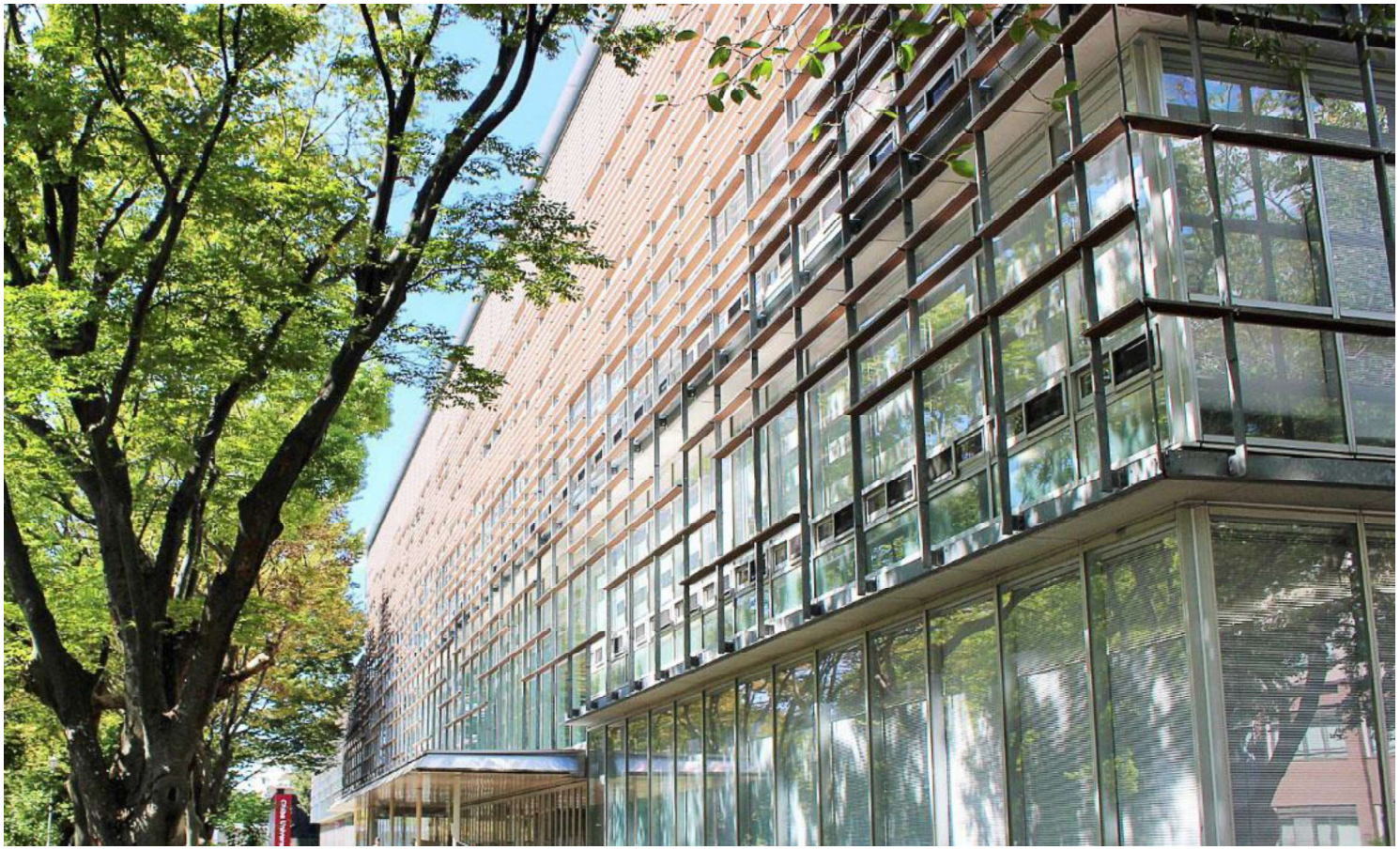
CHIBA UNIVERSITY

The Annual Meeting of Asia & ASEAN Center for Educational Research with Spring Institute
- Fostering excellent next generation -



Jan.30 - Feb.13, 2022

CHIBA UNIVERSITY

Asian & ASEAN Center for Educational Research CHIBA Univ.

TWINCLE

大学教育再生加速プログラム

JST Global Science Campus
研究者を目指す高校生のためのプログラム
ASCENT Program

サイエンススタジオCHIBA

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Contents

Greeting from Organizer

Dear Participants,

Welcome to The Annual Meeting of Asia & ASEAN Center for Educational Research with Spring Institute.

I proudly announce our reunion at the Annual Meeting of the Asia & ASEAN center for Educational Research 2022.
The pandemic of COVID-19 is still spreading all over the world. The re-spread of infection with the Omicron strain shattered our dream of the pandemic ends. On the other hand, we have received excellent news that vaccines for Omicron and new therapeutic agents for COVID-19 have been developed. We believe this situation will improve in the near future, and then we will be able to regain an everyday life and resume actual research and educational exchanges.

Jun Nomura, M.D., Ph.D.
Director, Asia & ASEAN center for Educational Research
Vice Dean, International affairs and Research Promotion
Faculty of Education
Chiba University

Organizers

Chief organizer: Jun Nomura, M.D, Ph.D., Professor
Chiba University, Japan

Organizer: Agus buono, Professor
IPB University, Indonesia

Atsawanonthapakorn Thanetweeraphat, Ed.D., Lecturer
Chulalongkorn University, Thailand

Arisara Leksansern, Associate Professor
Mahidol University, Thailand

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King mongkut's University of Technology Thonburi

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Universitas Gadjah Mada, Indonesia

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Silpakorn University , Thailand

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Chiba University, Japan

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Institut Teknologi Bundung, Indonesia

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Udayana University, Indonesia

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Silpakorn University, Thailand

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Chiang Mai University, Thailand

Poschanan Niramitchainont, Associate Professor
Mahidol University, Thailand

Rita May Tagalog, Ed.D.
University of San Carlos

Rojana Pornprasertsuk, Associate Professor
Chulalongkorn University, Thailand

Tuszie Widhiyanti, Ph.D., Lecturer
Universitas Pendidikan Indonesia, Indonesia

Udomluk Koolsriroj, Assistant Professor Dr.
Kasetsert University, Thailand

Utia Suarma, Lecturer/International Office
Universitas Gadjah Mada, Indonesia

Yi-Fen Yeh, Associate Professor
National Taiwan Normal University, Taiwan

Yu Lim Chen, Assistant Professor
National Taiwan Normal University, Taiwan

The Annual Meeting of Asia and ASEAN Center for Educational Research with Spring Institute

Live session

The timetable is written in Japan time

	10:40	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00
1/30		Spring Institute Opening	SDGs Workshop DAY1						Lesson Class Franklin Lo University of Cambridge	
2/6			Annual Meeting of Asia & ASEAN Center for Educational Research							
2/12			SDGs Workshop DAY2		PosterPresentation		Wrap up			
2/13	Opening	International Research Meeting					Wrap up & Closing			

On Demand Program

1/30 ~ 2/13	Lesson Class（Chiba University） （1.Prof.TSUJI, 2.Prof.TANABE, 3.Prof.SHIMONAGATA, 4.Prof.TAKAHASHI, 5.Prof.IZUMI, 6. Franklin Lo）
	University Tours
	Laboratory Tours
	Japanese Culture

International Research Meeting

Purpose of the Research Meeting

To find the subjects essential for the development and sustainability of the world is an essential ability for leaders in the next era. Furthemore, communication of those young people in the intellectual community will empower those young people. Therefore, this International Research Meeting aimed to create a platform for fostering next-generation leaders in the fields of science and education.
In this meeting, every presenter shows their achievements in science and educational activities with you. Please discover the advancement of scientific findings and exchange of knowledge and friendship at the meeting site.

We hope every presenter will find some positive suggestions and solutions for the progress of your research.

Timetable

The timetable is written in Japan time

Research Meeting（Feb.13）				
11：00~12：15	Group A	Group B	Group C	Group D
12：15~13：30	Group E	Group F	Group G	Group H
13：30~14：45	Group I	Group J	Group K	Group L
14：45~15：45	Group M	Group N	Group O	Group P
16：00~17：30	Closing & Wrap-up			

Members

Group A			
Chairperson	Ph.D, Ton Quang Cuong	VNU University of Education	Vietnam
Assistants	Nguyen Thi Khanh Ly		
	Tran Hoai Thu		
Presenter	Pronthep Kaewthongkham	Faculty of Education, Chiang Mai University	Thailand
	A Study of the Quality of Water in Chiang Mai		
	Nguyen Dao Phuong Nhi	The Olympia High School	Vietnam
	Air Pollution in Hanoi		
	Made Anindita Prahesti Dhamma	SMA 7 Denpasar	Indonesia
	AIR POLLUTION CAUSED BY GAS EMISSIONS		
	Wanwarin Limpanart, Parach Mabut, Pongpith Ruksutakarn	Chulalongkorn University Demonstration Secondary School	Thailand
	Nopanic Mask Nano Filter		
	Dang Khanh Linh	The Olympia High School	Vietnam
	From transportation to sick children: a research of Hanoi's air pollution		

Group B			
Chairperson	Associate Prof., Yi-Fen YEH	National Taiwan Normal University	Taiwan
Assistants	TENG, YA FENG		
	Peng Yen Chin		
Presenter	Lee, Ying Xuan/Lin, Yun Ting	Taipei Jingmei Girls High School	Taiwan
	The Research of the Light Reaction of Organic Compound		
	Armelyza Adler Rustam, Klinka Feyruz Chalisa	SMA Taruna Bakti	Indonesia
	Utilization of E.coli Bacteria in Contaminated Water of Citarum River as Microbial Fuel Cell Substrate		
	Yi Xing Lee	Taipei Jingmei Girls High School	Taiwan
	Compare the Background Rradiation Between Kinmen and Yangmingshan		
	Kamolwan Sowapak,Ekkaluk Khamphao	Silpakorn University	Thailand
	The helium ions shielding properties of steel slag		
	Hsiang-Hsuan Lee ,Tzu-Hsiang Weng	Taiwan Tapei Yang Ming High School	Taiwan
	How Ion thrusting technology can improve Rocket propulsion		

Members

Group C			
Chairperson	Rita May Tagalog, Ed.D	University of San Carlos	Philippine
Assistants	Jed Tomarong		
	Marchee Karen Diaz		
Presenter	Ivan L. Saligumba	University of San Carlos	Philippine
	Adding SALT (Self-Assessment Towards Learning Targets) in College Physics to Enhance Students' Self-Efficacy, Self-Regulated Learning Strategies, and Achievement		
	Nina Nurlatifah,Patricia Cindy Andiyanto	SMA N 3 YOGYAKARTA	Indonesia
	WEDANG UWUH INNOVATIONS AS A MILLENNIAL CANDY		
	Sakon Tangkawsakul	Faculty of Education, Kasetsart University	Thailand
	Annual Ring Problem: How do pre-service teachers mathematize it?		
	Ken Matsuzaki	Kaisei High School	Japan
	Improving Focus by Watching Horror Movies		

Group D			
Chairperson	Ph.D, Tuszie Widhiyanti	Universitas Pendidikan Indonesia	Indonesia
Assistants	Eksa Nursafira Sunarya		
	Sakhiyyah Afifah		
Presenter	Kongkiat Kunsa	Chulalongkorn University	Thailand
	An Analysis of Primary School Teachers' Understanding of Inquiry-Based Science Teaching		
	Judy Mae L. Castillo	University of San Carlos	Philippine
	Integration of the Fully Online Learning Community model with Digital Formative Assessment Tools and Student Response systems in Teaching Geometrics Optics		
	Kampanat Ta-in	Faculty of Education, Chiang Mai University	Thailand
	The Development of Environmental Awareness Integrated Instruction for the Courses in the English Subject using Problem-Based Learning for 11th Grade Students		
	KITANO Yoshinao,SAITO Rena,YADAV VALDES Rajan,YOSHIDA Riku,Lee Chenyu ,SUGIYAMA Ruri	Debate team	Japan
	What we learned through the debate		

Members

Group E			
Chairperson	Senior Lecturer, Ivonne Milichristi Radjawane	Institut Teknologi Bandung, ITB	Indonesia
Assistants	Adelina Lumbangaol		
	Edwin Apriyanta Winardi		
Presenter	I Nyoman Rai Widartha Kesuma	IPB University	Indonesia
	Usability Evaluation of the Participatory-based KMS Sawit Mobile Application		
	Hana Fauziah	SMA Labschool UPI	Indonesia
	DIY Solar Charger		
	Timothy Louis Barus	Pradita Dirgantara High school	Indonesia
	Effect of Using Air Conditioner Waste Water as an Electrolyte Solution In Lead-Acid Battery Against Current and Voltage Produced		
	Pichapong Tiemprasert,Thanut Weeraphan,Wisumitra Tirapanish	Kasetsart University Laboratory School, International Program	Thailand
	Engeon: A Smart Helmet Which Prevents Motorcycle Riders From Not Wearing a Helmet		
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Group F			
Chairperson	Ph.D., Karlisa Priandana, ST., M.Sc.	IPB University	Indonesia
Assistants	Dini Nurfaizah		
	Shaly Wanda Hamzah		
Presenter	Setthapon Krittigamas	Chiang Mai University Demonstration School	Thailand
	Reducing agricultural water use via utilizing symbiotic relationships between crops and plant growth promoting actinobacteria		
	Valencio Evanio Sahasika Kusumadyas	SMA Negeri 3 Yogyakarta	Indonesia
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	Nur Azahra Hariani,Raden Ade Septian Adiwinata	SMA Kornita	Indonesia
	Climate Change Threat: Coffea Stenophylla as The Coffee of The Future		
	Banthita Ketchom	Dara Academy	Thailand
	Carbon storage of Chamchuri trees in the landscape of Dara Academy		
	Yamamoto Ai	Ichikawa Gakuen Ichikawa Junior & Senior High School	Japan
	Differences between nukadoko samples		

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Chairperson	Dr. Eng (Head of International Office)Ni Nyoman Pujianiki	Udayana University	Indonesia
	Ph.D., Putu Ayu Asty Senja Pratiwi		
Assistants	Ayu Bintang Rena Sanjiwani Budhiarta		
	Putu Mayda Devianita Jaya		
Presenter	Duantemdoung Dethsuphar	Chulalongkorn University	Thailand
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	Arkananta Masarief,Elgracito Iryanda Endia,Raras Kaila Mitayani,Rosaline Cynthia Fina Sitohang,Ratu Putri Dewi	Pradita Dirgantara High school	Indonesia
	Aloe Vera Lamp		
	Ryan Ravioly Mukti	SMAN 1 Bandung	Indonesia
	Development of Water Management on Agricultural Highland in Indonesian Village		
	Archavit Chantasilp,Tanakrit Niranat	Suankualrb Wittayalai School	Thailand
	Non-fungible token(NFT)		
	OHATA Futaro, KAJIWARA Kent,YOSHIMURA Hayato,FUNAKI Yayoi,TSUCHIYA Ayaka,UETA Mami,HIZUME Suzu	Logical Analysis team2	Japan
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Group H			
Chairperson	Ph.D., Wanwisa Bungmark	Silpakorn University	Thailand
Assistants	Patteera Thienpermpool		
	Kititsak Sriwongsa		
Presenter	Parinchaya Wongdumrongsakul	Saint Joseph Convent School	Thailand
	Robotic machine for hearing loss people		
	Chanyanuch Tewapitak,Runch Puntawong,Amara Rodthong	King Mongkut's University of Technology Thonburi	Thailand
	Home Sweat Home		
	Haruka Yamaguchi	Graduate school of Education, Chiba University	Japan
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	Viritphon Chongpermwattanapol,Saranchana Juntanakeeree ,Saranpat Ngampayungpong ,Nattakit Sunthonthip	Patumwan Demonstration School	Thailand
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	FUKUCHI TAIKAN Markus, GOTO Yuko,HATANAKA Rio, TANAKA Yuna,SUGIURA Hyugo, OTSUKI Hiroto,TAKIZAWA Keita	Programming team1	Japan
	Python Programming		

Members

Group I			
Chairperson	Assoc.Prof. Dr.Poschanan Niramitchainont	Mahidol University	Thailand
Assistants	Tingting Wu		
	Chun Yang		
Presenter	Arnie Novianti Zulkarnain	Universitas Pendidikan Indonesia	Indonesia
	Wastewater is The Solution for Clean Water Crisis Inline with Climate Change		
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	Sakumi Enomoto	Chiba University	Japan
	Analysis of the differences in awareness of hydrocolloid dressings between general teachers and health care teachers		
	Rungradit Kulrit	Suankualrb Wittayalai School	Thailand
	Vaccine for hypersensitivity type 1		
	Kento Kajiwara	Tokyo Gakugei Univerfsity International Secondary School	Japan
	Analysis of the effects of lysozyme, catechin, and nattokinase on the growth of Streptococcus mutans		

Group J			
Chairperson	Associate Professor, Jeerawan Ketsing	Kasetsart University	Thailand
Assistants	Pattaraporn Pikunkwan		
	Sarayoot Channakorn		
Presenter	Anugrah Aditya Insani,Satria Tesa Vici Andi	Universitas Gadjah Mada	Indonesia
	Anthropogenic Geomorphological Mapping in Prambanan District, Yogyakarta, Indonesia		
	Jidarat Lakleam	Faculty of Education, Chiang Mai University	Thailand
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	Linh Ngoc Tran	High School of Education Science - VNU	Vietnam
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	Jasmine Khairunissa	IPB University	Indonesia
	Broiler Behavioral Analysis System Development to Achieve Agro Maritime 4.0		
	Kento Abe	Kugenuma High School	Japan
	Variation in the reaction of jumping spiders in response to the activity of preys		

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Group K			
Chairperson	Ph.D., Chalita Toopsuwan	King Mongkut's University of Technology Thonburi	Thailand
Assistants	Kriangdet Nakprasert		
	Surachan Netchinda		
Presenter	I Made Dwipayana Yoga	SMA 7 Denpasar	Indonesia
	The Effects of Bullying Towards LGBT Youths SDGs Research Peace, Justice, and Strong Institutions & Well-being and Good Health		
	Teejutha Kongsing	Chulalongkorn University	Thailand
	Development of Climate Change Education Curriculum to promote Climate Literacy of lower secondary school students		
	Thanawat Ngaoda	Faculty of Education, Kasetsart University	Thailand
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	Milanka Marinkovic	Mahidol University	Thailand
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Group L			
Chairperson	Assoc. Prof. Rojana Pornprasertsuk	Chulalongkorn University	Thailand
Assistants	Chansinee Buaphet		
	Supawee Jarus-u-raisin		
Presenter	Muhammad Hasby As-shiddiqy	SMA Labschool UPI	Indonesia
	Save Our Eectricity with IoT (Internet of Things)		
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	Yanapat Limrachadawong,Prasopchai Mahawong	Silpakorn University	Thailand
	The energy resolution and light yield of Li6GdB3O9:Ce scintillator crystal at 662 keV		
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Members

Group M			
Chairperson	Lecturer, Utia Suarma	Universitas Gadjah Mada	Indonesia
Assistants	Gonxha Bojaxhiu Obed Setiabumi		
	Avra Abida El Ravi		
Presenter	Le Thu Huyen	High School of Education Sciences, VNU	Vietnam
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	Tharadol Pornwisetsirikul	Faculty of Education, Chiang Mai University	Thailand
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Group N			
Chairperson	Ph.D., Pakdeekul Ratana	Chiang Mai University	Thailand
Assistants	Jannapha Soonjan		
	Watinee Kwangyoo		
Presenter	Napas Rattayabundit	Kasetsart University Laboratory School, Center for Educational Research and Development	Thailand
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	Adinda Siwi Utami	Universitas Pendidikan Indonesia	Indonesia
	Implementing "FeD Betel: 5 Days for Better Life" to Reducing Plastic Consumption Problems in Indonesia		
	I Made Dharma Raharja	Bandung Institute of Technology	Indonesia
	Tracking The Origin of Plastic Debris In Marine Protected Area of Nusa Penida, Bali		
	ABE Ryuki, CHIBA Haruki, SHIMOYAMA Yurika, SHISHIDO Tomoka, OBA Nanako, TODOKORO Ririka, SOMIYA Honoka	Logical Analysis team1	Japan
	Differences between causality and correlation		

Members

Group O			
Chairperson	Assistant Professor, Jose Gutierrez	Chiba University	Japan
Assistants	Sato Tsubasa		
	Takahashi Kenta		
	Mizuno Daiki		
Presenter	Suchawadee Ketchanok	Faculty of Education, Kasetsart University	Thailand
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	AYU YUANA	Universitas Pendidikan Indonesia	Indonesia
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	HOSOMI Takuma,SATO Yuki,HASHIGUCHI Rin,SUGIYAMA Oki,SAKURAI Kazuki,UENO Sotaro,SHINDO Kanata	Programming team2	Japan
	One step closer to matplotlib phython		

Group P			
Chairperson	Ph.D., Peter Chukwurah	Chiba University	Japan
Assistants	Ishigaki Yutaro		
	Ainiwaer Aikeremu		
Presenter	Lia Laela Sarah	SMA Labschool UPI	Indonesia
	The Implementation of STEM Learning on Renewable Energy In Physics Classroom		
	Teresea Marie Benitez,Aniesa Gabutero,Aveline Joni Laurente,Monica Nacario	University of San Carlos	Philippine
	THE PRESCHOOL TEACHERS' ATTITUDES TOWARDS INCLUSIVE EDUCATION IN SAINT LOUIS COLLEGE - CEBU		
	Saharad Yokyong	Faculty of Education, Kasetsart University	Thailand
	Enhancing Tenth Graders' Scientific Argumentation Skills Through Online Socio-Scientific Issue (SSIs)–Based Teaching		
	UESAWA Mao,TAKAHASHI Yuto,TAKEUCHI Hina,TADA Harune,TORIMARU Mao,FUKUHARA Shota,YOKOYAMA Mew	Social design team	Japan
	Social design team		

- Proceedings -

High School Students

Air Pollution Caused by Gas Emission
SDGs Research of Good Health and Well Being

Made Anindita Prahesti Dhamma[1], Ph.D. Putu Ayu Asty Senja Pratiwi [1] , Dr. Ni Nyoman Pujianiki[2], Ayu Bintang Rena Sanjiwani Budhiarta [2] and Putu Mayda Devianita Jaya[2]

1. SMAN 7 Denpasar, Bali, Indonesia
2. University of Udayana, Bali, Indonesia

Purpose and Background

This research is conducted from corncerns as Indonesia, a developing country and also home to 273 million people, is listed as one of the top 10 worst air quality countries in the world according to a few Indonesian news channels such as liputan 6, Kompas.com and cnnindonesia. The worsening air quality over the years has showed bad impacts for the health of its citizen. Many studies and research have been done to prove the devastating effects of the air pollution and yet not much has been done especially in provinces like Sumatra and Jakarta, where the air pollution has literally taken thousands to millions of its citizen's lives. This research was made to raise awareness about air pollution as well as promote ways to improve air quality in Indonesia with the hopes of improving the life expectancy and lower respiration related health issues as a way to complete the 3 rd SDG of Good Health and Well Being.

Materials and Methods:

The materials were using two journals, Air pollution and human health (Lave Seskin 1970) The transport sector as a source of air pollution (R. N. Colvile, E. J. Hutchinson, J. S. Mindell, R. A. Warren). The methods were using the qualitative and quantitative analyses regarding Indonesia's air quality condition as well as the effects and solution by comparing it with theories and cases already researched in the journals.

Results and Discussion:

Based on the research, it was discovered that six out of ten Indonesia cities are listed on the Top 10 Southeast Asia cities with the worst air quality according to IQAir. After analysing the root problems of bad air quality in Indonesia, it turns out that vehicle use contribute 60 % to Indonesia air pollution, making it the highest among other factors. This high contribution from vehicle is no surprise considering that Indonesian population mostly use private vehicle, especially students. Even though the government has made several attempts to overcome the vehicle use problem by providing public transportation and new student acceptance system according to the house distance, this was proven to not be enough as both attempts has not been affective in reducing the number of vehicle used everyday. This was because the lack of socialization to public about the public transportation and peer pressure students are getting from school about using their own vehicle to school.

In addition to that, there needs to be new ways implemented. Raising awareness about mass use of private vehicles can start from oneself by walking and using bicycle for short distance travel. Other than that, as one of the main corncern today is increasing socialization regarding the public transportation so the public can feel safe and at ease when changing their ways from using private vehicle to public transportation. Lastly, one of the new ways that can be implemented is the buddy system. The buddy system introduced a new way for students to be able to ride their own vehicle to school but with a note of bringing one friend with the closest house with them to school.

Lastly, Indonesia has an ambition to cut carbon emissions by 29% by 2030. This ambition of course feels near impossible with the growing demands and use of vehicle today. However, there is still hope. There is still hope for the success of Indonesia's higher air quality and ways to prevent the worsening case of air pollution from carbon emissions. By raising awareness and implementing ways to reduce our vehicle use, Indonesia's high air quality will be more than an ambition

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Compare the Background Radiation Between Kinmen and Yangmingshan

Yi Xing Lee
Taipei JingMei Girls High School , Taiwan

Purpose and Background:

My experiment objective is to compare the differences of background radiation in Kinmen and in Yandgmingshan, which is located in northern Taiwan. I accidentally found that the radiation in Kinmen is even higher than that in Yangmingshan. What's more, there is a huge gap between the background radiation dose in Kinmen and in Ronghu Water Purification Plant; the two places are only 20 kilometers from each other but the former ranks third in Taiwan. The above two phenomena aroused my curiosity.

Materials and Methods:

First, I processed the CSV data from the Internet, organized and kept only useful information. Then I calculated the data I needed. Finally, I used Python to draw my graphs and to compare the following three themes:

1. Monthly variation of the background radiation at three stations.
2. Kinmen's hourly average in the past thirteen years.
3. The annual variation of the background radiation at the three stations.

Figure 1

Monthly variation of background radiation at Kinmen and Yangmingshan

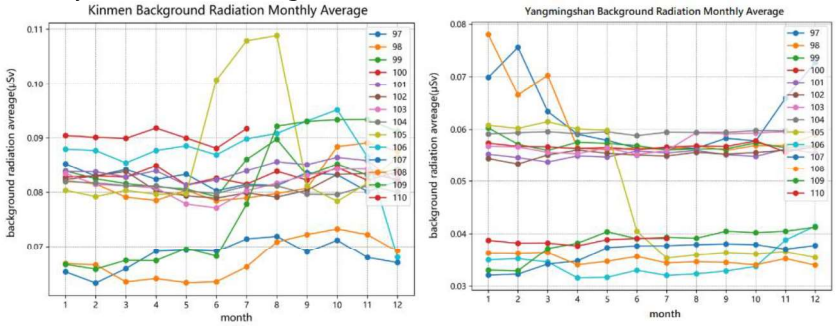
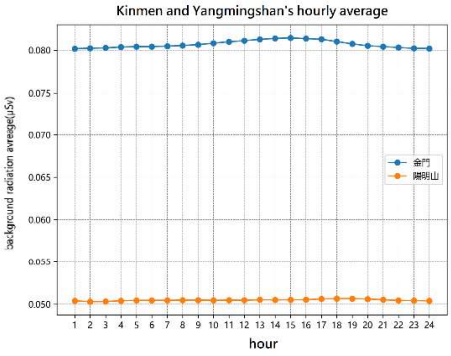


Figure 2

Kinmen's hourly average in the past thirteen years



Results and Discussion

From the above research, I achieved three results:

1. Both Kinmen and Yangmingshan experienced a data fault in 2016. It might be because of the replacement of the instrument, or some other reasons which are worth investigating.
2. Second, the radiation in Kinmen was higher in autumn and winter during the year, and it was different from other places.
3. Kinmen's radiation in the afternoon was higher than the others, which may be related to the temperature.

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WEDANG UWUH INNOVATION AS A MILLENNIAL CANDY

Nina Nurlatifah[1], Patricia Cindy Andiyanto[1]

1. SMAN 3 Yogyakarta

Purpose and Background

Wedang uwuh is one of the traditional drinks in the form of leaves like garbage. Uwuh in Javanese means trash. Dubbed uwuh because the dregs or ingredients of this drink look like useless trash. The presence of nutritious ingredients in wedang uwuh has been proven to be beneficial for health. One of them is rich in antioxidants. But as time goes by, people prefer instant smelling things. Therefore, we have an innovation to package wedang uwuh in the formof millennial candy so that all people can enjoy the benefits of wedang uwuh.

The purpose of this study was to determine the antioxidant content found in millennial candy from wedang uwuh, and to find out the response and public opinion about millennial candy from wedang uwuh..

Materials and Methods

Wedang uwuh candy is made using wedang uwuh dregs, water and gelatin powder. This study tested 3 different ratios between wedang uwuh dregs and water with water having a constant ratio: 1:1, 2:1, and 3:1. This research uses observation methods, literature studies, experiments, laboratory tests of antioxidant content, analyzing experimental results and organoleptic tests.

Expected Results and Discussion

The expected result from laboratory testing is that wedang uwuh candy with a ratio of 3:1 has the highest antioxidant content. Meanwhile, the organoleptic test obtained the best data on wedang uwuh candy with a ratio of 2:1.

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Improving focus by Watching Horror Movies

Ken Matsuzaki

Kaisei High school, Japan

Purpose and Background:

Mood Congruence Effect is a psychological phenomenon that we tend to form positive memories when we are feeling positive, and negative memories otherwise, but its mechanism still remains unknown. The hypothesis in this research is that you tend to pay attention to positive things when feeling positive (and otherwise), which brings about Mood Congruence Effect. In particular, this study attempts to prove this hypothesis in the case of fear.

Materials and Methods:

Group 1 (and 2) watched a 10-minute horror video clip, then worked on the positive (or negative, Group 2) word spotting tasks, where they attempted to spot as many positive (or negative, for Group 2) words as possible from a sequence of other meaningless characters. As control groups, Group 3 (and 4) worked on the positive (or negative, for Group 4) word spotting tasks without watching a horror video.

There were 10 words to be spotted in either of the tasks, and these words were carefully chosen so that anyone can immediately see that the word is positive or negative. The characters in the sequence were th don't convey any meaning or form any meaningful words.

For each group, demographic information about the participants were collected. For Group 1 and 2, participants were required to read the consent form, warning that they were going to watch the horror video clip. Also, after they watched the video clip, they reported their subjective opinion on how scary they felt the video was by 4 levels (very scary, scary, not quite scary, not very scary at all).

Results and Discussion

In total, 52 people participated in this experiment (15, 9, 9, 14 people for Group 1, 2, 3, and 4, respectively). Some of the participants claimed they had spotted more than 10 words, in which case their data were removed from this process of analysis. For each group, the average number of words spotted is shown in Table 1. Two T-tests were conducted to see if this data suggests any significant difference, neither of which did (see Table 2).

Group #	Avg. number of the spotted words
Group 1	6.5
Group 2	5.0
Group 3	5.6
Group 4	6.4

Table 1: the average number of words spotted

Combination	*p*-value from T-tests
Group 1 vs. 3	0.35
Group 2 vs. 4	0.23

Table 2: *p*-value from T-tests of targeted combination

This suggests that the hypothesis did not turn out to be true. Other t-tests and correlation coefficients were analyzed to see if it suggested any relationship between the words spotted and their age, gender, or reported scariness, none of which suggested such, either. Potential biasing factors, such as uneven male-female ratio of the participants (48 out of 53 were female), or the horror video clip being scary enough, can be pointed out, and further study can be carried out to inspect them.

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DIY Solar Charger

Hana Fauziah

SMA Labschool UPI

Background and purpose:

Renewable energy is energy that the sources are easy to obtain back naturally or with a certain process. This energy will not run out if its sources are managed properly. Besides being easy to get back, renewable energy believed to be very environmentally friendly and can reduce the effects of damage due to the use of fossil fuels.

One of the renewable energy is solar cells. Solar cells or solar panels are tools to convert solar energy into electrical energy. while photovoltaic is a technology that functions to convert solar radiation into electrical energy directly. Lately, Solar cells are gaining popularity because of the depletion of fossil fuels supplies and the global warming issue.also, the energy produced is also very
cheap because the source of energy (solar/sunlight) can be obtained for free.

The purpose of this experiment is to design a prototype of a DIY Solar Charger as an environment-friendly alternative source of renewable energy.

Materials and Method:

The materials used to create DIY Solar Charger are (1) avo meter; (2) glue gun; (3) cutter; (4) glue; (5) cable/jumper; (6) ice cream stick; (7) tinol & soldering iron; (8) mini solar panel; (9) USB step up/down; (10) scissor.

The methods for making DIY Solar Charger are (1) make a design; (2) test the solar panel circuit using a voltmeter, if the result is less than 5 volts then fix the circuit first; (3) use a USB step down to lower the voltage to 5V according to the mobile phone voltage requirement; (4) Combine the solar panel circuit with the base circuit.

Result:

Solar panel	Dimention/surface area	voltage
Panel 1	36cm^2	5V
Panel 2	63cm^2	5,5V
Panel 3	97,5cm^2	13,5V

Lux(light power):56.559

I use panel 3 because even though the voltage is more than 5V, by using a panel with a higher voltage and then lowering the voltage with a USB step down will make the result more stable compared to the panel that has a maximum voltage of 5V.

Electricity from the solar charger enters the cellphone and successfully charges the cellphone and the power bank, but when the solar charger is not exposed to enough sunlight, less electricity enters the cellphone or the power bank.

Conclusion and Discussion:

1. The solar charger that has been made can produce a voltage of 5V after using usb step down, so it can be used as a cellphone charger or power bank.
2. The solar charger that has been made is much more efficient and environmentally friendly compared to a charger that uses home electricity, this solar charger also does not depend on home electricity as long as there is sunlight. and also more portable and can be carried anywhere.
3. This solar charger still needs to be developed using a step-down USB which is more stable, but this experiment is an interesting challenge to create renewable energy
4. The larger the panel that was used, the greater the voltage generated

Effect of Using Air Conditioner Waste Water as an Electrolyte Solution in Lead-Acid Battery Against Current and Voltage Produced

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Purpose and Background

Air conditioners nowadays are commonly found everywhere. The process to decrease the heat of its surroundings makes air conditioners produce distilled water as its side product. This water holds a huge potential due to its pure properties (Sabnis et al, 2020). However it hasn't been used to its full potential and still gets treated as a waste. One of the potentials this water holds is to be a better water refill for lead-acid batteries than mineral water, as it has similar properties to battery acid water. This research project was held to find out the effect of air conditioner's utilization as lead-acid electrolyte water against the current and voltage produced throughout the time.

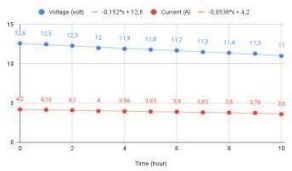
Materials and Method

Materials that are used in this experiment are two lead-acid batteries, one 1000 ml bottle of 96,1% sulfuric acid, multimeter, air conditioner waste water, mineral water, and 12 volt operating solenoid valve. Before running the experiment, for each battery the concentration of the sulfuric acid was decreased to 35%. Then, each was combined with air conditioner waste water and mineral water and was poured inside the batteries respectively. The batteries were wired with the multimeter and the solenoid valve. The experiment was conducted for 10 hours for each battery and the data of voltage and current produced are recorded every one hour. Both data were used for comparison using gradient line.

Result and Discussion

Air conditioner water experiment result:

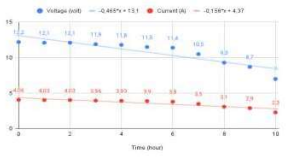
Time (hour)	Voltage (volt)	Current (A)
0	12.6	4.2
1	12.5	4.166
2	12.3	4.1
3	12	4
4	11.9	3.96
5	11.8	3.93
6	11.7	3.9
7	11.5	3.83
8	11.4	3.8
9	11.3	3.7
10	11	3.66



ΔV = -1.6 volt
ΔA = -0.54 ampere
$V_{gradient}$ = -0.152
$A_{gradient}$ = -0.0536

Mineral water experiment result:

Time (hour)	Voltage (volt)	Current (A)
0	12.2	4.06
1	12.1	4.03
2	12.1	4.03
3	11.9	3.96
4	11.8	3.93
5	11.5	3.93
6	11.4	3.8
7	10.5	3.5
8	9.3	3.1
9	8.7	2.9
10	7	2.3



ΔV = -5.2 volt
ΔA = -1.76 ampere
$V_{gradient}$ = -0.465
$A_{gradient}$ = -0.156

Based on the comparison, AC water lead-acid battery has lower voltage and current value drop rate is better to produce continous electricity. Further filtartion method might improve AC water performance.

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Engeon: A Smart Helmet Which Prevents Motorcycle Riders From Not Wearing a Helmet

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Purpose and Background:

An increase in the number of motorcycle riders correlates to a greater number of road accidents. On this account, a solution to this problem is mandatory. The purpose of this project is to promote a safety alternative for those who commute by motorcycles frequently in the hopes of being able to reduce road accident cases. We found out that motorcycle helmets are one of the most effective and vital accessories for motorcycle riders, but sometimes are overlooked due to negligence. With the design of Engeon, we can ensure that motorcycle riders would be at less risk of serious injury in the case of accidents.

Materials and Methods:

Engeon is composed of 8 main components including 3D printed motorcycle helmet, Arduino Uno Board, Arduino KY-008 Laser Sensor Module, Arduino Laser Receiver Module, Arduino KY-036 Human Touch Sensor Module, Arduino HC-05 Bluetooth Module, a motorcycle killsswitch and AA batteries. We first created a working system of Arduino laser sensor and Arduino human touch sensor by soldering the wires together and respectively programming the system through Arduino. The system is then wired to two batteries.

After that, we started preparing the killswitch by soldering it to an Arduino Bluetooth Signal Receiver and wired it to the batteries. The Arduino Bluetooth Signal Transmitter is also soldered to the initial system we have created so as to make communication between the two separate components possible.

Result and Discussions:

The helmet is currently in its initial stages of development. Even though we have successfully created a basic system consisting of the helmet and the kill switch which are capable of communicating via bluetooth, we have yet to test our prototype with an actual motorcycle. However, as our innovation is mainly concerned with enhancing the function of a killswitch, this is negligible especially as we have already successfully tested it with a relay.

Though there are no major hardware issues we have encountered, the biggest difficulties in developing an innovation like Engeon can be attributed to time management, idea articulation and contacts. We have fallen behind our developmental timeline numerous times and been obstructed by engineering mistakes we have made from not having articulated our ideas sufficiently. Additionally, contacting specialists and scheduling a meeting have also rendered a major problem.

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Wettability of Metallic Glass Nanotube Array Fabricated through Physical Vapor Deposition

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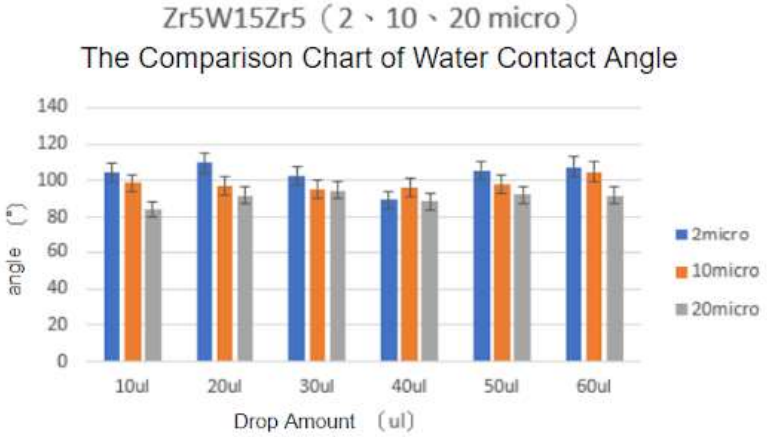
Water contact angle, usually tested to know the wettability of materials, is necessary for most of the materials, including metallic glass nanotube array (MeNTA) when developing applications of it. The purpose of this research is to acquaint the wetting properties of MeNTA. By testing the water contact area and wettability, the best hydrophilic or hydrophobic angle of the MeNTA under certain parameters can be tested.

MeNTA is a unique material that has characteristics of high strength, toughness, and durability. With these features, MeNTA can be an ideal material for solar cells, medical instruments and so on. MeNTA is different from other unistructural planes in some ways. Take two prominent features as an example. First, tens of million nanotubes can be planted on a 0.5 square centimeter wafer for MeNTA. What's more, the specific amount of nanotubes can be decided by just controlling either the size of nanotube diameter or nanotube spacing. Next, its cost of production can be reduced by the mass production of it. With these unique features, it can be widely applied to different fields. One of the applications that Professor Chu's laboratory is now developing includes wound dressing with ZrWZr MeNTA coated and other chemical material on it to speed up recovery.

The main equipment used for the experiment are physical vapor deposition apparatus, automatic contact angle analyzer, and the test pieces for building MeNTA after the photolithography process. In addition, the main method that structured MeNTA is physical vapor deposition. Our experiment design can be mainly separated into four steps. The first step is to sputter MeNTA. Next is to analyze the structure of it under the scanning electron microscope**.** Third, measure the water contact angle of MeNTA. The last step of the experiment is to analyze the data.

Chart on the right-hand side shows the result analysis of this experiment. Zirconium and Tungsten are deposited on substrate for fabricating MeNTA. The final data of water contact angle comes from 5 or 6 outcomes. What the data on the chart shows are the average of the 5 or 6 outcomes. The parameter we used for the experiment is Zr5W15Zr5. Different nanotube diameters are the independent variables of this experiment. Diameter of 2 μm, 10μm, and 20μm respectively. The chart shows that different nanotube diameters will cause different angles. For instance, when the automatic contact angle analyzer drops a 10 microliter droplet, the presented water contact angle from the small to large diameters is test pieces of 20 micrometers, 10 micrometers and then 2 micrometers. As a result, the conclusion of the experiment is in the range of 2 micrometers to 20 micrometers, the smaller tube diameter is, the more hydrophobic it is.



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Reducing agricultural water use via utilizing symbiotic relationships between crops and plant growth promoting actinobacteria

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Purpose and Background

Water is an indispensable resource for sustaining life on the planet. Usable freshwater only makes up a small fraction of the total amount of water on earth; thus, preserving freshwater is of great importance to sustain life. The majority of freshwater is used for agricultural purposes. If water use in agriculture could be reduced, the amount of freshwater available for other purposes would be significantly higher. Plant growth promoting actinobacteria (PGPA) are a form of gram-positive actinobacteria which can promote the growth of plants grown under drought conditions. (Lasudee et al., 2018) They do not have any negative effects on the environment or organisms; thus, they could prove beneficial if implemented in agriculture. Incorporating plant growth promoting actinobacteria into agriculture could bring forth benefits to the plant. Plants would be more resistant to droughts (Lasudee et al., 2018), gain necessary nutrients from the soil (Richardson, 2001), and resist plant disease (Gopalakrishnan et al., 2013). These factors contribute to the plant requiring less total water for similar growth.

Materials and Methods

Thai basil (*Ocimum basilicum.* L. var. *thyrsiflora*) was grown in two experiments where 16 Thai basil seeds were planted on rockwool substrate and watered with "DoubleOAT" fertilizer solution in 10-day intervals. The experiments were done in a sterile environment where the temperature was kept at ~26°C and light intensity was maintained at ~40μmol·m^{-2}·s^{-1} throughout the whole 30-day experiment period. The first experiment was a control experiment where the plants initially received 100cm^3 of "DoubleOAT" fertilizer solution on the first day and 10cm^3 on the 10th and 20th day. The second experiment was treated with 10^8 cfu/ml *Streptomyces sp.* Isolate S3 and was watered with only half of the amount of "DoubleOAT" fertilizer solution. Photographs and planting box weight were recorded on the 1st, 10th, 20th, and 30th day. After the 30-day period, the Thai basil plants from both experiments underwent thorough biochemical analysis where fresh weight, chlorophyll content, proline content, sugar content, and hydrogen peroxide content were statistically analyzed using one-way analysis of variance (ANOVA) and Tukey's multiple range tests (TMRT). Calculations were done in SPSS (version 16.0) at $p = 0.05$

Results and Discussion

Plants from both experiments yielded similar appearance despite the second experiment receiving only one-half the amount of "DoubleOAT" fertilizer solution. As shown in **Table 1**, Fresh weight, chlorophyll content, proline content, and sugar content were not measured to be statistically different between the two experiments suggesting that the basil plants' ability to synthesize sugars and protein were not hindered despite a reduction in hydration and nutrients.

Treatment	Total Chlorophyll	Proline content	Sugar content	H2O2 content
Control	19.39 mg/g.FW	77.32 μg/g.FW	7.01 μg/g.FW	887.5 μmol/g.FW
S3	19.18 mg/g.FW	73.82 μg/g.FW	5.95 μg/g.FW	1795.8 μmol/g.FW

Table 1; biochemical analysis of basil plants

However, hydrogen peroxide content in the second experiment was observed to be elevated compared to the control experiment, incicating that the basil plants in the second experiment were under stress. Despite being subjected to drought conditions, the basil plants treated with *Streptomyces sp.* Isolate S3 were not observed to have diminished growth compared to the control experiment. These results correlate to a past study on thai jasmine rice (Lasudee et al., 2018) in which S3 treatment was observed to have positive effects on the water-stressed jasmine rice.

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ANALYSIS OF POTENTIAL GROUNDWATER AVAILABILITY USING EUCLIDEAN DISTANCE IN YOGYAKARTA SUBURBAN CITY

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Purpose and Background

Water is one of the basic needs for humans, water resource problems occur due to the increase in population and changes in land use (Vörösmarty et al., 2000). Changes in land use on the suburbs of the city are indicated by the reduced open area and vegetation. This phenomenon causes problems for the sustainability of groundwater potential, namely groundwater (well water) which quickly runs out (drys) in the dry season. As is the case in the suburbs city of Yogyakarta (District Banguntapan). Therefore, a spatial approach (GIS application) is used to find potential spaces for groundwater availability by referring to the distance relationship between spaces using the Euclidean Distance method. The purpose of this study is to determine changes in the recharge area, water absorption space, and the distribution of groundwater availability with high, medium, and low potential.

Materials and Methods

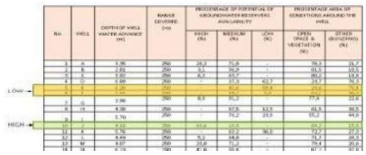
The research material used in this study consisted of primary data, namely survey activities and observations ofthe depth of the groundwater table in 14 dug wells selected by purposive sampling and the existence of three types of vegetation. Furthermore, secondary data collection consists of multi-temporal satellite image data from the Suburbs of Yogyakarta, namely 2006 and 2019, rainfall data, soil type data, and geological data (rock type layers). The research method is a combination of qualitative analysis and quantitative analysis. The qualitative analysis includes interpretation of multi-temporal satellite imagery, to identify open space and vegetation areas. Furthermore, the quantitative analysis includes the use of the Analytic Hierarchy Process (AHP), Weighted Linear Combination (WLC), and Overlays methods to identify recharge area using Euclidean Distance GIS analysis. While the GIS Overlay analysis is to determine the spatial distribution of the potential for groundwater availability.

Expected Results and Discussion

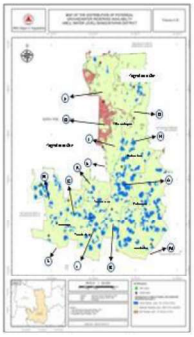
The expected results are as follows :

a. IDENTIFICATION OF THE POTENTIAL DISTRIBUTION SPACE GROUNDWATER AVAILABILITY

b. IDENTIFICATION OF POTENTIAL GROUNDWATER AVAIBILITY BASE ON OBSERVATION DUG WELLS



c. MAP OF THE DISTRIBUTION OF POTENTIAL SPACE THE AVAILABILITY OF GROUND WATER



Discussion: The area of the open space has decreased by 627.38 hectares, meaning that it is a recharge area that has decreased by 316,752.52 m³. The diminishing existence type vegetation areas have affected the absorption area is 125,531 hectares, meaning that the groundwater infiltration rate is 260,360.55 m³. The spatial distribution of potential groundwateravailability in the suburbs of Yogyakarta City is as follows: a. The space with a high potential of 8.33% isdug well J; b. Medium potential space, which is 84.94%, is dug wells A, B, C, F, G, H, I, K, L, M, andN; c. Low potential space which is 6.79% is dug well D and E.

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Carbon storage of Chamchuri trees in the landscape of Dara Academy.

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Background and research question

Carbon dioxide can occur for many reasons such as human activities, Industry factory, burning fuel, oil, coal and natural gas from theproduction process of energy, transportation, including the change in land use and the burning of solid waste which is an important cause (Watthanarong,2018). CO^2 reduction can be accomplished in manyways such as using recycled paper reduce the use of plastic, reduce waste burning, avoid cutting down tree because one tree can absorb 9-15 kg of carbon dioxide / year. (Royal Park Rajapruek ,2017). Therefore, the researcher is interested in carbon uptake by studying the carbon storage of trees by surveying and calculating the amount of carbon storage in the trees from the Chamchuri tree, In addition, the results of studies that have raised awareness of the conservation and planting of trees to solve environmental problems will continue. The purpose is to study the amount of carbon storage in Chamchuri trees around Dara Academy and find ways to reduce carbon dioxide.

Materials and Methods

Materials: tape measure, cardboard right triangle.

Methods: Survey and select 10 Chamchuri trees within the Dara Academy scattered within the school then measure the circumference of the tree at 1.3 meters above ground (using tape) and measure the height of the tree (using trigonometry).Calculate biomass according to Ogino's Allometry Equation et al. (1967) and calculate Carbon Storage from the Tsutsumi's equation et al. (1983)

Chamchuri trees	Hight (m)	Diameter(m)	Carbon storage(kg/tree)				
			Stem	Branch	Leaf	Root	Total
At Activity Area	34.92	2.29	10337.20	9813.83	2.88	924.08	**21077.98**
At Dararasmee Building	22.88	2.01	5576.23	4667.58	2.86	543.74	**10790.41**
At Greenclassroom Area	7.45	1.16	757.12	421.71	2.66	97.79	**1279.274**
At beside Winnie Building	15.62	0.73	631.71	339.09	2.62	83.70	**1057.123**
At School Bank	13.73	1.13	1243.60	766.47	2.74	149.79	**2162.604**
At near Swimming Pool	16.62	0.75	705.53	387.36	2.65	92.04	**1187.575**
At 115th Anniversary Memorial Building	18.51	1.11	1586.93	1027.95	2.77	184.69	**2802.346**
beside Football Field	19.84	0.99	1364.27	856.88	2.75	162.20	**2386.094**
entrance to the front	36.67	2.18	9898.08	9314.10	2.88	890.25	**20105.3**
At Winnie Building Area	19.18	1.26	2058.13	1405.78	2.80	230.92	**3697.636**
						Sum	***66546.34***
						Avg	***6654.634***

Results

Carbon storage is between 1057-21078 kg/ tree. The preserved Chamchuri trees in Dara Academy had average carbon storage of 6655 kg/tree. This is considered to be very high compared to the large trees in most natural forests in northern Thailand that have a carbon storage content of about 100-1,000 kg/tree

Discussion and Conclusion

The study found that the 9th tree is taller than the 1st tree but has a smaller diameter which is called the annual ring of the tree. The amount of carbon storage in the stems, branches and roots of the 1st was higher than the 9th but the amount of carbon storage in the leaf part was very similar., however, if the size of the year circle is greater, the amount of carbon storage is greater. The size of the trunk of the Chamchuri tree, which was proportional to the age of the tree, had an effect on the ability to store carbon in the tree's biomass according to Kasetsart University (Wasan,2010)said that carbon storage depends on tree species, age, planting period and local conditions, as well as forest management methods. We can use this study as a guide to plant care, give the tree a longer life which affects the year circle even more, or you can consider planting other types of trees with larger branch sizes.

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Differences between nukadoko samples

Ai Yamamoto

Ichikawa Gakuen Ichikawa Junior & Senior High School

Purpose and Background

Nukadoko is a fermented pickle made by pickling seasonal vegetables in a bed of rice bran (nukazuke) fermented mainly by lactic acid bacteria. Recently, my grandparents' neighbors gave me some of their bran bed, which has been handed down since the Taisho era (1912-1926). It is said that, in general, the older the nukazuke, the better it becomes. In fact, when I pickled cucumbers for the same amount of time in a newly prepared bed and a bed that I had been using for a long time, the newly prepared bed seems to produce less salty pickles. Since bran bed has a lactic acid fermentation, it would be appropriate to compare the number of lactic acid bacteria by changing the salt concentration to confirm the difference between the old and the newly prepared bran beds. Ono et al. (2015) found that the types of lactic acid bacteria differed in bran beds with salt concentrations. However, it has not been discovered which salt concentration is suitable for different maturation periods of bran beds. In this research, I verify the differentiation in the colony number of bacteria between the Taisho Era (“T”) and a newly prepared commercial bed (“S”).

Materials and Methods

I cultured lactic acid bacteria from bran beds T and S in Petri dishes with agar with Brom Cresol Purple (Nissui, Japan) in five incubation trials. Each incubation consisted of three different salt concentrations: 3%, 5% and 7%, and were incubated at room temperature for three days. After sampling 10g of each of the cultures, three dilution concentrations were prepared: 10^{-3}, 10^{-4} and 10^{-5} the original volume.

Results and Discussion

In the first incubation, the bran bed “S” had a higher number of lactobacilli overall, and among them, 3% had the highest number of lactobacilli. was the highest at 5%. On the other hand, in the second incubation, the overall number of lactic acid bacteria was higher in the continuously used bran bed T. However, in both the first and second incubations, the commercial bran bed S had the highest number of lactic acid bacteria at 3% and the continuous use bran bed T had the highest number of lactic acid bacteria at 5%. The reason why the lactobacilli did not appear on the medium in the 3rd, 4th, and 5th times was as follows: 1) the incubation time was equal in all cultures; 2) the procedure may have been rough because it was done three times at once. In the future, we will continue culturing for the above reasons, and also consider approaches other than lactic acid bacteria (such as microscopic observation).

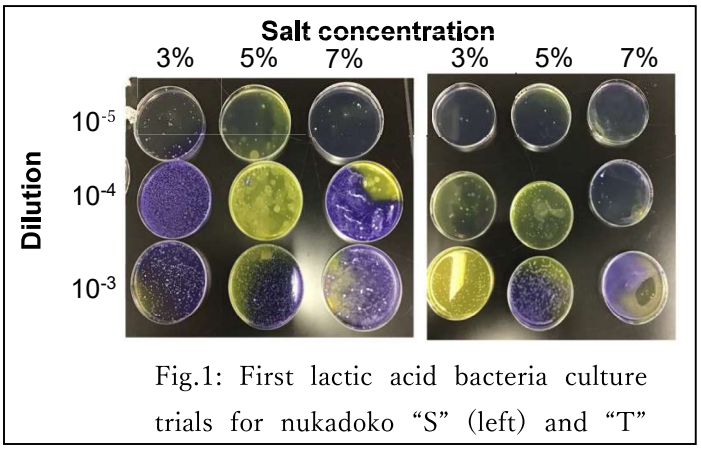

Fig.1: First lactic acid bacteria culture trials for nukadoko “S” (left) and “T”

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Aloe Vera Lamp

Arkananta Masarief[1], Elgracito Iryanda Endia[1], Raras Kaila Mitayani[2], Rosaline Cynthia Fina S[2] and Ratu Putri Dewi[2]

Pradita Dirgantara High school, Indonesia

Purpose and Background

The background of this project is the limited electricity access in rural parts of Indonesia. The purpose of this project is to introduce plants as an energy source as well as to know the amount of electricity from *n* aloe vera plants can light a lamp.

Materials and Methods

Zinc and copper plates, a multimeter, soldering wire, soldering tool, alligator clips, and an aloe vera plant are all required materials. When electrodes are implanted into an aloe vera plant, chemical energy is converted into electrical energy through an oxidation-reduction reaction. As a result of the anode electrode's oxidation and the cathode electrode's reduction, electrons move from the anode to the cathode to generate electricity.

Results and Discussion

The aloe vera lamp works by utilizing the process of photosynthesis. By implementing electrodes into plants, an electrochemical process occurs which converts chemical energy into electrical energy through an oxidation-reduction reaction. The electrical energy that was converted is used to light up a bulb. We can generate 4.2 volts and 0.2 amps from two plants with a total of ten leaves, enough to power a 5mm LED bulb. We utilize a parallel electric circuit since it is the most efficient electric circuit, according to studies. With this project, we introduce plants as an energy source, this can be an alternative energy source that reduces the need of PLN based electricity.

Table and/or Figure(s)

	Number of Aloe Vera plants	Number of copper plates	Number of zinc plates	Voltage (V)	Current (A)	Power (W)
1.	1 plant	1	1	1.3	0.06	0.08
2.	1 plant	5	5	2.43	0.11	0.27
3.	2 plants	7	7	2.86	0.14	0.40
4.	2 plants	10	10	4.23	0.2	0.86

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Development of Water Management on Agricultural Highlands in Indonesian Village

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2. Institut Teknologi Bandung, Indonesia

Purpose and Background:

Highland areas usually contain many clear springs. However, this is not the case in Pangalengan Village, Bandung, West Java, Indonesia. One of the RWs, RW 24, does not yet have clean and adequate water services. The residents generally have a livelihood as farm laborers and cattle breeders. The springs in RW 24 cannot be used because 5 large springs are contaminated with cow dung and chemical fertilizers. The other 2 large springs that have good quality are already owned by private companies and the local community is not able to afford the service fee. Moreover, water distribution in RW 24 is uneven. The position of the spring is located below the village, causing residents to carry water to their homes. Meanwhile, residents who live close to the springs have very easy access to clean water. Recently, the Bandung Institute of Technology (ITB) community service program has helped find new springs and build a water distribution system using electric-powered pumps. Although this technology is very useful, the costs incurred by the community are quite large so that it becomes an economic burden for each family there.

The purpose of this literature review is to recommend a new water distribution system that is suitable for the environmental, social and economic conditions of the residents of RW 24, so that the availability of water can effectively meet the needs of the community. Furthermore, business units such as Rural Drinking Water Management (PAMDes) can help distribute clean water efficiently according to data on the number of residents and houses.

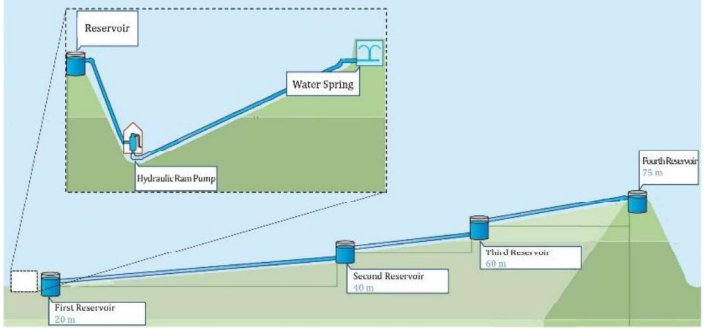
Materials and Methods:

Problems were identified from the literature review and information obtained from the ITB team. This manuscript was written using a hypothetical method. Hypothesis is a scientific method that offers an idea as a solution to the problems that have been identified. A communicating vessel and a hydraulic ram pump are proposed in this manuscript to replace the electric pump currently used in water management in Pangalengan Village.

Results and Discussion

The tub or vessel will be connected to a spring located in the lowlands. Then, the vessels are made by connecting each other from the top to the bottom of the next vessel on a higher ground (Figure 1). With the help of a hydraulic ram pump, if water is added to the first vessel, the water will be elevated to flow into the second vessel. This pump utilizes the power of the flow of water that falls from a water source and some of the water is pumped to a higher place without the need for electricity or fuel. It is hoped that this will continue to the next connected vessels until water can flow to the housing of the residents of RW 24. It is necessary to study the structure and design of further tools related to soil strength so that their utilization can be optimized.

Figure 1. Solution for using a hydraulic ram in a connected vessel
This illustration is modified from https://loermecke.de/hochbehaelter/



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Non-fungible token (NFT)

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Suankularb Wittayalai school, Thailand

Purpose and Background :
To prove that just a screenshot does not make you the owner of NFT ,inspired from Jimmy Fallon tweets, some people were curious about why don't you screenshot the NFT instead of buying the prototype NFT.

Materials and Methods :

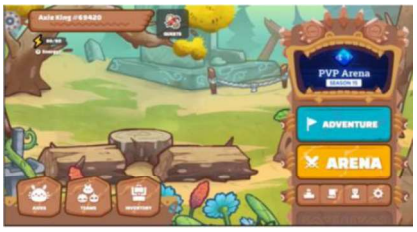
Materials: 1.Marvis hub 2.https://marketplace.axieinfinity.com/

Methods 1.Save an Axie NFT 2.Go to marvishub and login 3.Start playing game 4.Check the items

Results and Discussion :

By purchasing the NFT, it gives you the authority to utilize that NFT (pic1)

Saving does not give you the benefit of that NFT. (pic2)



A non-fungible token (NFT) is a unique and non-interchangeable unit of data stored on a blockchain, which means that only screenshots won't give any use and the importance of NFTs is not just about the arts, but also the real-life utility that it has.

REFERENCE :

Jimmy Fallon tweet, (2021, November 17)
https://twitter.com/jimmyfallon/status/1461011913479962630

Robotic machine for hearing loss people

Parinchaya Wongdumrongsakul

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Purpose and Background

The purpose of this research is to assist people with hearing loss to deal with stress as effectively as possible. As we all know, everyone has struggled with stress, and we all respond to it in various ways. Robotics, particularly virtual reality, or VR as it is commonly known, can assist deaf individuals in managing their stress. The question is "Is virtual reality capable of lowering deaf people's stress, as this observation suggests?"

Materials and Methods

1. To discover a knowledge gap in order to create a robotic system that can help deaf people with their mental health. There have been a lot of studies into utilizing technology to assist the deaf, such as Nguyen Truong Thinh's research on robots that assist deaf and hard-of-hearing individuals. PALOMA: A deaf-blind remote communication system with a novel human-robot interaction system by Neil S. Glickman and Robert Q Pollard, JR.

2. Conducting a focus group discussion with experts on creating virtual reality. To obtain advice on how to construct virtual reality in order to promote the mental health of deaf individuals.

3. Interview key informants who are deaf about mental health issues and their needs.

Results and Discussion

1. No one, according to the data, created VR to assist deaf people with their mental health. The vast majority of them just create technology that converts sign language into voice or text.

2. There are some crucial sections to consider, according to Assistant Professor Doctor Sovaritton's discussion,

Compendium	Details
Content	It's possible that a machine may be developed to help people with hearing loss improve their mental health.
Technique of production	Virtual reality or VR.
Materials	To study robotic equipment and mental health in order to aid deaf people's mental health.
Accessibility	The VR program will be provided for free on the website, making it easily accessible.

3. During the interview, the majority of key informants claimed that they all desire to interact with people in the simplest method possible. However, few people are able to converse via sign language. They simply want people to be more accepting of disabled individuals. They put in a lot of effort and can do as well as regular individuals, but their employers are usually concerned about their communication issues. Furthermore, some of them believe that entertainment material, such as movies and music, should include sign language. Therefore, the next step, the researcher is planning to create virtual reality to relieve stress, especially stress from communication issues.

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https://journals.sagepub.com/doi/full/10.5772/60416

Vaccination analyzing suitability app for people

VIRITPHON CHONGPERMWATTANAPOL,SARANCHANA JUNTANAKEEREE, SARANPAT NGAMPAYUNGPONG and NATTAKIT SUNTHONTHIP

Patumwan Demonstration School, Thailand

Purpose and Background:

Background Currently, Thailand's FDA (Food And Drug Administration) has authorized 6 different Covid-19 vaccines including Sinovac, AstraZeneca, Johnson and Johnson (J&J), Moderna, Pfizer, Sinopharm. Each brand of vaccines has different efficiency and compatibility to different types of people. Sometimes people don't know which brand of vaccine they should take because the doctor is the one who specifies, which sometimes takes time to analyze the data of the one who is wishing to vaccinate. Even though we currently only have 3 brands of vaccines which are Sinovac AstraZeneca and Sinopharm but if in the future they import 3 more brands of vaccines and also other vaccines there will be complications in choosing one type of vaccine to take. Therefore we think that if we create an application to choose the only compatible vaccine for the user., the process should be faster. Factors that we are taking into account are efficacy, age appropriateness, congenital disease, number of doses, and number of vaccines remaining will speed up the processing time. and those who wish to vaccinate will be able to know which vaccines they should take.

Materials and Methods:

1) Equipment used for vaccine processing program (Computer) 2) visual studio code

From the problem that many people still do not know which vaccination they should choose because the doctor must be the specifies and sometimes it may take time to view the data. Of those who wish to vaccinate and then come to process that Each person is suitable for which vaccines do the authors think? If we implement an appropriate vaccination selection program, it will speed up the process taking into account efficacy, age suitability, congenital disease.

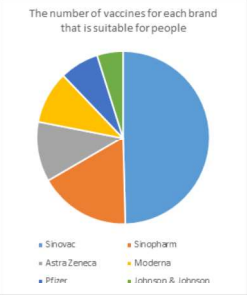
Results and Discussion:

Group 1 Infomation Age : under 18 Gender : Male/Female don't have / have congenital disease or pregnant(1/2) Result : Pfizer

Group 2 Infomation Age : 18 - 59 Gender : Male/Female don't have congenital disease or pregnant(2) Result : Sinovac

Group 3 Infomation Age : 18 - over 60 Gender : Male/Female have congenital disease or pregnant(1) Result : Moderna / AstraZeneca

Group 4 Infomation Age : over 60 Gender : Male/Female don't have congenital disease or pregnant(2) Result : AstraZeneca / Johnson & Johnson.



The authors will use the data obtained from the data collection in the application to select the appropriate vaccine by collecting the data as the number of vaccines to keep as data, which can be used to extend the vaccine type. There will be 6 The categories are AstraZeneca , Sinovac , Johnson & Johnson , Moderna , Sinopharm and Pfizer . The panel's data is presented by pie charts. to tell the appropriate dose of vaccine as a percentage value as shown in the picture.

Vaccine for hypersensitivity type 1

Rungradit Kulit

Suankularb wittayalai school, Thailand

Purpose and Background

1. This research aimed to develop a vaccine that would be the first to treat people with hypersensitivity. This research is new and old research that exists, but there are a few things that people have already done the research, namely “Desensitize therapy” Which is the same treatment, but this type of treatment is not wide enough to treat all diseases.

2. Provided attain of the treatment, the patient will not only recover from the allergy to the immunosuppressant, but the patient will gain antibiosis so that the allergy can continue to be prevented.

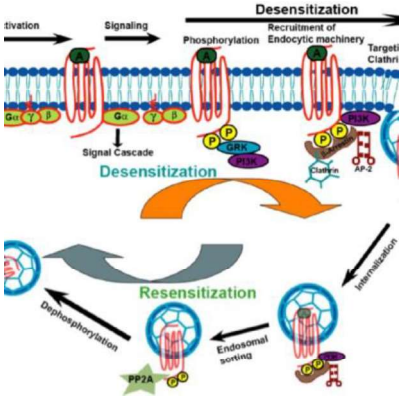
Materials and Methods

Materials: Proteins that are structurally similar to allergens.

Methods: The synthesized antigen protein is injected to allow the immune system to make antibodies. If an error occurs during the experiment, injecting structural proteins capable of binding to the CLRT4 and TCR of the regular T-cells is to suppress the total mechanism.

Result and discussion

After treatment, patients who received this vaccine intravenously in the blood, upon completion, found antibodies specific to the allergic antigen.



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Analysis of the effects of lysozyme, catechin, and nattokinase on the growth of *Streptococcus mutans*

Kent Kajiwara

Tokyo Gakugei University International Secondary School, Japan

Purpose and Background

Dental decay is one of the most prevalent modern diseases, and *Streptococcus mutans*, the causative agent of dental caries, has been suggested to induce not only dental caries but also worsening of infective endocarditis and enteritis (Nomura et al.,2019) (Ojima,2014). Therefore, untreated carious teeth may have a significant impact on health and healthy life expectancy. To prevent carious teeth, it is important to develop toothpaste containing antibacterial bio-compounds that can inhibit plaque and caries formation. This report examined the antibacterial effects of egg white lysozyme (Lys), catechin (Cat), and nattokinase (Nat) on the growth of *S. mutans*.

Materials and Methods

Cat, Lys, Nat, and bacitracin were all purchased from Fujifilm (Japan), and Mitis Salivarius agar was purchased from Difico (USA). *S. mutans* was obtained from the author's plaque and isolated in MSB medium (Gold et al.,1973). This experiment also used equal parts CLC (catechin-lysozyme combination), which is effective against other bacteria (Rawdkuen et al.,2012). A concentrated stock containing 100 mg/ml Lys and Nat, 2 mg/ml Cat, and 1 mg/ml CLC was added to a 96-well plate containing BHI liquid medium and then serially diluted (2-fold steps). Then, *S. mutans* solution diluted to OD 0.0125 was added to each well and incubated for 24 h. After incubation, a Microbial Viability Assay Kit-WST (Dojin) was used to achieve colorimetric detection of bacterial metabolism. Since Cat has a chromogenic effect, its color at an equivalent concentration in the absence of bacteria in the control zone was subtracted when evaluating the results. The antimicrobial effect of CLC was analyzed by the same method according to its ratio and concentration.

Results and Discussion

Cat had a strong antibacterial effect on *S. mutans* (MIC around 60-25 μg/ml), while Lys showed a lesser degree of inhibition. In contrast, Nat had no antibacterial effect (Fig. 1).

As in a previous study (Rawdkuen et al.,2012), CLC had an antibacterial effect. In an analysis of CLC at different concentrations and ratios, plates with a Lys concentration gradient (from 8300 μg/ml) showed an inhibitory effect when a medium concentration (>33 μg) of Cat was added. Plates with a Cat gradient (from 333 μg/ml) showed growth inhibition at higher Cat concentrations. The 1:1 CLC ratio reported by Rawdkuen et al. was not found to be effective in this experiment.

Thus Cat and Lys inhibited bacteria in a dose-dependent manner, and CLC inhibition depended on Cat concentration.

Based on these findings, Lys and Cat are expected to have an inhibitory effect on plaque and caries formation. However, data dispersion in these experiments was large, so accurate data could not be obtained. Optimizing the experimental system to enable more accurate measurements will be a priority in the future.

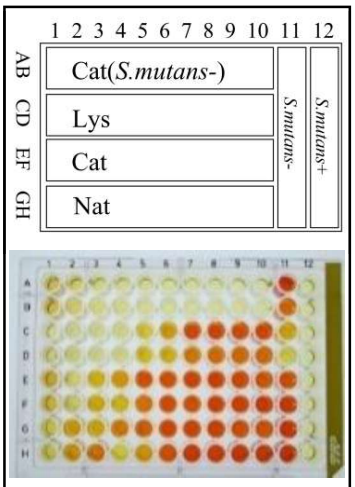

Figure 1

Antibacterial effects of Lys, Cat, and Nat

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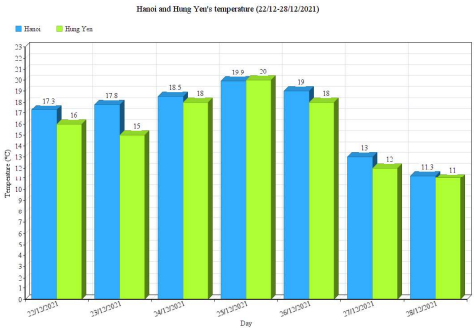
URBAN HEAT ISLAND (UHI) AND VEGETATION'S BENEFICIAL EFFECTS

Linh Ngoc Tran

High School of Education Science - VNU

- **Purpose and Background:** Urban heat island has become a significant problem in these recent years, especially in developed and developing countries. To minimize this phenomenon, it is essential to increase the area covered by plants in houses and man-made buildings.
- **Materials and Methods:** To clarify and restate the advantages of vegetation in a metropolitan area, a record of Hanoi and Hung Yen's temperature at 7 A.M on 7 consecutive days from 22/12/2021 to 28/12/2021 was taken. In doing this observation, two thermometers were placed outside, and every day, the temperature at 7 o'clock was recorded. After 7 days, a full report of Hanoi (an urban area) and Hung Yen (a suburban area) was finished. By using the data of it, I continued to use the descriptive data-analyzing method to present the outcomes of the observation and prepare for the conduction of predictive analysis to predict future situations. Finally, I applied the result from above to make a 3D design of a modern "green" apartment in big cities.
- **Result and Discussion:**



Overall, by monitoring two areas with two different vegetated rates in the same region, I have found an average of nearly 1°C difference between an urban area (Hanoi) and a suburban area (Hung Yen) with a higher vegetation rate. Not only that, metropolitan areas, that are significantly warmer than their surrounding rural areas (urban heat islands), have appeared around the world and become a major concern of human society. This has proven the beneficial impact of urban vegetation on the area's climate and air quality, especially in industrial cities. From the observation, it is seen that trees and other vegetation have the ability to cool buildings and neighborhoods, which can cut down the amount of energy used in cooling and the cost of it. A study has shown that near-surface air temperatures would drop by 1-2°C if the Los Angeles region increased vegetation in residential neighborhoods, saving the region $20 million in annual air conditioning costs [1]. A large tree coverage also benefits the community by improving the urban landscape and the air quality because of its natural appearance and respiration. In conclusion, enlarging the vegetated area in a metropolitan neighborhood brings numerous beneficial impacts on citizen's life and the worldwide environment.

Applying the result acquainted from above, a 3D design of a model modern "green" apartment was made. By placing small plants and flowers around the common living space and plants in different sizes in ventilated areas of bedrooms with a balcony garden, I hope to increase the indoor tree coverage and help decreasing the air temperature. At the neighborhood size, there should also have larger vegetated areas such as public parks or common gardens to improve not only one household's quality of climate and air but also a whole community's.

To sum up, the number of urban heat islands is increasing in the world so humankind needs to acknowledge the problem and enlarge the tree coverage in metropolitan areas.

[1] (1994, May 1). The potential for reducing urban air temperatures and energy .... Accessed January 1, 2022, từ The potential for reducing urban air temperatures and energy consumption through vegetative cooling (Technical Report) | OSTI.GOV

Variation in the reaction of jumping spiders in response to the activity of preys

Kento Abe[1], Masashi Murakami[2], Daiki Sato[2]

1. Kugenuma High school, Kanagawa, Japan
2. Chiba University, Chiba, Japan

Purpose and Background:

Biopesticides have attracted attention in recent years in order to reduce the amount of used chemically synthesized pesticides. Jumping spiders (predators) capture preys by jumping to catch them (Nagata et al., 2012). Therefore, we considered using jumping spiders as an alternative to reduce the use of chemical pesticides. We believe that this will lead to efforts to create a sustainable society. Therefore, the objective of this research was to investigate whether the predator's behavior is affected by the behavior showed by the preys (Koyanagi et al., 2012; Cresswell et al., 2011).

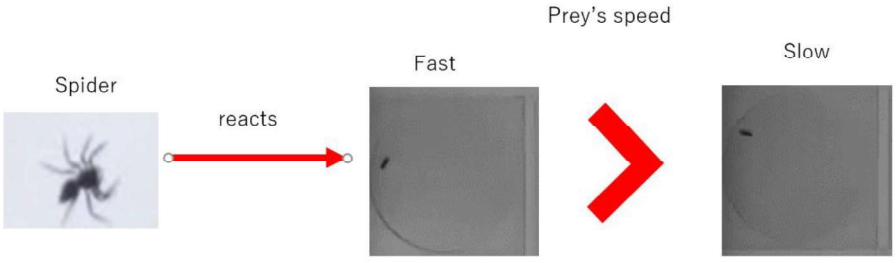
Materials and Methods:

To make our experiments, we used the jumping spider species *Hasarius adansoni*. In a previous research, the third author identified three *Drosophila* sp. pure lineages obtained from a natural population that differ on their behavior: DGRP786, DGRP26, DGRP324, showed high activity, mid activity and low activity, respectively (we define "activity" as how frequently the individuals move within a given time). These three groups of flies were used as preys. We separated six experimental trials in separate plastic containers. Three trials corresponded to one individual of each lineages, and the other three corresponded to groups of six flies of each lineage. We record videos of each group.

Then, we played each video in a screen in front of a jumping spider in a plastic container for 5 minutes. We measured the number of "attacks" that the spider did to the screen when trying to catch the preys in the videos. Statistical analyses were made in R.

Results and Discussion

I found that jumping spiders attack the most active single and multiple preys more often, and refrain from attacking slow-moving preys even if they are in front of them. Jumping spiders might infer that actively moving insects are healthier and tastier, and that immobile insects are sick or old, poorly nourished, and not tasty. Also, we found that the jumping spiders attacked less while the time passed. So, it is possible that jumping spiders become accustomed to the video flies and are not attracted to them anymore, or have become physically tired after attacking a few times. Further experiments will help understanding more details on the behavior of jumping spiders when attacking preys.



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The Effects of Bullying Towards LGBT Youths SDGs Research Peace, Justice, and Strong Institutions & Well-being and Good Health

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Purpose and Background: Mental breakdown of LGBT Youths due to Bullying and Coercion

This research has been giving constribution to conduct partnership partnership within public in achieving Sustainable Development Goals (SDGs). In this context, the partnership would be implemented in solving the issues regarding inequality, the mentality of LGBT youth, and the justice they should get. In the United States, high school students who self-identify as LGBT report having been bullied on school property (32%), cyberbullied (26,6%), not going to school since safety concerns (13,5%) than their straight peers. Bullying puts all youth at increased risk for depression, suicidal ideation, misuse of drugs and alcohol, experiencing sexual violence, engaging in unsafe sex practices, and can affect academics as well. For LGBT youths, that risk is even higher. 29% of LGBT middle school and 25% high school students who were bullied attempted suicide in the past years. And one of the sources said that he was once forced to change his sexual orientation back to straight again by his family, however in coercion way. This research was made to identify the effects of bullying amon LGBT students.

Materials and Methods:

The materials were using articles analyses with a theory that is Determinatns and health theory(Dahlgren and Whitehead, 1991), and two journals. The methods were using the qualitative and quantitative analyses with depth interview with 3 people who self-identitfy as Gay, collection their answers and comparing it, searching bullying and suicidal data towards LGBT youths, and compare and also match data & source people's answers. We know these 3 people, we are not able to generalize because the population is small, however it's still important, and that's why take qualitative research and to strengthen the interview results that we've obtained and we also used some data.

Results and Discussion:

Based on the interview with 3 sources, the results have shown 2 out of 3 interviewees their mental health has been affected by mistreatment, and also their own thoughts caused by their surroundings, whether that be at school or at home. 2 sources claimed that it was not possible for them to not mind what others have said to them, whereas on the other hand, 1 source claimed to not care at all about other's opinions. 1 source admitted to 5 past suicide attempts and 1 source has admitted to suicidal thoughts related to being in the LGBT community. And 1 other source said that he will continue to live his life. Although, he will be judged and said by people. Nearly 3 out of 4 (72%) said they had been verbally insulted about their identity, and almost half (46%) said they had been threatened with violence. More than a third (37%) reported having been physically attacked or sexually assaulted.

The data and interview suggests that LGBT youths are most vulnerable to abuse whether that be school or at home. This correlates with the Determinants and Health Theory by Dahlgren and Whithead, 1991 which states that a person's mental health is greatly affected by one's individual lifestyle, social and community networks, etc. From the data and interviews that have been conducted, the mental health state of LGBT Youths is mostly determined by their environment and also their own concerns on whether they can or cannot ignore the mistreatment they receive from others. The theory of Determinants and health by Dahlgren and Whithead, 1991 also reinforces that a person's mental health is greatly affected by several factors, such as the work environment, inequality, and so on.

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3 source people who self-identify as Gay from Indonesia.

NBC NEWS: Nearly a third of young gay people have attempted suicide, study finds coming out earlier in life is a double-edged sword, experts say. Dan Avery, 2021.

MedicalNewsToday: What to know about sexual orientation and mental health in youth. Francis Kuehnle, MSN, RN-BC. Zawn Villines, 2021.

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SAVE OUR ELECTRICITY WITH IoT (Internet Of Things)

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Purpose and Background:

The background of the research is about world is getting warmer day by day which would cause a climate change because of the overuse of burning coal that would produce electrical energy which also cause a lot of disposal gas to be released into air. If that so, we need to solve the problem by showing a way how to conserve more power to reduce the usage of burning coal and it's disposal gas to minimize the global warming

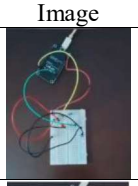
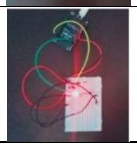
With that being said, the purpose in this reserach study is to design a prototype that can be done to conserve power such as a tool that has an automatic system concept to save electricity, reduce the usage of coal and help the temperature of the world stable

Materials and Methods:

The materials used to create this prototype are: (1) Project Board, (2) NodeMCU V3, (2) LED Light, (3) Jumper Cable, (4) Micro USB Cable, (5) LDR Sensor Module, (6) 10k Ohm Resistor, (7) 330 Ohm Resistor. After that, place and assemble all those materials into a specific design.

The next step after assembling all of the materials on the project board, set up the prototype by inputting the adjustment value of light based on the situation or room like inputting light value of 980 as the midpoint between on and off by using a coding program

Results:

Room lights	Light value detected	Sensor read as	LED Light	Image
Turned On	992	Light	Off	
Turned Off	565	Dark	On	

As you can see in the table, when the room isn't having enough light then the LED light will be turned on and when the room has enough light then the LED light will be turned off automatically. This because the prototype detect the light value every 3000ms interval and then proceeding to turn on and off the lights automatically.

Conclusion and Discussion:

In conclusion, the impact generated when this simple tool is used by many people it will reduce the causes of climate change and make the earth better. If more than a thousand people use this system in their daily life, we could imagine how much coal we could save in order to save our electricity.

How to improve the efficiency of small wind turbines

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Yang Ming High School, Taiwan Taipei

Purpose and Background:

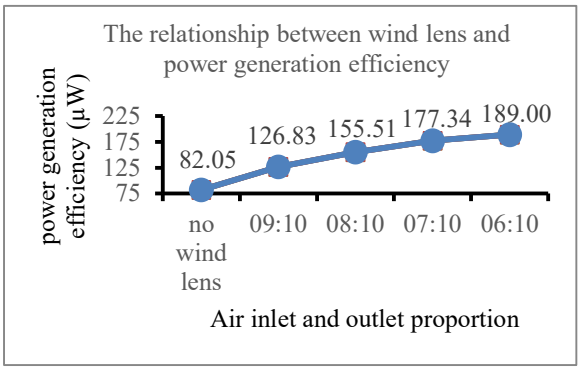
Due to the aggravation of global warming, the issue of how to produce energy more sustainably has become popular around the world. However, wind power only accounted for 0.68 percent of the total renewable energy produced in Taiwan.Therefore,We want to boost the power of small wind turbines with a wind lens.

Materials and Methods:

We made a small wind turbine and wind lens with various air inlet and outlet proportions(9:10、8:10、7:10、6:10). Experiment with electric fans as natural wind.

Results and Discussion

In our experiments,we found that the wind lens can indeed improve the power generation efficiency of the small wind turbine, and the wind lens with the proportion of air inlet and outlet of 6:10 can improve the power generation efficiency the most.However, it can be seen from the chart that as the difference between the inlet and outlet of the wind lens rise, the rise in power generation efficiency gradually slows down.Therefore, we believe that there will be a wind len with a gap value between the inlet and outlet that can improve the power generation efficiency the most, in the future we will try to find this wind len.



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PUBLIC RELATIONS OFFICE(July 2011). *COVER STORY: Embracing New Energy:Second Wind.* https://www.gov-online.go.jp/eng/publicity/book/hlj/html/201107/201107_03.html

The influence of nickel-tungsten bimetallic oxide on the concentration of uric acid

Kai-Ying CHENG and Yun-Yan WU

Taipei Jingmei Girls High School, Taiwan

Purpose and Background

In the past, doctors used invasive procedures to diagnose patients. However, gout is a disease that requires long-term monitoring; therefore, a patient has to receive blood drawing, which may cause much pain and resistance from the patients. So we want to invent a non-invasive sensor for detecting uric acid.

Purpose 1- Discuss the definition, application and development of biosensors.

Purpose 2- Understand the inquiry of experimental equipment and experimental drugs.

Purpose 3- Study the influence of nickel-tungsten bimetallic oxide on the detection of uric acid concentration.

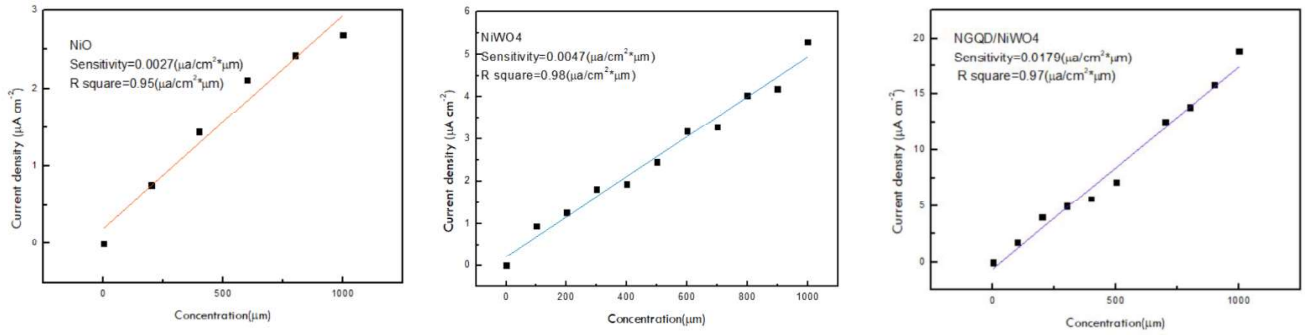
Materials and Methods

The materials used in the experiment are Sodium tungstate aqueous compound, Nickel Oxide, Citric Acid, Ammonia Water, uric acid, vitamins C3, Glucose, Nafi Film and isopropyl alcohol. There are two main experimental methods, one is electrochemical analysis and the other is general analysis. The biggest difference between the two methods is that the electrochemical analysis instruments are easier to manipulate and cheaper, and the analysis results are more accurate.

Results and Discussion

According to this experiment, cyclic voltammetry is used to test the sensitivity of different concentrations of uric acid. Compared with NiO and NiWO4, NGQD/NiWO4 has better uric acid catalytic ability. It is also based on the results measured by cyclic pulse voltammetry. The density is on the vertical axis, and the uric acid concentration is on the horizontal axis for linear regression. From the above figure, we can see that NGQD/NiWO4 is the most sensitive electrode. So in the future, if it is necessary to use biosensors to detect the concentration of uric acid, to check the health of the body. NGQD/NiWO4 can be used as a sensing material for biosensors.

Figure 1



Sensitivity results for three materials

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FOOD LOSSES AND WASTE IN VIETNAM

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High School of Education Sciences, Vietnam
Vietnam National University, HaNoi

Purpose and Background

According to a survey by Electrolux, among 8 Asia - Pacific countries, Vietnam is the second-largest producer of food waste in the region, behind China.

Foods after being thrown away will stay in landfills and produce CH4, which is ranked the second most emitted greenhouse gas after CO2.

Materials and Methods

Method of Document Collection

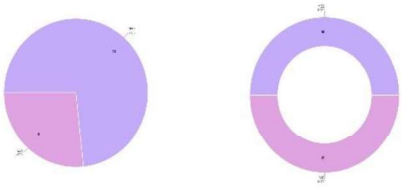
Survey Methodology

Observation Method

Results and Discussion

When food being transported/harvested:
+) Numerous farmers lack financial credit that help them improve currently degraded production and harvesting conditions
+) Existing packing and handling solutions in the agriculture chain are basic and low grade. For instance, when fruits and vegetables are packed too tight or with many layers, they end up damaging themselves, in contrast, if packed too loose, they will be damaged by the impacts during road transit. (globalcoldchainnews.com)

More than 50% of people surveyed said they have wasted their food.(a)
More than 70% of people surveyed said they know the impact of food waste on the environment.(b)



(a) (b)

However, when they were asked to elaborate on the impact, the answers were vague.

"The biggest reason originates from the antiquated thinking: "better ample rather than deficient" of Vietnamese people, without calculating the amount of food needed for a meal. Moreover, in special occasions such as weddings, Vietnamese people tend to take precedence of formality, so they make an excessive amount of food, at the expense of the environment."

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Soil liquefaction

Chen-Kuan-Ju Chiang-Yun-yuan

Jmgsh senior high school

Purpose and Background: We want to solve the soil liquefaction by bacillus badius

What do we do?

First of all, we need to grow the bacteria, then configure the medium and high potential soils and configure the cementing solution, then we inject the configured mixture into the experimental model, and send it to the soil strength test.
Next, we have to let the experimental model sit for three days so that its inside can be fully cemented
Finally, we test the strength again and use the ground motion platform to destroy it.

What can we see?
Soil is obviously solidified in the upper layer so the house can stand on top of the soil, while the high-potential soil is solidified in the lower layer. Therefore, the house will collapse when the earthquake is stronger.

Results and Discussion
1. we test this modified formula is more environmentally friendly than the cement filling method
2. although the high-potential liquefied soil will collapse when encountering a strong earthquake, it will sink vertically in the first few seconds, which can greatly reduce the difficulty of rescue.

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Comparative Studies About the Concentration of Polyethylene Microplastic in Instant Pet Food

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2. Ramathibodi Hospital

Purpose and Background:

The amount of microplastics in the ocean have been increasing in recent year. There is a probability of microplastic contamination in cat food, which is mainly produced from fish. This study had been conducted to compare the amount of polyethylene microplastic in cat food produced in Thailand; which is wet food and dry food and raise awareness of the increasing amount of microplastic among cat food producers and cats lovers.

Materials and Methods:

In this study, 25 samples of each dry and wet cat food produced in Thailand were used. Every sample was prepared by putting 80 ml of the sample into a mixing bowl, followed by 80 ml of water. The mixture was microwaved at 800 W for 3 min, mashing and filtering through the 1 mm filter. One tablespoon of the mashed sample was stored to be analyzed by microscope with 100x magnification. The photos of the samples were taken through the lens with a mobile phone and were compared with the photos of PET particles.

Results and Discussion

Some particles from 11 out of 25 dry samples and 1 out of 25 from wet samples were found as possible polyethylene microplastics because of its transparency and unnatural shape.

For preliminary results, dry food has more probability to be contaminated by polyethylene microplastic than wet food around 40%. However, further research needs to be conducted to ensure that the microplastic particles are valid. An Artificial Intelligence such as Image processing could be used to determine the microplastic particle along with the researcher's opinion to provide more accurate results.

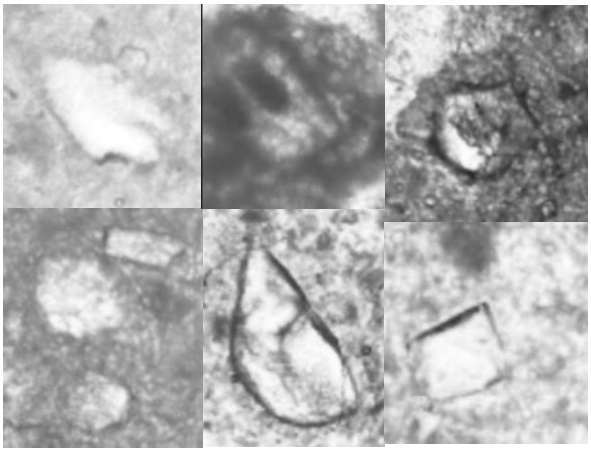

Fig. 1: examples of potential polyethylene microplastics in dry cat food

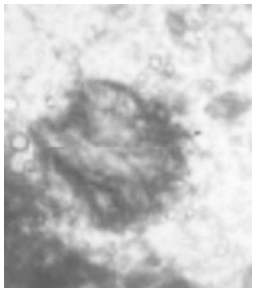

Fig. 2: example of potential polyethylene microplastics in wet cat food

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- Proceedings -

Undergraduate Students

Postgraduate Students

In-service Teachers

A study of the Quality of Water in Chiang Mai

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Purposes And Background

Chiang Mai is situated in the northern part of Thailand in which has a wide range of rivers and most of them are headwaters. Water is an important element in the environment because water is one of the major substances in living organisms. It is also contributing to the growth of the communities and economy in Chiang Mai. However, pollution has increased each year because of several phenomena. These events can result in serious damage to the environment and life. If the headwater is polluted, there will be adversary impact on Chiang Mai and other districts in many aspects. The purpose of the study is to investigate the quality of water and factors that cause the poor quality of water and to raise public awareness of the poor quality of water and factors that contribute to it. Thus, the study aims to answer the following research question:

1. In the past three years, how was the quality of water in Chiang Mai?
2. What are the factors that caused water pollution in Chiang Mai?

Materials and Methods

1. Data collection: The data was collected from documents, statistics, and literature reviews from Regional Environment Office 1 annually reports of the quality of water.
2. Data analysis: The data were analyzed by using Microsoft Excel. **These data are not fully validated.**
3. Conclusion and Discussion: Conclusion and Discussion were drawn from the result of the study.

Results and Discussion

Table 1: The quality of water and the indicators 2019 - 2021

Location	Water Quality Indicator					
	2019		2020		2021	
	BOD (mg/L)	NH3 (mg/L)	BOD (mg/L)	NH3 (mg/L)	BOD (mg/L)	NH3 (mg/L)
Pa Daet, Mueang Chiang Mai District	N/A	N/A	1.71	0.85	2.72	1.64
Nong Hoi, Mueang Chiang Mai District	1.31	0.23	1.29	0.39	2.2	0.31
Pa Tan, Mueang Chiang Mai	1.25	0.02	1.95	0.45	2.37	0.33

In the past three years, there was a significant trend of high amount of BOD in Pa Daet, Nong Hoi, and Pa Tan district each year. Additionally, there was ahigh amount of NH_3 (ammonia) that exceeded the standard quality in Pa Daet district which are 0.85 in 2020 and 1.64 mg/L in 2021.

The increasing amount of BOD in the past three years can be concluded that there were a large number of bacteria in water of Pa Daet, Nong Hoi, and Pa Tan districts each year. This is because these districts are cities and villages which involved with urbanization activities such as wastewater from residential areas. Moreover, the increase amount of NH_3 is due to the decomposing of bacteria, especially in Pa Daet district because Pa Daet district is also involved with agricultural activities which are Longan productions and animal husbandries that use fertilizer and caused agricultural waste. These indicated that agricultural, and urbanization activities are one of the factors that impact the quality of water in Chiang Mai. These factors have a similar result as according to Regional Environment Office 1 and Ogata et al. (2020) which concluded that the main factors that caused polluted water are agricultural, industrialization, and urbanization activities. These activities can directly impact the quality of water in the future if people do not take an action towards these phenomena. In addition, further research is required to deeply understand the factors that caused the poor quality of water and how to prevent and sustain the quality of water for future generations.

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The helium ions shielding properties of steel slag

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2. Lecturers responsible for Bachelor of Education Program in Physics, Faculty of Education, Silpakorn University, Nakhon Pathom, Thailand.

Purpose and Background:

The objective of this research was to study the shielding properties of charged ionizing radiation of 4types of steel slags (ABS, BOFS, EAFS, and LFS). Steel slag is a waste material obtained from the production of crude steel and Steel slag has a chemical composition that is similar to clinker in Portland cement which we use as the main material for shielding radiation. The charged radiation under consideration is helium ion because, for practical applications, it is important to study the radiation protection properties of helium ions.

Material and Methods:

The steel slag used in this analysis was obtained from Chiang Mai University. The radiation shielding properties were analyzed by examining in detail the density and chemical composition. The parameters tobe analyzed are the mass attenuation coefficient, the effective atomic numbers, and the macroscopic effective removal cross-section for fast neutrons. SRIM software program is used to simulate a scenario that occurs when helium ions pass through a material medium. The parameters to be analyzed are electronic stopping and nuclear stopping in the energy range of 10^{-2} to 10^{3} MeV which is the energy required to displace an atom from the lattice position.

The energy loss rate of ions in steel slag is divided into two different mechanisms of energy loss

1. Nuclear stopping power is the energy lost by moving particles due to elastic collisions per unitlength moving into a target is given by equation (1)

$$-\left.\frac{dE}{dx}\right|_{n} = N\int_{T_{\min}}^{T_{\max}} T\frac{d\sigma(E)}{dT}dT \qquad (1)$$

2. Electronic stopping is caused by electronic collisions in which two moving ions stimulate or knock electrons out of the atoms in the iron slag. the energy loss caused by electronic stopping can be calculated from equation (2)

$$-\left.\frac{dE}{dx}\right|_{e} = \frac{2\pi Z^2 e^4}{E} NZ_2 \left(\frac{1}{m_e}\right) \ln\left(\frac{2m_e v^2}{I}\right) \qquad (2)$$

Result and Discussion

When helium ions are boom collisions with atoms and electrons occur in the surface region of the steel slag Figure 3 shows that in the kinetic energy range 10^{-2} to 10 MeV the electronic stopping value increases because in this energy range the electronic stopping value depends on the velocity of the incident ions and as the ion energy tendency increases, the electronic stopping value decreases due to the transfer of energy of ions by binary collisions between ions and electrons. This result showed that EAFS has more chances to electronic stopping.

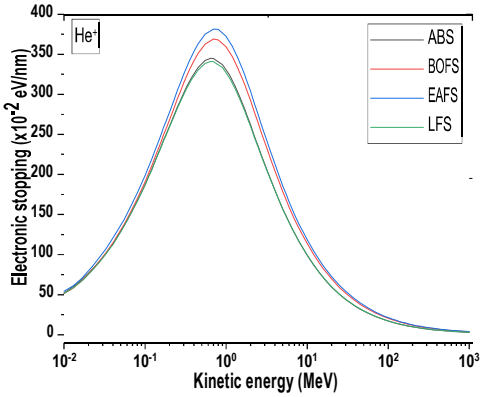

Figure 1. The electronic stopping of helium ions in the energy range 10^{-2} to 10^{3} MeV

Figure 4 shows the nuclear halt of helium ions, wherein a nuclear halt takes into account the average energy loss caused by an elastic collision with a steel slag atom. This result showed that EAFS has more chances to electronic stopping. This result shows that EAFS has the most energy loss to the incident ions.

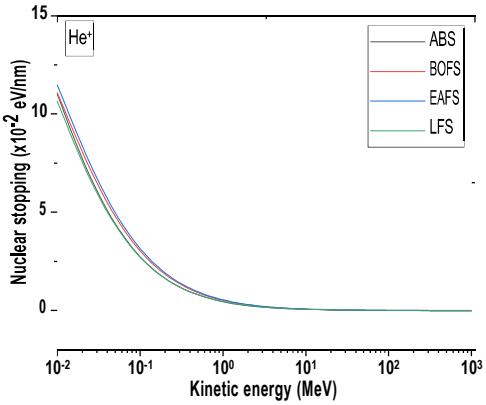

Figure 2. The nuclear stopping of helium ions in the energy range 10^{-2} to 10^{3} MeV.

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Annual Ring Problem: How do pre-service teachers mathematize it?

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Research Background

The teaching and learning of Mathematical modelling – *translate between reality and mathematics* – has already played an important role in mathematics education in many parts of the world. Pre-service teachers (PSTs) who intend to teach mathematical modelling in their future careers as teachers must acquire specialized knowledge. (Borromeo Ferri, 2013) According to Borromeo Ferri's model of teacher competencies for teaching mathematical modelling (2018), both pre-service and in-service need to starts with solving and developing the modelling task for school – *task competencies*. Therefore, the primary objective of teacher education is to advance those competencies. Around half of 15-year-old Thai students failed to achieve the international basic proficiency level in mathematics in PISA 2009 and 2012, which assessed students' modelling competence. (Klainin, 2015) Additionally, the PSTs lacked experience with educational modelling tasks. (Nonthapa, 2019) As a result, it is critical to enhance the PSTs' competencies. To foster the modelling competence, it is critical to elicit and diagnose the thinking and blockages while modelling. (Blum, 2015; NCTM, 2014) Thus, the researcher attempts to understand how PSTs mathematize and their blockages in solving the modelling task to adjust intervention and provide feedback to PSTs. This study is a part of the development of competence for teaching mathematical modelling of Thai PSTs projects. The results will inform educators to support and resolve possible PSTs' blockages in the modelling process. (Stillman et al. 2007)

Purpose

The researcher aims to study PSTs' mathematizing and their blockages in the solving the modelling task.

Methods

The question is posited as to how do PSTs mathematize and their blockages in the solving the modelling task– *The Annual Ring Problem* – as showed in Fig.1. In this study, mathematizing performance and blockages refer to (1) understanding and simplifying the context and (2) assuming and formulating the context into a mathematical model in the modelling process. (Stillman et al. 2007) The data were obtained from the 23 Thai PSTs who had not been exposed to mathematical modelling. The PSTs were divided into six groups of 3-4 students with wide-ranging abilities in mathematics. They were assigned to solve the modelling task. Their actions and thoughts about the solving problem were gathered through observations and written work. The data were analyzed by using content analysis.

Result and short explanation

The PSTs' mathematizing performance and blockages in Modelling process as shown in Table 1. To illustrated the PSTs' blockages, several groups of PSTs were unable to interpret real-world situations in the annual ring problem, particularly the concept of tree growth and linear relationship. They use the internet to get idea about annual ring and tree's growth. In addition, they discuss what the linear relationship means with their friends. Then, the PSTs were able to clarify and simplify the problem. In addition, based on the PST's prior experiences, the set of numbers may be structured by the pattern. As a result, the majority of PSTs attempt to deduce the pattern of the annual ring radius as illustrated in Fig. 2.

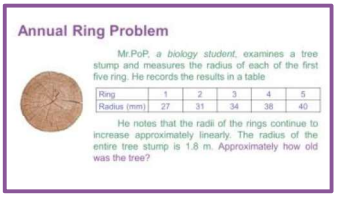

Fig.1. The Annual Ring Problem (adapted by Belcher et al, 2019)

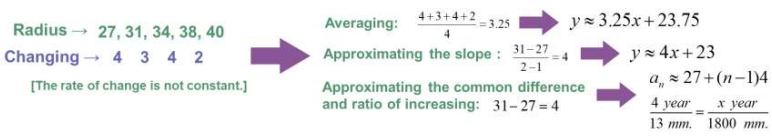

Fig.2. The mathematical model of the annual ring radius

Discussion and conclusion

Although, the PSTs were able to mathematize the annual ring problem with multiple mathematical models – *the proportion, the systems of linear equation, the linear equation, the arithmetic sequence* – they had difficulty

understanding the idea of the annual ring that related to scientific context. Moreover, they had difficulty identifying the rate of change (ring radius) because the changing of the radius is not consistent like the problems in the traditional textbook. This result show that the extra-mathematical knowledge, personal experiences, and searching knowledge abilities are pre-requisite abilities that are important for problem solvers when mathematizing the real-world problem. (Borromeo Ferri, 2018) This point is an issue for educators who develop the learners' mathematizing ability to prepare the necessary knowledge [inter- and extra-mathematical] and the additional supporting materials for learners before dealing with the real-world problems. In addition, this is a good sign for educators to develop the PSTs' mathematical content knowledge through making the relationship of several mathematical models that they used.

Table 1. The mathematizing performance and blockages

Mathematizing in Modelling process	**Mathematizing performance**	**Blockages**
Understanding and simplifying the context	Clarifying the meaning: Ring, Unit conversion (mm., m), Tree's growth, linearly increasing	Knowledge: Annual Ring, Tree's growth, linearly increasing
	Assuming: each ring corresponds to one year of the tree's growth, the shape of the tress stump surface seems as circle	
Assuming and formulating the context into a mathematical model	Identifying the variables: Ring (IV), Radius (DV)	Confusing: The progression of the radius (cannot find the pattern of the radius, the changing of the radius is not consistent), Independent and dependent variables (Ring is IV or DV)
	Assuming the relationship: A linearly relationship between ring and radius	
	Assuming the rate of change: Averaging and approximating the rate of change of the radius that corresponds to each ring	
	Formulating the math model: Linear Model (The proportion, The systems of linear equation, The linear equation and graph, The arithmetic sequence)	

Acknowledgement

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An Analysis of Primary School Teachers' Understanding of Inquiry-Based Science Teaching

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Purpose and Background

The two main factors affecting education in Thailand are 21st century education and education system 4.0. The concept of 21st century education has been shaping the teaching paradigm in Thailand for many years. If later, another factor has emerged, namely the study of the education system 4.0 due to the latest policy of Thailand's economic development plan. to be successful in learning Learners must develop many skills necessary for future life and work. Thai teachers are inevitably challenged by the changing trends in the education system. Inquiry-based learning (IBL) is recommended by educators as one of the effective teaching and learning approaches for 21st century education.

Research indicates that teachers' knowledge of Inquiry-based science teaching is the most important factor determining the level of implementation of Inquiry-based teaching. (Rop 2002; van Driel et al. 2001). It is reported, however, that many science teachers have limited knowledge of Inquiry-based teaching. This limited knowledge prevented them from successfully implementing this approach. (Crawford 2000; Kang et al.2008; Keys and Kennedy 1999; Wallace and Kang 2004; Windschitl 2004). This finding calls for specific guidelines that enable teachers to better understand what inquiry-based teaching is and how to implement it (Beerer and Bodzin 2004; Kang et al. 2008). In this regard, the NSES delineated inquiry-based teaching in terms of its five essential features:

(1.) Students are engaged by scientifically oriented questions.
(2.) Students give priority to evidence in responding to these questions.
(3.) Students formulate explanations from evidence
(4.) Students evaluate their explanations in light of alternative explanations.
(5.) Students communicate and justify their explanations. (National Research Council 2000, p.29).

Since then, these features have been widely used as a framework to help teachers understand and perform inquiry-based teaching in their classrooms (Trumbull et al. 2005). This study would to some extent serve as a platform to refer to by Primary School science teacher when envisaging the most relevant strategies to enhance teachers' understanding of Inquiry-Based teaching and thus to implement it.

The purposes of this study were to explored primary school teachers' understanding of Inquiry-based science teaching.

Materials and Methods

Participants

Primary school science teacher. Purposeful sampling method was used to select participants. In this way, characteristics that require compliance with the nature of the study are determined and reach those who adhere to these traits (Christensen et al., 2014, p.150). Knowledge and experience in creating science teaching, curriculum and lesson plans The research was conducted using the consent model of these voluntary participation.

Methods

This study used an embedded combination method, including both qualitative and quantitative methods. Mixed method refers to a combination of quantitative and qualitative research, and the main priority was to better understand the research problem by taking advantage of both approaches (Plano Clark et al., 2008) to align with the study objectives. This research method was chosen because qualitative data were needed. (open-ended questions and interviews included in the self-assessment) are needed to complete the quantitative data obtained through the evaluation rubric. In the planning and implementing the 5E Inquiry Survey lesson plan steps, the impact of teacher assessment and teacher self-assessment was conveyed in accordance with the research structure.

Results and Discussion

In progress

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The Development of Environmental Awareness Integrated Instruction for the Courses in the English Subject using Problem-Based Learning for 11th Grade Students

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Purpose and Background

Environmental issues are one of the more critical problems in Thailand. According to the Thailand State of Pollution Report 2020, it was found that the government made important policies, which aimed at preventing, solving and reducing pollution problems, such as determining PM 2.5 pollution problem resolution and pushing for measures to solve plastic waste management etc. (Pollution Control Department, 2020). For that reason, the developing requires educational processes as a tool; so, we could raise awareness to make any changes among the students. As a teacher working in the school, the researcher is interested in developing environmental awareness in the English subject using problem-based learning for 11th grade students to promote and develop students' environmental awareness.

Materials and Methods

1. Designing lesson plans
2. Assessing lesson plans
3. Implementing lesson plans
4. Observing students' learning activities
5. Discussion and Conclusion

Results and Discussion

From the learning activity in the classroom, the students define an environmental issue by Fishbone diagram and 5Ws 1H table. They also brainstorm and find the solution of that defined problems with their groups. And they take action on waste sorting campaign and smokeless stove project. The only problem found during the activity was from group 2. The solution from the topic was building smokeless stove, so they needed to get advices from another teacher who teaches industrial trades. After finishing activity, the students reflect their own findings and opinions about the environmental issues by writing "exit ticket" and most of the students express their opinions on the positive way amount 90 percent.

From the learning activities, the students can address the environmental issues by using Problem-Based Learning process. During the process, the students are always encouraged with the steps of PBL and enjoy working their group members. The study shown that learning from the process of PBL help students construct the environmental awareness and acquire knowledge by fully and directly participating in an activity. According to Songlux Chowphakhow (2000), "The Awareness of environmental issues after learning with problem-based teaching methods is higher. As, the activities allow students to learn from participating in groups' work and let them create and test the best solution". The students can reflect their opinions conduced towards the environmental awareness. After finishing activities, they apply the solutions to make a project such as waste sorting campaign, smokeless stove.

Groups	Environmental issues	Solutions
1	Garbage	1. a system of waste separation in the school 2.DIY from recyclables
2	Smog	1. Smokeless stove

Table 1 The Environmental issues with solutions after learning activity.

Groups	Messages from Exit Ticket
1	1. What we have learned *- Learning about environmental issues from the passages and watching video about climate change. After that we work in group to define the environmental issue, which is garbage in our school and community. And find the way to solve in multiple methods.* 2. What we will apply for *- Environment is very important to all humans because we live in the earth and take many advantages from them. We should also protect our lovely world and the habitats to the wildlife. By starting from ourself, we can do it.*
2	1. What we have learned *- Watching the video makes us realize on where we live right now. We still hit the earth in many ways. We should save our local environment and community.* 2. What we will apply for *- We should go back to our community and tell our friends, our parents to take action on these problems by waste sorting, reducing wastewater and not polluting any environment.*

Table 2 Messages from students' exit tickets

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OPTIMISATION OF LEDS FOR MUSEUM LIGHTING

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Introduction

The Museum lighting environment is one of the most challenge types of lighting design. Since it needs to meet the requirements of artwork protection, the aesthetic of the users and energy saving. The four primary damage factors in the artworks are air quality, temperature, humidity and light. While the first three indexes can be adjusted to the appropriate conditions for museum usage, lighting is inevitable and any presence of light will cause the deterioration of the artworks [1]. Originally, halogen lamps were a major light source used in the museum. Until 2012, the Getty Conservation Institute (GCI) gave a suggestion of using LED lamps in the museum because of an advantage in doing less damage than halogen [2].

Nowadays, LED technology is extensively used in many industries, including art conservation. Advantages such as energy efficiency, adjustable colour and intensity, and the absence of ultraviolet (UV) and infrared (IR) radiations make it be the center of attraction for illuminating museum artifacts instead of using halogen lamps. However, even though LED lamps do not emit radiation outside the visible range, most LED lamps emit strong radiant power, which consist of the intense peak at approximately 430–470 nm (blue) and broad peak at 600 nm (green to red). Previously, researchers conducted a series of investigation into the degradation process of Lead Chromate caused by the UV-visible light in the artworks of Van Gogh [3]. It was found that blue light (335–525 nm) induces significant degradation of the chrome yellow pigment. To confirm the theory of deterioration in pigments by LED lamps, the impact of LED-based lighting was investigated on sixteen historical pigments mixed with eight different binding materials and three different vanishes [4]. It was found that after 4,000 hours of exposure in a 10,000 lux tunable LED light booth, every pigment sample's colour change can be seen. Not only the western pigments, but in 2019, the researchers have found that LED lamps induce the fading of Korean pigments as well [5]. The results of LED illumination on traditional Korean painting pigments show that even though blue illumination shows the discolouration on Wunghwang at first, the green illumination more effectively induces the fading in longer exposure time. However, if the discolouration occurs on the artworks, it means the artworks are in a critical condition. Accordingly, the damage needs to be detected from the early state of deterioration through chemical analysis. The molecular structure changes of the Chinese cultural relics were investigated with Fourier transform infrared (FTIR) spectroscopy [6]. The FTIR data was used to control the spectrum composition and evaluate its lighting damage degree at the micro level and minimise the damage of LED.

Research aim

Previous researche proves that LED lamps are not entirely safe for all pigments due to a sensitivity at different wavelength. Since most of the researche has been done only on specific pigments, further research should be done on more pigments to find the wavelength that cause damage to the pigments in general. The purpose of this research is to optimise the LED spectrum to minimise the damage while considering other museum requirements and, based on the results, obtain a prototype of LED lamps for usage in museums.

Materials and Methods

The accelerated aging test will be conducted with 90 historical pigments, mixed with 4 kinds of binding materials that represent different types of art paint. Therefore 360 samples will be prepared for the aging test. The samples will be painted on acid-free paper in order to avoid yellowness after long exposure.

Fifteen different channels of LED light sources are manufactured by Lighting and Equipment Public Company Limited (L&E), one each have a different peak in the range of visible light. Any attempt to test the effect of light by accelerated aging on the object assumes that the reaction of material under a level of light typically used in the museum for a long period of time is equal to the intense light for a short period of time, as referred as *reciprocity principle* [7]. A concept in this principle is that the dose (D) or cumulative exposure is the product of the exposure time (t) and lighting level in lux during the exposure (L), as can be written in equation 1.

$$D = LT \qquad \text{Equation 1}$$

Considering a common museum lighting intensity of 50 lux for 8 hours a day, 7 days a week, that makes 13 hours of exposure under 10,000 lux in aging chamber equivalent to 1 year for museum illumination. The Chemical analysis data (Raman and FTIR spectroscopy) and colour parameters (CIEL*a*b*) will be collected at intervals of 65 hours.

Expected Results

The Raman and FTIR spectra obtained from the accelerated method will be further analysed by the degree of lighting oxidation. The oxidation index is defined by the ratio of the integral area of the characteristic peaks of pigments. The higher the oxidation index value, the more deterioration occurs in the pigments [6]. According to the CIE $L^*a^*b^*$ colour parameter measured in the experiment, the colour difference between every pigment in each exposure interval (L_i^*, a_i^* and b_i^*) and initial state (L_0^*, a_0^* and b_0^*) will be calculated (ΔE_{ab}) by equation 2.

$$\Delta E_{ab} = \sqrt{(L_i^* - L_0^*)^2 + (a_i^* - a_o^*)^2 + (b_i^* - b_0^*)^2} \quad \text{Equation 2}$$

The result is expected that the colour difference of pigments corresponds with the increases in the irradiation time, by the rapid rate at first then decelerate to the stable state [8]. Furthermore, it not depends on only the pigments and illumination but also on the material and the reaction between binding materials and pigments can cause the modification of the chromophore and auxochrome which results in deterioration of the samples [4]. The wavelength that should be avoided for use in the museum is the blue range, due to the highest energy among the visible region. However, the green range should be closely observed in longer exposure time [5]. Finally, the pigments containing C-Si, C-N, S-S, C-S, Si-Si, N-N and O-O bonds might not be durable due to the amount of energy required to break the common bonds as shown in figure 1.

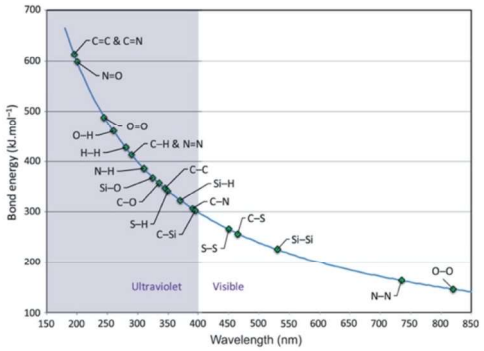

Figure 1 Plot of energy versus the wavelength of UV and visible range which require breaking common bonds [7].

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Analysis of the relationship between high school student's PMS/PMDD prevalence and frequency of their visit to the school health care room

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Purpose and Background

Premenstrual syndrome (PMS) is a mental and physical symptom that lasts for several days before menstruation and resolves at the onset of menstruation. Physical symptoms include fatigue, abdominal pain, swelling, and hypersomnia. Psychiatric symptoms include frustration, depression, anxiety, and similar symptoms. Premenstrual dysphoric disorder (PMDD) is a condition in which the psychological symptoms of PMS are particularly severe and interfere with social life. (Japan Society of Obstetrics and Gynecology, 2018).

The current status of menstruation-related problems in high school students has been reported as follows.

- 90% of high school students experience menstrual cramps (Nagasu et al., 2011)
- 51.2% of students experience moderate to severe menstrual pain (Matsutake & Nagahashi, 2020)
- 62% of students experience a loss of efficiency in their studies and other educational activities due to menstruation (Bayer Yakuhin, Ltd., 2021)
- 4.1% of students report that menstrual pain is the main reason for visits to the school health care room (Japan School Health Association, 2018)

In recent years, it has become clear that there is a correlation between the presence of menstrual pain and the onset of PMS/PMDD (Akimoto et al., 2009).

Materials and Methods

Surveillance was done using a premenstrual symptoms screening tool (PSST) questionnaire to survey students in one high school in Chiba City. A total of 287 students participated in the survey, with parental consent. The prevalence and severity of PMS/PMDD were calculated using the PSST (Steiner, 2003; Kamada, 2012). The number of visits to the school health care room was obtained from health management records. The participants were divided into four groups according to the number of visits (none, average, medium, and many). None of the students were diagnosed with gynecological disorders such as PMS/PMDD, dysmenorrhea, or endometriosis before the study.

Results and Discussion

The analysis revealed that 97.9% of students answered that they had experience with PMS/PMDD-related symptoms (Figure 1). Only 2.1 % of students did not have any symptoms related to PMS/PMDD. These results demonstrate the importance of considering PMS/PMDD in evaluating the physical and psychiatric conditions of high school

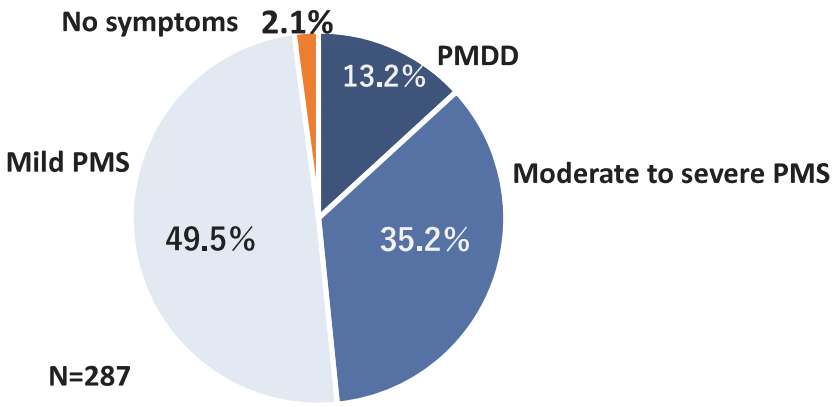

Figure 1. Prevalence of PMS/PMDD in Japanese high school students.

students.

Therefore, the relationship between the severity of PMS/PMDD and the frequency of visits to the health care room in the school was analyzed (Figure 2). Darker blue bars show a higher frequency of visits, "++" shows the significance of abundant visits, and "--" shows the importance of infrequent visits, respectively. According to these results, there was a significant relationship and positive correlation between the severity of PMS/PMDD and the frequency of visits to the health care room.

Figure 2. Relationship between the severity of PMS/PMDD and the frequency of health care room visits.

According to these results, the following two points were clarified. There is a significant relationship between the severity of PMS and the frequency of visits to the health care room, and PMS and PMDD reduce the quality of life of high school students. However, this research has limitations, as only one high school was studied and the educational level of the students is not clear. Therefore, further research is necessary to confirm these findings.

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Wastewater is A Solution for World Clean Water Crisis Inline with Climate Change

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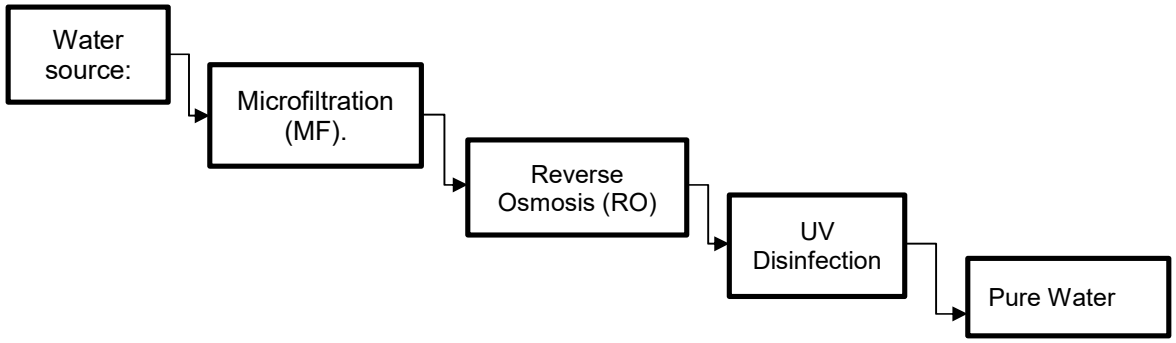
Purpose and Background

Climate change is disrupting weather patterns, leading to extreme weather events, unpredictable water availability, exacerbating water scarcity and contaminating water supplies. Such impacts can drastically affect the quantity and quality of water that children need to survive (UNICEF, 2021). Climate change is not just increasing the global average temperature. It is also causing seasonal meteorological variabilities and making the climate less predictable (Gonçalves, 2020). According to the WMO's State of Climate Services 2021, more than 20 per cent of the world's river basins experienced either rapid increases or declines in their surface water area in 2020. Water is one of the essential requirements that exist in our life. The 6th Goal of the SDGs is to guarantee the availability and management of clean water and sustainable sanitation for all. In order toachieve the goals of clean water and proper sanitation by 2030, 8 targets were set through 40 indicators. These targets include access to improved drinking water, access to proper sanitation, waterand waste quality, as well as the utilization, management and conservation of water resources. Efforts made to achieve these targets are outlined in policies, programs and activities that will be carried out by the government and non-government organizations (Tortajada, 2016). On the other hand, high population growth followed by economic growth, industrial development, f & b, and animal husbandry that uses a lot of lands, and water causes increased water scarcity. In this era, clean water is something that is a must in our lives. Especially with the existence of COVID-19, which makes us always have to live clean. Since the coronavirus outbreak first occurred in China, the World Health Organization (WHO) has echoed the importance of washing hands thoroughlyand routinely to avoid transmission of the virus. This condition is causing the need for clean water to rise, and we cannot limit our need for clean water due to the COVID-19 pandemic. But the problem is, will clean water continue to exist where climate change is now causing a lack of clean water and a COVID-19 pandemic that is causing an increase in the need for clean water? And we don't know whenthis COVID-19 pandemic will end. As many as 33.4 million Indonesians lack clean water and 99.7 million lack access to proper sanitation facilities. Data from the Central Statistics Agency (BPS) states that the current access to clean water is 72.55 percent. This figure is still below the Sustainable Development Goals (SDGs) target of 100 percent. (Rossa & Nodia, 2018). An innovation for processing domestic wastewater into clean water that can be used to meet household and industry needs is crucial.

Materials and Methods

NEWater is recycled from treated sewage ('used water') and produced using a rigorous 3-step purification process (Lee & Tan, 2018).



Steps to make wastewater into ready-to-drink water using the NEWater method

- In MF, thetreated used water is passed through membranes to filter out and retained on the membrane surface suspended solids, colloidal particles, disease-causing bacteria, some viruses and protozoan cysts. The filtered water that goes through the membrane contains only dissolved salts and organic molecules.

- In RO, a semi-permeable membrane is used. The semi-permeable membrane has tiny pores which only allow tiny molecules like water molecules to pass through. Hence, NEWater is RO water andis free from viruses, bacteria and contains a negligible amount of salts and organic matters.
- In UV Disinfection, ultraviolet or UVdisinfection is used to ensure that all organisms are inactivated and the purity of the product water guaranteed.
- In pure water with the addition of some alkaline chemicals to restore the acid-alkaline or pH balance, the Water is now ready to be piped off to its wide range of applications. (Agency, 2018)

Over the two years, some 20,000 test results from seven sampling locations in the plant, coveringabout 190 physical, chemical and microbiological parameters, were collected. This included more than4500 results for NEWater, which surpassed the WHO and USEPA drinking water standards. The microbiological parameters for NEWater were found to be comparable to or better than PUB drinking water: of the microbiological water quality parameters analyzed, only heterotrophic plate counts were consistently detected in NEWater, and these were lower in concentration than that in PUB drinking water. (PUB, 2002). NEWater prices have been reduced from S$1.30 (=US$0.87) per cubic meter in 2003 to S$1.15 (=US$0.77) per cubic meter in January 2005 and S$1.00 (=US$0.67) per cubic meter in April 2007. This has also encouraged non-domestic customers to make the switch from potable water to NEWaterfor their nonportable uses. (Howe, Smith, & Henderson, 2010). The NEWater tariff is SGD1.22/m3compared to SGD0.65/m3 for Industrial Water (PUB, 2014).

Results and Discussion

From this case, we understand how to process wastewater into drinking water. By using NEWater technology from Singapore, which can be produced using a rigorous 3-step purification process, might help countries that lack clean water due to climate change. Water that can be treated is not only domestic wastewater, but when the rainy season comes, even rainwater can be accommodated and processed into ready to drink wateror clean water. For example, in Indonesia, there are two cities which are often hit by rain, namely Bandung city and Bogor city, we can use rainwater from these two cities to support this project. With technology, it could reduce diseases caused by a lack of clean water or the amount of polluted water. The technology is also one of the answers for some countries that have difficulty getting clean water amid the COVID-19 pandemic because by using this technology, clean water capacity will increase. On the other hand, NEWater provides a more cost-effective solution to meet long-term water demand by lowering the quantity of desalinated water required to meet demand.

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RELATIONSHIP OF WATER USE DURING THE COVID-19 PANDEMIC TO IMPLEMENTATION OF HEALTH PROTOCOLS (CASE STUDY: BANTUL VILLAGE, YOGYAKARTA, INDONESIA)

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Purpose and Background

The Covid-19 widespread has caused significant impacts on human life and the environment, including water use universally (Pant et al., 2021). The essential advantage of freshwater for inhabitants is the requirement for residential water used day by day, such as drinking, cooking, showering, and washing hands. During the pandemic era, freshwater can support the amid of Covid-19 widespread. Regular handwashing with soap and running water is a preventive degree of Covid-19 transmission recommended by WHO (WHO and UNICEF, 2020). The current Covid-19 widespread has caused water to extend, particularly in central activity ranges and high population areas.

Bantul sub-district is the capital of Bantul Regency. Bantul sub-district includes five villages, namely Palbapang, Ringinharjo, Bantul, Trirenggo, and Sabdodadi. Among the five villages, Bantul Village has the highest population density. Bantul Village is in the center of the Bantul Sub-district and gets to be the center of action within the Bantul rule. Population thickness is not the driving cause and has no substantial impact on the spread of Covid-19 (Wahyuni, 2021). The first purpose of this research is to distinguish the socio-economic characteristics of the population and its impact on the level of water needs. The second purpose is to analyze the centrality of the expanded water needs amid the widespread application of health protocols.

Materials and Methods

This research is a type of qualitative descriptive research to explain the relationship related to water use to implement health protocols during the Covid-19 pandemic. This research was conducted six months in Bantul Village, Bantul District, Yogyakarta, Indonesia. The water use referred to in this study is the average daily clean water use and the number of family members such as bathing, washing, and watering (Cahyo et al., 2016)

The sample of this study was obtained from a population of 16,535 family heads in Bantul Village (Central Bureau of Statistics Republic of Indonesia, 2020). The method of determining the number of samples in this study uses the Slovin formula with an error rate of 10%. This percentage was chosen due to limited resources and a large population. Data samples were taken with the help of research tools in a questionnaire containing questions relevant to the research. Furthermore, the sampling method used a proportional random sampling technique spread evenly to 12 hamlets in Bantul Villages (Figure 1). The data obtained were processed using SPSS (Statistical Package for Social Sciences) and Microsoft Excel application. The Wilcoxon test was chosen to test the significance of water usage data before and during the Covid-19 Pandemic. This test was chosen because the existing data showed an abnormal distribution. The results of the study were analyzed descriptively with other supporting data for summarizing quantitative data.

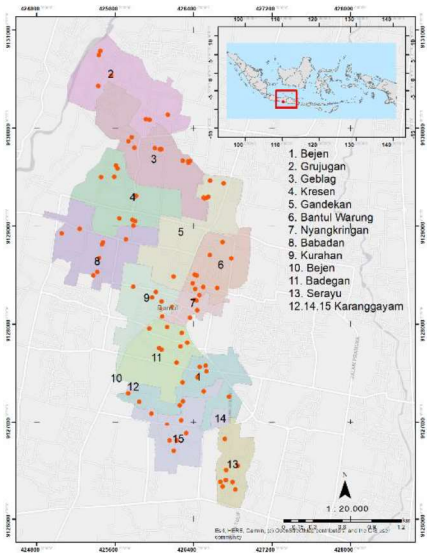

Figure 1. Distribution of research respondents in Bantul Village

Results and Discussion

Based on a survey of 99 respondents in Bantul Village, the total water use per capita of Bantul Village residents are 54 liters/day - 1044 liters/day. Based on data, 91 respondents used 325.6-651 liters of water/day, 7 respondents used 651.1-1,042.5 liters of water/day, and 1 respondent used 66-325.5 liters of water/day. According to the Indonesian National Standards Agency, the total water use of most residents of Bantul Village is much more than the average water use per capita, which is 178 liters/day/capita (Asian Development Bank, 2016).

Domestic water use in Bantul Village has increased during the Covid-19 Pandemic. The amount of water used per capita before and during the Covid-19 pandemic and the percentage of the significant changes are presented in Figure 2. Almost all types of water use have increased, especially the need for water for washing hands and bathing. The increase in water use for washing hands was twice as large (101.4%), while the increase in water use for bathing reached 4.6% (Table 1). Changes in water use for washing clothes, watering plants, cooking, wudu', and others are

relatively small, only in the range of 0.22-0.75%. The types of water use that did not increase was water for drinking, watering plants, and washing vehicles.

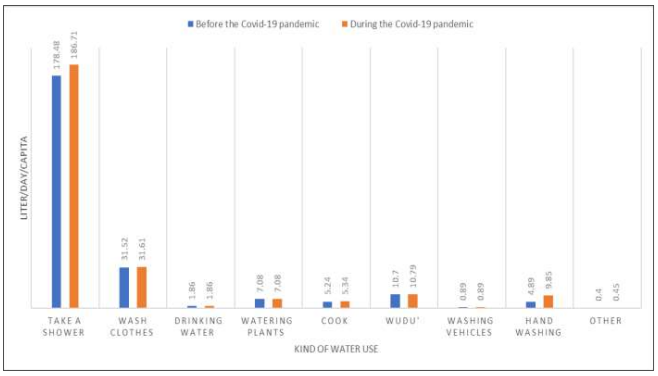

Figure 2. Significance of Water Use Before and During the Covid-19 Pandemic

Table 1. Significance of Water Use During the Covid-19 Pandemic

Freshwater Uses	Increase in water use during the pandemic (liter/capita/day)	The signification of water uses during the pandemic (%)
Take a shower	8.22	4.6
Wash clothes	0.09	0.7
Drinking water	0	0
Watering plants	0	0
Cook	0.1	0.75
Wudu'	0.09	0.65
Washing vehicles	0	0
Hand washing	4.96	101.4
Other	0.03	0.22

The water use that has increased significantly is the water used for bathing and washing hands. The significance is not the same in every area. The spatial distribution of water use significance is presented in Figure 3. The highest water use significance for bathing is in Geblag Hamlet and Bejen Hamlet. The significance of water used for bathing is in Gandekan and Badegan Hamlets, while the highest total water use significance is in Geblag Hamlet. The significance of water use, especially bathing and washing hands, is high, indicating that the health protocols are implemented quite well. Hand washing is one of the health protocols recommended by WHO and UNICEF.

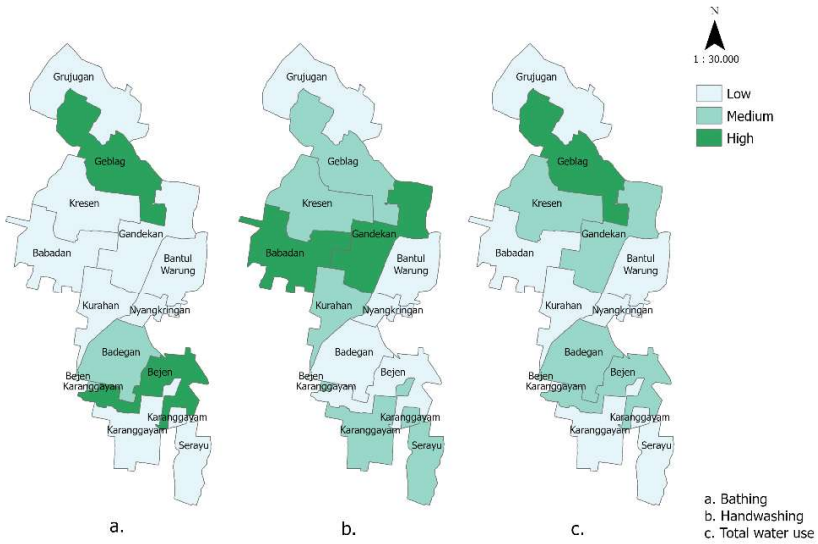

Figure 3. Distribution of significance of water use during the Covid-19 pandemic. (a) The total significance of water use. (b) Significance of water used for bathing purposes. (c) The significance of the use of water for handwashing.

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Analysis of the differences in awareness of hydrocolloid dressings between general teachers and health care teachers

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Purpose and Background

According to the Japan Sport Council, the number of reported school-based injuries per year in Japan is 746,913. Therefore, all teachers working in schools must know basic first aid, and this knowledge must remain current, as the approach to medical treatments is constantly being revised and updated. Recently, the treatment of scrapes and abrasions has been updated. Previously, the treatment of abrasions involved treating the wound with disinfectant and then allowing it to dry by wrapping it with cotton gauze. Hydrocolloid dressings have now become the standard of care as they do not dry out the wound. However, I observed that hydrocolloid dressings were not being used at schools where I taught. Therefore, a questionnaire survey was conducted to determine the extent to which teachers knew about the appropriate treatment of wounds.

Materials and Methods

A questionnaire survey was conducted among 279 teachers working in schools in Chiba and Tokyo prefecture. It included 247 general teachers and 32 health care teachers.

Results and Discussion

Differences in the knowledge-based scores regarding the treatment of scrapes and abrasions between general and health care teachers were analyzed. A perfect score was defined as 10. The maximum score achieved by a general teacher was 7 and by a health care teacher was 8. The mean score of the general teachers was 7.2 and that of the health care teachers was 8.4.

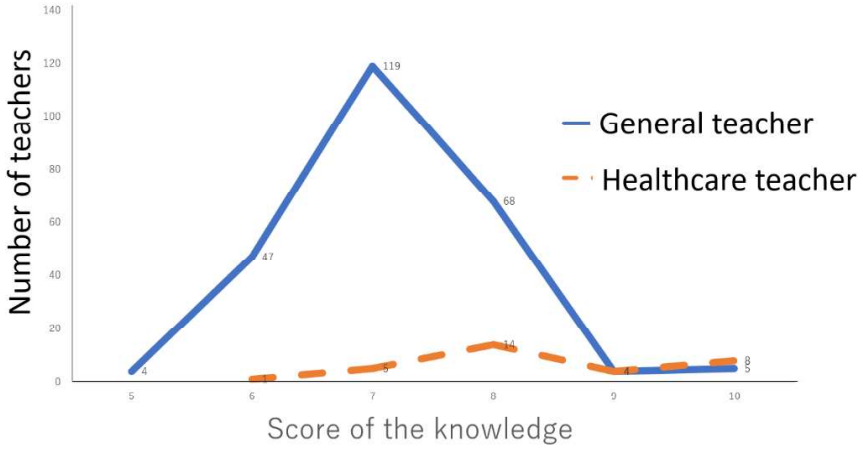

Figure 1. Analysis of differences in knowledge scores for the treatment of scrapes and abrasions between general teachers and health care teachers.

Awareness of hydrocolloid dressings was investigated between both groups and 97% of health care teachers answered that they were aware of hydrocolloid dressings, while only 21% of general teachers answered in the affirmative. Therefore, approximately 80% of the general teachers answered that they do not have an awareness of hydrocolloid dressings.

These results indicate that there is a difference between general teachers and health care teachers in terms of awareness of the treatment of abrasions with hydrocolloid dressings. Therefore, health education for general teachers will be necessary to improve school safety.

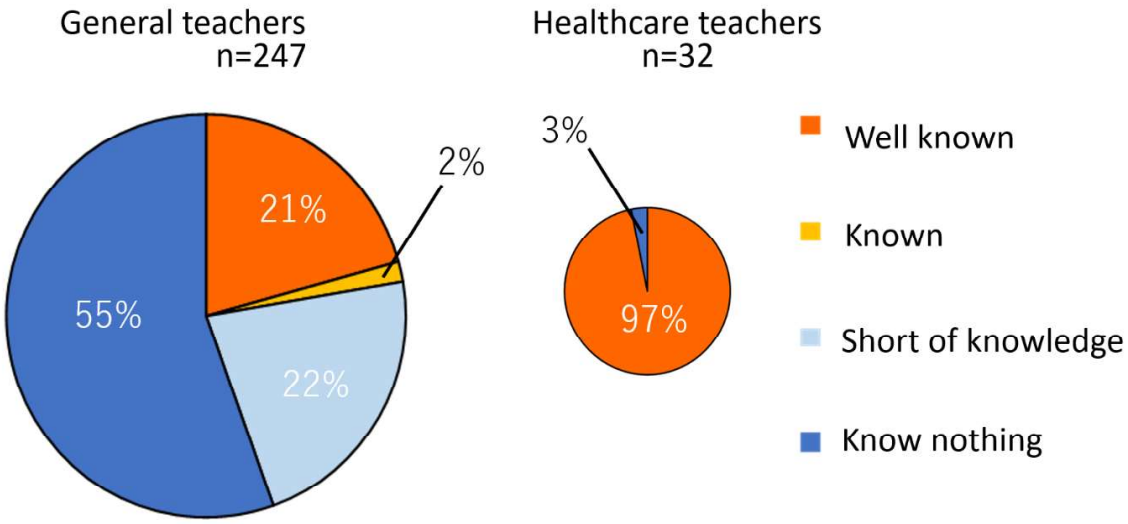

Figure 2. Awareness of hydrocolloid dressings.

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ANTHROPOGENIC GEOMORPHOLOGICAL MAPPING IN PRAMBANAN DISTRICT, YOGYAKARTA, INDONESIA

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Purpose and Background:

In geomorphological studies, humans are socially and culturally important geomorphological agents (Szabó, 2010). At least one-third of the earth's continents have human impacts on landforms (Rózsa, 2010). Human impacts on landforms and geomorphic processes can occur in two ways, direct and indirect (Szabó, 2010; Goudie, 2013; Howard, 2017). Direct human impacts are generally the result of human activities, while indirect human impacts are natural geomorphic processes triggered by human activities (Szabó, 2010; Goudie, 2013; Howard, 2017).

The first purpose of this research is to map the anthropogenic landforms in Prambanan District, Special Region of Yogyakarta. This mapping will provide a detailed description of the intervention and anthropogenic landforms. The second purpose is to sequence the morphochronology. The morphochronological sequencing will provide an overview of the evolution of anthropogenic landforms based on historical and archaeological aspects within the broad framework of anthropogenic geomorphology.

Materials and Methods:

This study uses images from Google Earth, Digital Elevation Model (DEM) from "DEMNAS" with a resolution of 0.8 arcseconds, "Badan Perencanaan Daerah DIY" and contour shapefiles and administrative boundaries from the "Badan Informasi Geospatial." DEM is processed into a hillshade raster, the direction of the slope (aspect), and the slope. The working scale is 1:20,000 and follows the mapping rules used following Speight (2009) and Szabo (2010). The mapping begins with mapping natural landforms and anthropogenic interventions and the types of anthropogenic landforms. Then, natural landforms and anthropogenic interventions were processed with union tools. Furthermore, the mapping results will be displayed in the form of maps and pivot tables of anthropogenic interventions for each type of natural landform. The whole process is done on ArcGIS Pro and Microsoft Excel.

Results and Discussion

The Prambanan District landform consists of a gently sloping plain as part of the Merapi Volcano, cuesta as part of the Baturagung Range, and an isolated hill. Cuesta is in the east with a shape like a semi-circle. In contrast, the plain with a gentle slope is integral to the Merapi volcano on the lower slope. Isolated hills are spread over the plains and have the same material as the cuesta. Each of these landforms is detailed in a 1:20,000 working scale into a landform element, as shown in figure 1.

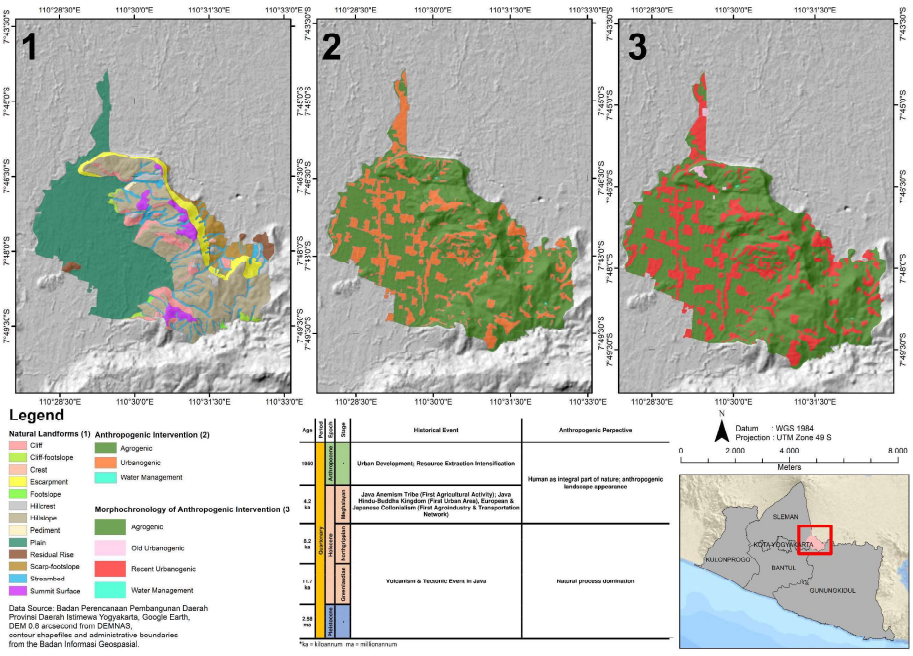

Figure 1. Natural landform element (1); anthropogenic intervention (2); and morphochronology map (3) of Prambanan District

Agrogenics dominated anthropogenic interventions in the Prambanan District. Agrogenic interventions in the cuesta are mixed gardens, fields, and rainfed rice fields. Irrigated ricefields dominate the plains and are fragmented by other activities, namely urbanogenic. Meanwhile, the water management intervention is in the form of a reservoir spread over the cuesta.

The results of the union between the natural landform map (landform element) and the anthropogenic intervention map and supported by field validation are anthropogenic process and landform. At a scale of 1:20,000, indirect interventions are difficult to identify. However, direct intervention can be approached with land use, existing morphology, and appearance in figure 1. Anthropogenic landforms and processes are presented in table 1.

Table 1. Result of union between the natural landform map (landform element) and the anthropogenic intervention map

Anthropogenic Intervention	Landform Element	Anthropogenic Processes and Landform	Area (m²)	Area (%)
Agrogenic	Plain	Direct; Planation; Rice Field	17347441.3	4.38%
	Cliff	Direct; Planation; Terraces	2074613.57	0.84%
	Cliff-footslope		374511.6371	0.07%
	Crest		38260.19118	5.09%
	Escarpment		2259502.952	0.14%
	Footslope		75508.2996	1.77%
	Hillcrest		881805.2743	20.29%
	Hillslope		10683894.54	0.18%
	Pediment		71022.81925	28.66%
	Residual Rise		636112.4659	1.21%
	Scarp-footslope		1575672.332	2.40%
	Streambed		2809350.1	5.97%
	Summit Surface		1285584.841	2.20%
	Escarpment		2259502.952	0.00%
	Hillslope		10683894.54	0.00%
	Hillslope		10683894.54	0.00%
	Streambed		2809350.1	0.00%
Urbanogenic	Cliff	Direct; Planation; Construction	2074613.57	0.80%
	Cliff-footslope		374511.6371	0.09%
	Crest		38260.19118	0.03%
	Escarpment		2259502.952	0.54%
	Footslope		75508.2996	0.05%
	Hillcrest		881805.2743	0.43%
	Hillslope		10683894.54	6.34%
	Plain		17347441.3	14.58%
	Residual Rise		636112.4659	0.38%
	Scarp-footslope		1575672.332	1.53%
	Streambed		2809350.1	1.01%
	Summit Surface		1285584.841	1.00%
	Escarpment		2259502.952	0.00%
	Hillslope		10683894.54	0.00%
Water Management	Hillslope	Direct; Excavation; Reservoir	10683894.54	0.01%
	Streambed		2809350.1	0.02%
			133028822.1	100.00%

Human impacts on landforms increased in the era of "The Great Acceleration" in 1950 (Goudie & Viles, 2016; Lewis & Maslin, 2015). However, the human impact on landforms prior to 1950 cannot be ruled out. Prambanan District, located in the Special Region of Yogyakarta, can provide examples of the morphochronological diversity of anthropogenic landforms and their types of intervention. During the Ancient Mataram Kingdom, Prambanan District was an important area. This is based on the findings of various cultural heritages such as Prambanan Temple and Ratu Boko Palace.

On the other hand, today's human activities still occur, marked by settlements and modern agriculture. Thus, in morphochronology, it can be identified as old urbanogenic ("candi"/temple and palace) and recent urbanogenic (recent dwelling). Meanwhile, agrogenic and water management are the results of recent processes.

In figure 1, a morphochronology map and chronostratigraphy in Prambanan District. Old urbanogenic interventions that can still be identified (temple/temple and palace) occur at the meghalayan stage. Meanwhile, recent urbanogenic interventions (after 1950) occurred in the Anthropocene epoch. This is based on urban development and natural resource extraction intensification, which has implications for the emergence of anthropogenic landscapes.

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Ocean Acidification that affected to Crustaceans' and Mollusks' shells

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Purpose and Background:

Ocean acidification is a reduction in the pH of the ocean over an extended period of time, caused by uptake of Carbon Dioxide (CO_2) from burning of fossil fuels and land using from the atmosphere. It makes the seawater become more acidic from Carbonate Ions that is an important building block of structures of shells, making them thinner and more fragile by the lack of calcium carbonate. For this reason, the Crustaceans and Mollusks species are risk from hunting more than before and make the entire food web collapse.

Consequently, in this research experiments will refer about how Carbonic Acid affected to the Crustaceans' and Mollusks' shells. The purposes are to study the effect of Carbonic Acid to Crustaceans' and Mollusks' shells and to raise people's awareness on effect of Ocean Acidification to living-things, both in the ocean and on the land (which is *Homo sapiens*.)

Materials and Methods:

Materials:

For materials have three ingredients, a cup of sea water and a cup of Sodium Bicarbonate water which have the same quantity of water (100 ml. / cup), and arks' shells (1 shell / cup.)

Methods:

1 Pre-Proceeding:

-Researching about Ocean Acidification and the effect to Crustaceans' and Mollusks' shells and planning the working project.

2 Proceeding:

-Making experiment by using ark shells putting in the plain sea water and Sodium Bicarbonate water for 5 days and see the difference of the shell in Sodium Bicarbonate water.

3 Post-Proceeding:

-Concluding the results after finishing the experiment and presenting the research to the society.

Results and Discussion:

Day	Ark shell in plain sea water	Ark shell in Sodium Bicarbonate water
1	-Remain the same	-Remain the same
2	-Remain the same as Day 1	-The texture of the shell became slicker than Day 1
3	-Remain the same as Day 1	-The texture of the shell became slicker than Day 2
4	-Remain the same as Day 1	-The texture of the shell became slicker and looked brighter than the Day 3.
5	-Remain the same as Day 1	-The texture of the shell became slicker and looked brighter than the Day 4.

From the experiment shows that for 5 days, while the ark shell in the sea water remains the same, we can see the difference in the shell in Sodium Bicarbonate water. The color of the shell has become brighter since day 2 and the texture has been slicker than the ark shell in the sea water since day 4. It shows that the acid erodes the shells to make it thinner and it will become translucent if we put it inside the Sodium Bicarbonate water for months.

According to the Science Heathen Organization Research (2016), Ocean Acidification associated to pollution in sea water, for example, the Red Tide Events that can make whales and dolphins to death, or the coral bleaching in The Great Barrier Reef, the biggest coral reef system in the world. It also effect to the food chaining collapsing and the animal extinction when the shells' species risk of hunting more than before. This leads to the lack of marine life for fishery industries, affecting to economic growth and scarcity of food in people who live in seashore areas and who have main meal for living as seafood.

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Development of Climate Change Education Curriculum to promote Climate Literacy of lower secondary school students

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Purpose and Background

Nowadays, the climate change caused by increases carbon dioxide and others greenhouse gas (e.g. methane, nitrous oxide) from human activities (e.g. burning fossil fuels, deforesting large areas of land) had a profound influence on Earth's climate, effected directly global temperature. According to the Intergovernmental Panel on Climate Change (IPCC) report that observed temperature change in space and time show clear evidence of human influences on the climate system. (GCRP, 2009) To enable human beings to adaptation and mitigation with climate change, encouraging global citizens to become more climate literacy by using climate change education will help citizens adapt themselves to deal with the changes and complete the sustainable development goals (Anderson, 2012).

In Thailand, considering in the basic education core curriculum B.E. 2551 (A.D. 2008) in the content of lower secondary school were founding some content about environmental and climate change, but in Thailand still founding some problems about environmental and climate change education. Such as in the school don't have a specialist teacher in the environmental topic, the teacher can't analyze and integrate content about the environment with other subjects because of the limit of time and the curriculum development in environmental education and climate change education in Thailand are not much concrete (Department of Environmental Quality Promotion, 2016).

This research is interested to develop a climate change education curriculum to promote climate literacy of lower secondary school students that encourages students to understand the problem of climate change. able to apply knowledge to enhance their quality of life as well as being able to prepare to deal with the changes that occur as well.

The purposes of this research are

1) To develop a climate change education curriculum to promote climate literacy of lower secondary school students
2) 2. To assess the quality of climate change education curriculum for lower secondary school students as follows
    2.1. Study and Compare the development of climate literacy towards climate change of learners before and after teaching with the climate change education curriculum
    2.2. Study student's opinions on climate change education curriculum

Methods

This research is Research and Development type, using descriptive research methodology and quasi-experimental research, defines the details of the research process into 2 phases (Figure 1). Sample of the research are 30 lower secondary school students that selected from the recruitment in Nakhon Nayok, Thailand.

Results and Discussion

Now this research is working on Curriculum Development phase, in the process study opinions about climate change curriculum from qualified person in climate change, climate change education or environmental education.

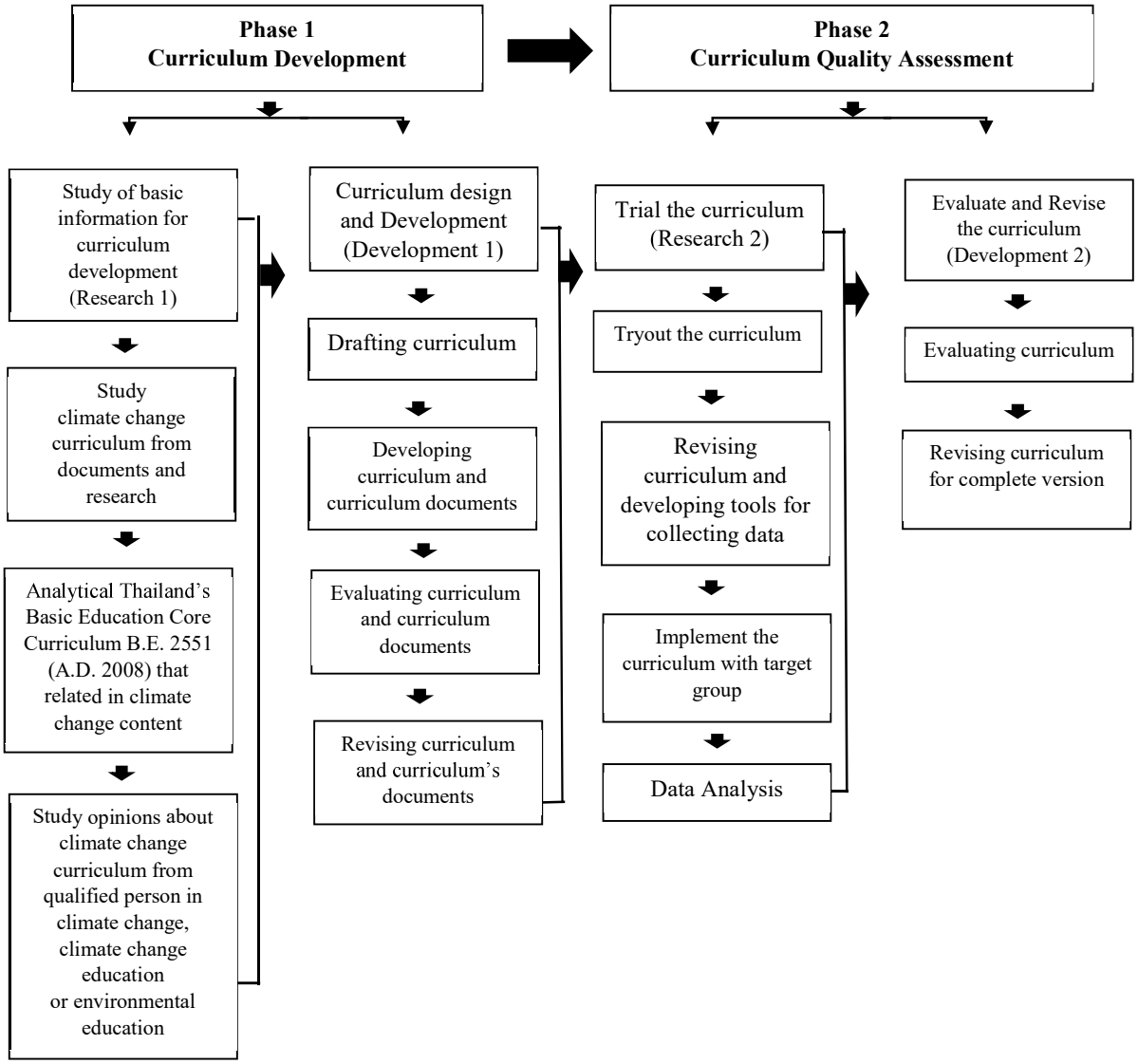

Figure 1 Reseach Methods

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Enhancing grade 9 students' self-efficacy on science subject online learning

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Purpose and background

Due to the situation of coronavirus 2019 outbreak (COVID-19) and infection control policy in 2021, the ministry of education offers 5 approaches to school for running educational system and defending teacher and student from COVID-19; 1) On-site, 2) On-air 3) Online, 4) On-demand and 5) On-hand (Office of the Basic Education Commission (OBEC), 2021) Online learning, the most approach was chosen in the 1/2021 semester (June-October) in Udon Thani Secondary Educational Service Area. As well as my school has a plan to choose an Online approach in the 1/2021 semester.

The survey in science subjects before starting the lesson showed that most grade 9 students (80.15%) lacked the confidence to succeed in online learning because it is the new approach for them and science is the content subject that is hard to understand. This person's belief in his or her capability to successfully perform a particular task is self-efficacy, it is one of the most powerful motivational predictors of how well a person will perform at almost any endeavor. (Bandura, 1977; Heslin & Klehe, 2006) So, students' self-efficacy in online learning is needed for enhancing.

For enhancing self-efficacy, Bandura (1977) states that individuals develop their self-efficacy beliefs by interpreting information from four main sources of efficacy; enactive mastery experience, vicarious experience, verbal persuasion, and physiological and affective state (Bandura, 1997) and a systematic review in the topic "an exploration of factors influencing self-efficacy in online learning show that factors influencing self-efficacy in online learning consist of online learning experience and knowledge, feedback and reward, online communication and interaction, social influence, learner motivation and attitude (Peechapol et al.,2018).

This research used 5Es inquiry which is the normal approach combined with the above factors based on Bandura source of efficacy for enhancing student's self-efficacy in online learning to answer the research question "what is grade 9 students' self-efficacy in online learning after using 5Es inquiry combined with self-efficacy's enhancing factors lesson plan (5EsSEF lesson plan)?"

Materials and methods

This research is quasi-experimental research, one group pretest-posttest design, collecting data using quantitative and follow up with qualitative to fully fill the result. The study group is one class from simple random sampling, consisting of 32 grade 9 students. The 4 5EsSEF lesson plans in the topic of science in everyday life were used after students had completed self-efficacy questionnaire for online learning (KR-20=0.81) which, adapted from SeQoL of Tsai et al. (2020) Furthermore, the CISCO WebEx application was used as a learning platform. Self-efficacy questionnaires for online learning were used again after finishing 4 lesson plans. The self-efficacy score was analyzed using mean ($\bar{X}$), standard deviation (S.D.), and t-test independent for comparing mean between before and after. And then researcher interview 3 students who were the highest increasing self-efficacy score for deep detail using a semi-structured interview. Qualitative data were analyzed by inductive qualitative approach and were used to support quantitative data.

Result and short explanation

The study revealed that the students' post-self-efficacy score ($\bar{X}$=7.65, SD=1.24) had statistically significantly higher than pre-self-efficacy score ($\bar{X}$=4.66, SD=0.36) ($p<.01$) as shown in table 1 below.

Table 1. Students' self-efficacy score

Test	Number of students	$\bar{X}$	S.D.	t
Pre-self-efficacy score	32	4.66	0.36	13.478*
Post-self-efficacy score	32	7.65	1.24	

*df = 31, at the 0.01 significant level.

After I asked 3 students who were the highest increasing score with the question "What is the most effective from the "science in everyday life unit" in increasing your self-efficacy?" the answers sort by highest frequency were; 1) Watching the other success cases in VDO clip and they had the motivation to learn. 2) They can do it well in the lesson. 3) First describing how to use learning platform or application. 4) good feedback from teacher after student answer both true and wrong and, 5) The easy of a learning platform for use.

Discussion and conclusion

As the result showed the students' post-self-efficacy score had statistically significantly higher than the pre-self-efficacy score after using the 5EsSEF lesson plan because 5EsSEF lesson plans consist of source of self-efficacy. 5EsSEF lesson plan consists of 4 lesson plans: first lesson plan is for introducing Cisco WebEx platform in using and functions that used in online learning that support online learning experience and knowledge factors which is the factors that affect self-efficacy (Peechapol et al., 2018) in the second-hour teacher shown the VDO of successful online learning in science subject to the student, this support vicarious experience. (Bandura, 1977) The second to the fourth lesson plan is in the topics; what is the importance of science? the effect of science on the world and solving the problem using science are emphasized on the discussion in explanation and elaboration step is the online communication and interaction factor which can enhance self-efficacy. (Peechapol et al., 2018) All 4 lesson plans in every step (engagement, exploration, explanation, elaboration, and evaluation) emphasized positive feedback to both correct and false answers, emphasized giving star scores to students who answers correct and who frequently answer the question, these support feedback and reward factor which enhancing self-efficacy (Peechapol et al., 2018). These are related to the data from students who got the highest increasing self-efficacy score that all these following factors enhancing their efficacy; 1) Watching the other success cases in VDO clip and they had the motivation to learn. 2) They can do it well in the lesson. 3) First describing how to use learning platform or application. 4) good feedback from teacher after student answer both true and wrong and, 5) the easy of a learning platform for use.

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Information Systems Prototype
Student Teacher Communication Forum
To Address Stakeholder Problems and Attempt to Identify True Issues in Education and Apply Solutions to SDG of Education

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Background and Purpose

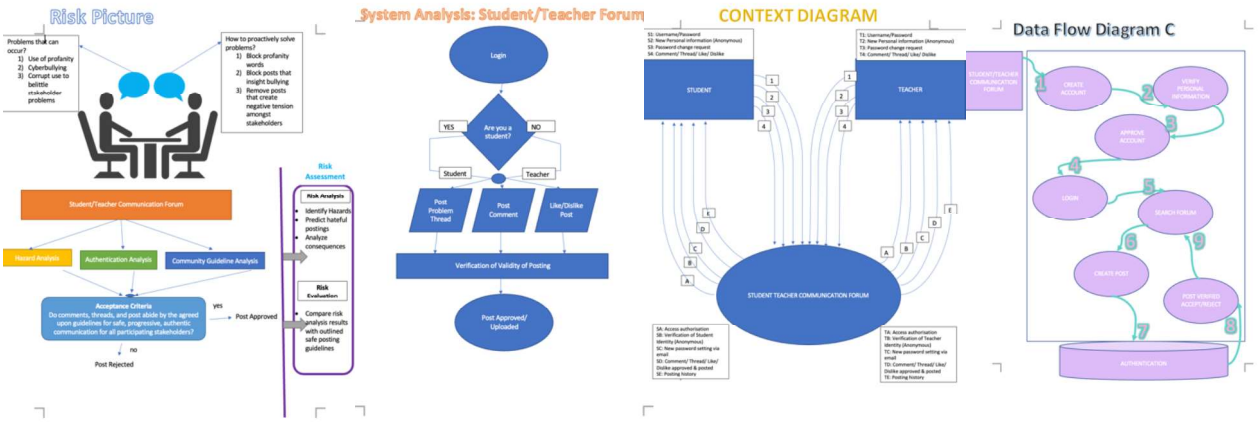
Currently in education there are increasing problems in both execution of education and the well-being of stakeholders. Most bottom stakeholders such as teachers and students are experiencing similar hardships with the current system of education but have no means to authentically communicate with one another due to the division in status, expectations, roles, hierarchy, and lack of trust between the two. This research is to suggest a creation of a new anonymous forum; *Student Teacher Communication Forum,* where students and teachers can communicate their frustrations within the education system free of fear of retaliation from above stakeholders and have their communications be applied to making policies to amend the shortcomings both students and teachers are currently facing in their education systems. In order to best work towards the UN's Sustainable Development Goal (SDG) of education it is instrumental that the voices of those directly struggling within the current system of education be heard.

The purpose of this study is to create a prototype forum that allows authentic anonymous communication between bottom stakeholders in education, giving both students and teachers the opportunity to openly address issues regarding educational problems. The forum will hope to allow major problems in education to be addressed from the bottom-up, providing insight in which areas are in need of drastic policy and legislative change.

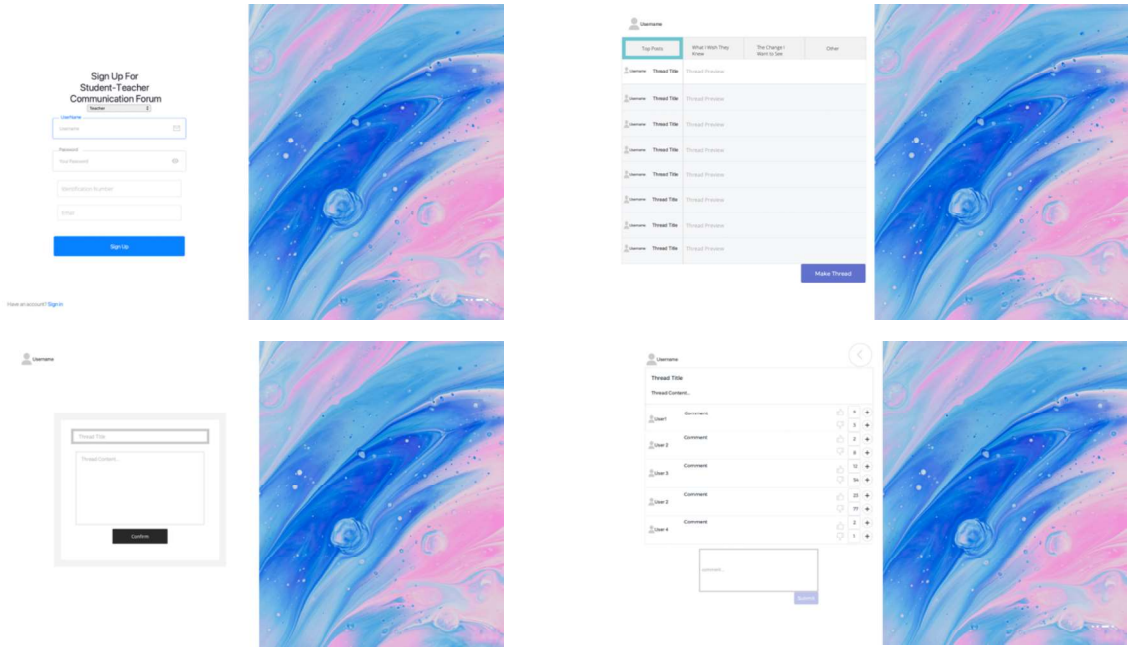
Materials and Methods

The materials used are the JUSTINMIND prototyping software

The methods used are the implementation of the System Development Lifecycle SDLC for System Analysis



Results and Discussion



To best address the SDG of Education communication with bottom stakeholders must be opened to fully understand the issues that currently overwhelm our education systems. By creating a platform where both students and teachers can honestly and authentically communicate their frustrations educational leaders and policy makers can understand exactly where the shortcomings in the education system arise and how exactly it impacts stakeholders. With the creation of the Student/Teacher Communication Forum prototype it is the aim to show that within the structure of education stakeholders have common struggles that can be worked on and improved by means of communication and collaboration. To develop a sustainable model of education those who are most impacted by the structure should have means to vocalize their ideas, opinions, and frustrations. If education systems are aware of problems that arise in real time education leaders can proactively work to solve these problems before they become a systemic issue.

Conclusion

The aim for this information system the *Student Teacher Communication Forum* is to provide insight into the current problems of education and unite the bottom stakeholders to make drastic change to their school systems. With the proposed creation of this forum the hope is that both students and teachers share their honest opinions and frustrations that they experience so that those in positions of power, the top stakeholders can have a visual representation of common problems and then create the proper policies and legislation to address them.

The energy resolution and light yield of $Li_6GdB_3O_9$:Ce scintillatorcrystal at 662 keV

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Purpose and Background:

The scintillators are materials that can emit light after absorbing photons or γ-ray. The scintillators can be divided into two main types as organic and inorganic which inorganic scintillators were widely used in many applications. Good scintillators should be composed of properties such as a good energy resolution, fast decay times, and high light yield (Y_{ph}). The energy resolution (R) was a very important parameter for selecting using a scintillator. This parameter was driven by two primary parameters which Y_{ph} and non-proportionality of light yield (photon non-proportionality response or non-proportionality of light yield).

The Ce^{3+} doped lithium gadolinium orthoborate $Li_6GdB_3O_9$: Ce (LGBO: Ce) scintillator crystal was the inorganic scintillator. It had been grown by the Czhochralski method [1]. It was expected to be a model object of optical materials.

In this experimental, we use the light yield ($Y_{(ph/MeV)}$) which is a ratio of emitted photon numbers per incident γ-ray (MeV). It can exhibit in terms of the amount of photo-electron (N_{phe}) per MeV, of absorbed γ-ray energy by average quantum efficiency (QE) of PMT and can be described using [2],

$$Y_{(\mathrm{ph/MeV})} = \frac{Y_{(\mathrm{phe/MeV})}}{QE} \qquad (1)$$

Material and Methods:

In the experiment of finding energy solution and light yield of LGBO: Ce scintillator by using scintillator with the dimension of 6 mm x 5 mm x 2 mm. This scintillator was coupled to an R11102 PMT using silicone grease and coated with black Teflon tape for protected light from anywhere. Then, connected with Canberra HV supply and Canberra preamplifier (2007B model). The electronic signal was expanded by Canberra amplifier (2022 Model) and using analog to digital converter (ADC) to convert analog signal to digital signal. The signal was analyzed, and the spectrum was shown using Multichannel Analyzer Gamma Acquisition & Analysis (MCA). The experimental schematic was shown in Figure 1. The γ-ray source of ^{137}Cs (662 keV) was used in this experiment.

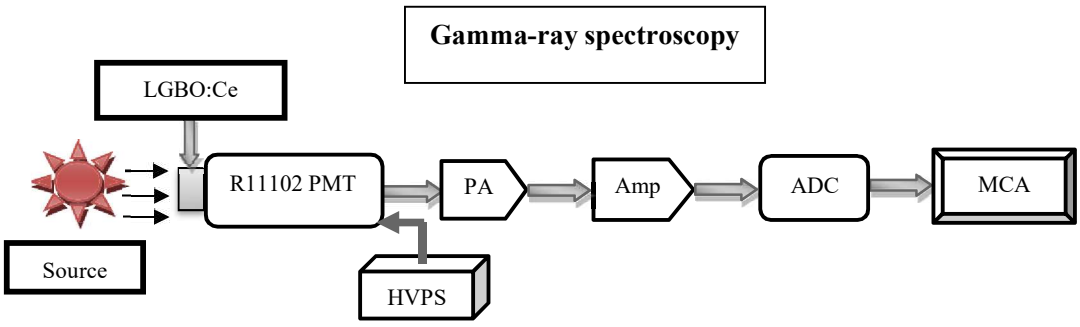

Figure 1 Experimental setup for characterization LGBO: Ce detector.

Result and Discussion

The measurement of γ-ray spectra for LGBO: Ce scintillation has been exhibited in Figure 2 which presented energy spectra at 662 keV. The result exhibited that LGBO: Ce detector had 15.3% of energy resolution (R) at the energy of 662 keV.

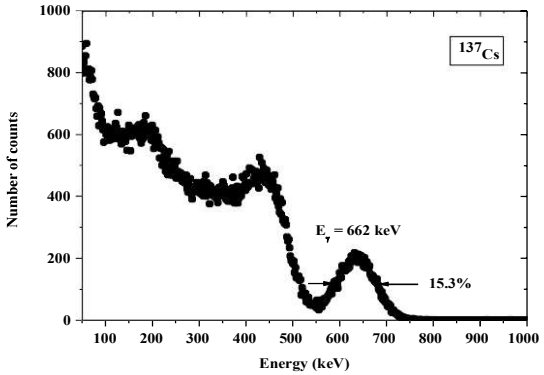

Figure 2 γ-ray energy spectrum (^{137}Cs) measured with LGBO: Ce scintillator.

The Y_{ph} has been determined by using Eq. 1, for LGBO: Ce scintillator at the energy of 662 keV. The result shows Y_{ph} value at 16,393 ph/MeV at 662 keV. The Y_{phe} value at 459 phe/MeV at 662 keV. The cross-section ratio (σ-ratio) of LGBO: Ce which was calculated by WinXCom program found that σ-ratio is 10.1% at 662 keV.

The non-proportionality of light yield characteristics which have been measured for LGBO: Ce scintillator. The non-proportionality of light yield was determined. The result exhibited that the non-proportionality of light yield is at 9% at 662 keV.

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A study of the relationship between climate change and longan productivity in Lamphun Province

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Background and purpose

Thailand is the biggest exporter of longan in the world. Among other tropical fruit, Longan is one of the most successful Thai fresh fruit to be exported to many countries especially China. Thailand's major production area for longans is located in the northern Thailand, especially in Lamphun province. In production, suitable weather is very important for flowering, producing, and developing its fruit. Nowadays, the increased accumulation of greenhouse gases from fuel combustion and agriculture contributes to global warming and climate change. The El Niño, the phenomenon of changing weather condition is affecting the agricultural produce, particularly longan yield. Therefore, this research aims to investigate the effects of climate change on longan yield in Lamphun province from document dated between 2010 and 2019.

Materials and Methods

1. Data collected from statistic, research and annual reports from the Department of Agriculture, the Meteorological Department and the Office of Agricultural Economics.
2. Analyzed the relationship between minimum temperature, rainfall, the El Niño and longan yield
3. Presented the data by using a table.
4. Explained the relationship between the changing weather conditions and longan yield.

Results and Discussion

Data / Year	temperature (^{0}C)	Rainfall (mm.)	The yield (tons)
2010	12.0	281.4	125,857
2011	12.0	663.0	133,540
2012	10.0	482.4	168,829
2013	9.5	462.5	202,831*
2014	8.7	187.4	202,831

Data / Year	temperature (^{0}C)	Rainfall (mm.)	The yield (tons)
2015	12.4	363.7	103,599
2016	9.4	306.9	69,385
2017	16.3	653.4	135,336
2018	11.5	446.3	149,640
2019	14.9	268.2	88,149

Longan trees need a temperature of 10-15 degrees Celsius in January for flowering. They need water during January to June to produce and develop their fruit. The longan harvest season in Thailand is from July to August.

The table portrays the data of the minimum temperature for Lamphun province in January of 2015, 2017 and 2019. In addition, in 2010, 2014, 2015, 2016, and 2019, the rainfalls in Lamphun province were very low in between 187.4 - 363.7 mm. However, the relationship between the temperature and the rainfall in 2014 was an exception due to the yield in that year was higher than in other year while the temperature was the lowest at 8.7 ^{0}C.

From the results, the factors of the weather were significantly important for the longan yield. In 2015, 2016, and 2019, the decreasing longan yields were obviously affected by the El Niño, in accordance with the reports from the Meteorological Department which stated that the increasing temperature and low rainfall had reduced the yield. Nowadays, the effects of climate change have varied the rainfall and the temperature from year to year. Therefore, the climate change caused the unstable yield.

Reference

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IMPLEMENTING "FeD BeteL: 5 DAYS FOR BETTER LIFE" TO REDUCING PLASTIC CONSUMPTION PROBLEMS IN INDONESIA

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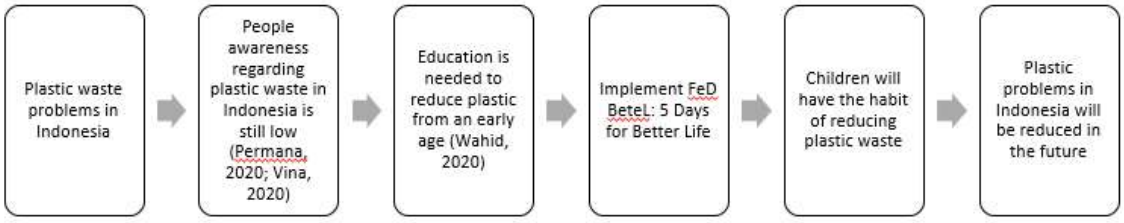
Purpose and Background

Starting from background and purpose, the background of this research is coming from the data of Central Bureau of Statistics stated plastic waste in Indonesia reaches 64 million tons per year. Indonesia is also in second rank after China for the country with the biggest plastic consumption. It means this problem is not only for Indonesia but also for the world. So, the purpose of this research is to suggest what is the proper plastic waste solution in the education sector? As the graph below shows that there are plastic waste problems in Indonesia then it is caused by people's awareness regarding plastic waste is still low. So, education about reducing plastic consumption from an early age is needed. Implementing FeD BeteL: 5 Days for Better Life is expected can bringing a habit for children to practice plastic waste management in their life, thus plastic waste problems in Indonesia will be reduced in the future.



Materials and Methods

This research was analyzing some articles about plastic problems in Indonesia based on regulations, people awareness, and environmental education. The research was conducted by doing literature review from 8 article journals from 2017 – 2021.

Results and Discussion

Regulations about plastic consumptions in Indonesia,

- There is no choice and straight law enforcement in the district. (Permana et al., 2020)
- Argued that the city regulation is more detailed compared to the national regulation which could result in better waste management in terms of waste reduction. (Nizar et al., 2018)

People awareness about plastic consumptions in Indonesia

- The local community has an enormous perspective on seeing this policy. Most of them already show this phenomenon as environmental orientation, even though there are still people who think about the economic value in the policy's trial period. (Kusuma Putri, 2018)

- Majority of the consumers reduce the plastic bag usage after the enactment of the policy, but in the short time.(Sobaya et al., 2018)

Environmental Education in Indonesia

- Most people are not educated on the topic of plastic pollution in schools and otherwise. (Giesler, 2018)
- Students perception, attitude, and self-reported pro-environmental behaviour regarding plastic consumption and pollution significantly increased after the implementation of environmental education. (Numanovich & Abbosxonovich, 2020)

There should be an environmental education since an early age thus people will have awareness and make it as a habit. This project can be implemented from kindergarten level even to university's students. It should be supervised thus will run well and continuously.

Environmental Education Strategy for Reducing Plastic Consumption in Indonesia

FeD BeteL: 5 Days for Better Life				
Monday	Tuesday	Wednesday	Thursday	Friday
Day without straw consumption	Day with using re-useable bag	Day with bring lunch from hom	Day without plastic bottle consumption	Day with giving awareness to the people

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Tracking the Origin of Plastic Debris in Marine Protected Area of Nusa Penida, Bali

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3. *Korea-Indonesia, Marine Technology Cooperation Research Center (MTCRC)*
4. *Marine Science Study Program, Faculty of Marine Science and Fisheries, Udayana University*
5. *Center for Remote Sensing and Ocean Sciences (CReSOS), Udayana University*

Purpose and Background:

Nusa Penida is an island located in Bali Province, Klungkung Regency. Nusa Penida, a marine conservation area, has a problem, which is related to the existing of plastic marine debris in the area. The previous study conducted by Germanov et al. (2019) revealed that marine debris abundance during the rainy season was higher than in the dry season. In addition, from the study conducted, it is also known that 59.5% of marine debris found in the Nusa Penida manta feeding ground area is plastic waste, then 45% of marine litter is film type, and 31.5% is a fragment. Meanwhile, from a study conducted by Argeswara et al. (2021), it is known that, the dominant types of polymer marine plastic waste found in the Nusa Penida manta feeding ground area, are Polyethylene (PE) and Polypropylene (PP). PE and PP have low toxicity but are the object of attention from manta rays and another marine biota.

The study of marine debris related to plastic types can be assessed through modelling the movement of plastic particles using numerical modelling (Hendrawan and Asai, 2014). However, research related to plastic waste, whose completion is often carried out with forwarding tracking schemes, from previous research was only limited to knowing the forward movement and distribution of particles. So, this study was conducted to determine the origin of the plastic litter found using a backward tracking scheme.

Materials and Methods:

In this study, to describe the circulation pattern of the current movement, then the Finite Volume Community Ocean Model (FVCOM) was used, a hydrodynamic numerical model that was developed by the University of Massachusetts Dartmouth and the Woods Hole Oceanographic Institution. Meanwhile, the PyLag model developed by Plymouth Marine Laboratory is used to simulate the pattern of particle movement. Simulations were carried out in June and December 2020; both times were chosen to represent the southeast and northwest monsoons.

The domain area of the model covers an area large enough to cover the dynamics of the current circulation and release of the backward particle area (2000 particle; 1 particle = $\pm$ 0.7 kg/day) in Nusa Penida as shown in Figure 1. In the north part, the Nusa Penida waters influence by the current from Java Sea and Makassar Strait, while in the southern part by Indian Ocean.

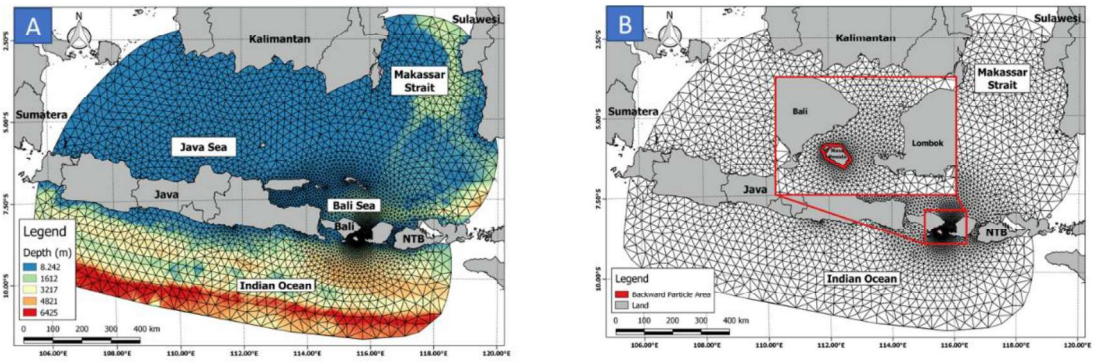

Figure 1. Domain Model Area (A) and Backward Particle Area Release in Nusa Penida (B)

Results and Discussion:

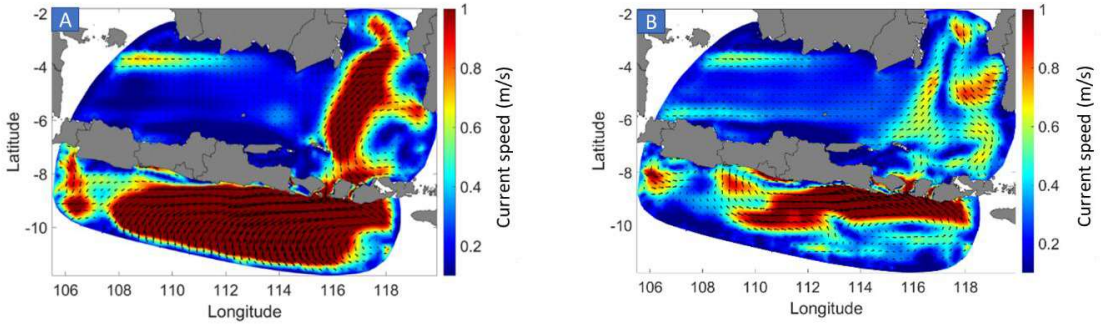

Figure 2. Current Movement Patterns in June 2020 (A) and December 2020 (B)

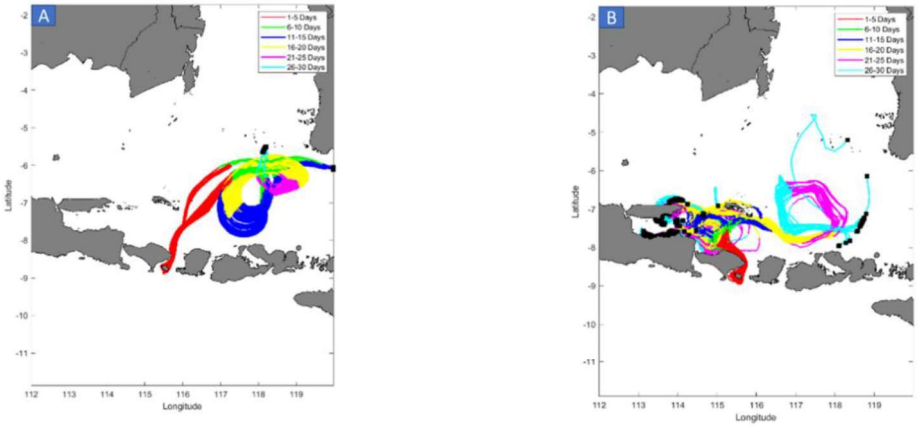

Figure 3. Particle Movement Patterns in June 2020 (A) and December 2020 (B).

From the pattern of the current movement as seen in Figure 2, it can be seen the role of seasonal monsoon that effected to the waters surround the Nusa Penida Marine Protected Area. The current conditions appear to be stronger moving from the Makassar Strait to the Indian Ocean. At the Indian Ocean, the dominant current moving from east to west, with the average current velocity is 1 m/s in June 2020. However, in December 2020, the value of the overcurrent velocity decreased. This is also due to the impact of the Indonesian Throughflow (ITF) phenomenon, where the current is stronger in June, which represents the southeast monsoon.

The pattern of backward particle movement seems to be influenced by surface currents with different resource conditions in each season (Figure 3). During the northwest monsoon, the dominant particles came from the northwest (89.6%) of Nusa Penida Island with the source of particles from Bali was 1.15 tons, East Java was 0.42 tons, Madura was 0.76 tons, and Kangean Island was 0.06 Tons. During the southeast monsoon, the dominant particles move from the northeast of Nusa Penida but the Bali area also remains a source of particles with a total particle originating from Bali of 0.28 tons.

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Exploring Middle School Students' Action Competence for Environment

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Research Background

Action competence is of paramount importance to "Education for Sustainable Development (ESD)" It is a practice based on participation in the democratic process for solving environmental problems (Elin Biström & Ragnar Lundström, 2021). Environmental learning activities in the past of Thailand emphasized on environmental knowledge. Measurement and evaluation are still limited to the environmental intention rather than developing the potential of students to be able to take action to protect or solve environmental problems. In addition, almost all research does not train students to work with other sectors to drive environmental policy work (Department of Environmental Quality Promotion Ministry of Natural Resources and Environment, 2010).

Action competence for environment is the ability to act as citizens of a democratic society aims to solving environmental problems (Almers, 2013; Breiting & Mogensen, 1999; Jensen & Schnack, 1997; Kollmuss & Sass et al., 2020; Olsson et al., 2020). They are able to work with others and decide on environmental solutions that are appropriate for the social context. Learners have knowledge of what they do and can identify problems, causes and effects of environmental. In addition, They having confidence in their own potential that they can change society for the better (Jensen & Schnack, 1997; Sass et al., 2020; Sterling, 2010). However, for the development of learners to become action competence for environment, it is necessary to study the students' based action competence for need assessment before using the data to design learning activities. Therefore, it is necessary to explore the action competence for environment of students as a knowledge base for the future development of students' action competence for environment.

Purpose

This research aims to explore the action competence for environment of middle school students in a sub-urban school in Bangkok.

Materials and methods

In this survey research, the data were obtained from 100 grade 8 students (46 males and 54 females) whom enrolled in a general science subject of a high school located in a sub-urban area of Bangkok. The children were invited to complete a Likert's Scale questionnaire, including 19 items of action competence. The questionnaire was validated by three experts in the fields of science education and environmental education. The questionnaire covers four construct of action competence: knowledge of action possibilities, motive for action, thinking skills for action and democratic partnership. The reliability coefficient of the instrument was 0.88 and its discrimination value ranged from 0.26-0.68. The data was collected from 100 students in December of the second semester of the academic year 2021. The methods for analyzing the data were statistical. The average value from the whole assessment results of each student was taken to find the frequency as a percentage. The data was then classified into five levels of action competence: very high (average score of 3.00), relatively high (average score of 2.50-2.99), moderate (average score of 2.00-2.49), relatively low (average score of 1.50-1.99), and very low (average score of 1.00-1.49). In addition, these were analyzed from the component of action competence: knowledge of action possibilities, motive for action, thinking skills for action, and democratic partnership.

Result and short explanation

Findings from statistical analysis, as shown in Table 1., reveal that the majority of the middle school students (50%) pursue action competence at a moderate level. Around 30% of the children shows 'relatively low level' of the action competence. About one forth present 'relatively high level' of the action competence. Surprisingly, non of the children was in 'very high level'.

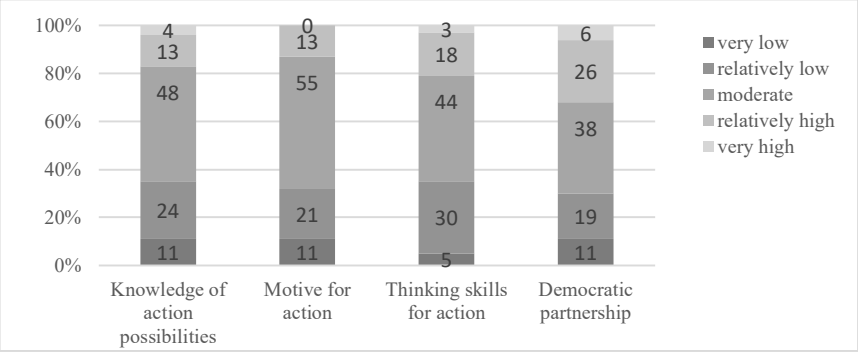
Table 1. Number of students in each level of action competence for environment

n=100

Level of action competence for environment	Average score	Number of students (%)
very low level	1.00-1.49	4
relatively low level	1.50-1.99	29
moderate level	2.00-2.49	50
relatively high level	2.50-2.99	17
very high level	3.00	0
Total		**100**

The Figure 1. illustrates percentages of students in each level of action competence. The that all component of action competence for environment have students' low percentage (13%-32%) in very high level and relatively high of action competence for environment in each component. Therefore, both the data showing the overall and the separate components tend to go in the same direction are most of the students had moderate level to very low level of action competence for environment.

Figure 1. Students' action competence for environment in each level



Discussion and conclusion

Action competence for environment of Middle School Students in this finding, It needs to be develop to increase. When analyzed separate component, It was found that amount of students for each component was moderate level, relatively low level and very low levels. These three levels need to be improve and promote to increase. Therefore, motive for action must be promoted as much as possible, followed by knowledge of action possibilities, thinking skills for action and democratic partnership. This study found that traditional teaching methods still have limitations in promoting students' action competence, so teachers are encouraged learning opportunities by engaging students with other sectors and encourage motive for action to learn about the environment in authentic settings.

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Reveal Various Forms of Teaching Climate Change in Secondary School

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Purpose and Background

Students in secondary school are young agents who are expected to bring about a better chance for the future of the world. Teachers need to convey the issue of climate change to students with various approaches or methods that can motivate students to care about climate change. Teaching about climate change will have a great impact to the shared leadership approach at school. Students need to be prepared to meet the challenges posed by climate change. Students need to learn how to properly responded to the changing conditions caused by Climate change. These actions require effective educational strategies so that students have model from what they have learned throughout their lives and become part of the great social change (Sharma & Monteiro, 2016).

Scientific information such as climate change processes must be reinforced with activities that engage students to connect topics to solutions. Studying climate change offers an opportunity to develop various crucial to overall student success. Critical thinking, problem-solving, interdisciplinary connections, and collaboration are all stimulated when learning about climate change, allowing students to think creatively and change behavior (Anderson, 2012). The question posed in the study: What are the learning trends of climate change that are significant in motivating secondary school students? What kind of innovations is carried out to teach climate change in secondary school? The purpose of this research is to uncover trends and innovations in teaching climate change learning in secondary schools.

Materials and Methods:

This paper is a paper-based review of ten articles. The research is descriptive and exploratory as it describe learning trends and innovations related to climate change issues. Research data come from secondary sources. the article is searched through google scholar by using search keywords. The keywords were used to narrow the search, and all of the documents taken into account were in English with a period of 2018-2022. A systematic literature evaluation became performed, taking into account a complete evaluation of records and proof from more than one perspective (Cooper, 2010). The qualitative look follows unique and replicable steps; key phrases had been used to slender the quest, and all the files taken into consideration had been in English. Entering the quest terms (such as "teaching climate change" and "secondary school") in the Google Scholar educational database yielded (n = 218) outcomes, and (n = 10) applicable papers had been screened.

Results and Explanation

The results of the analysis from several studies on the teaching of climate change (table 1) found many interesting facts. The entire learning process related to climate change involves students' active learning. The learning process is structured to motivate students to care more about the future of the earth and the survival of living things on earth. Through these learning activities seem so real, that the knowledge of climate change becomes part of education and cannot be separated from the goal of education, namely maintaining survival on earth.

Table 1. Research result

No.	Country	Author	Innovation
1	Nigeria	(Ahove et al., 2021)	The existence of climate anxiety in the emotions of the learners created the necessity for the climate educator to seek appropriate learning techniques that will help overcome strong negative climate anxiety and translate such into a dosage that will enhance learning outcomes in favor of climate change.
2	Malaysia	(Khan et al., 2020)	The research informs that knowledge distinctively has a small effect. However, in combination with belief and motivation, knowledge plays an instrumental role.
3	Germany	(Meya & Eisenack, 2018)	the effectiveness of a simulation game named "KEEP COOL" for communicating and teaching international climate politics.
4	Greece	(Karatza et al., 2020)	Satellite image processing software (for educational purposes), as well as the European Space Agency's (ESA) website, Eduspace material, are of great significance for the Greek educational system.
5	France	(Vidal et al., n.d.)	method to accompany the students in a role-play imitating a Cop-Climate. This "EduCopClimate" lasts for a semester used to enter the role of COP delegate for a group of countries and concludes by a COP session with schools representing at least 7 groups of countries plus lobbies.
6	Netherlands	(Ouariachi & Wim, 2020)	escape rooms can offer to climate change education: experiential and immersive learning, problem-solving and critical thinking skills, and a sense of collaboration

			and urgency
7	Canada	(Bush et al., 2019)	Students learned through inquiry with climate education technologies.
8	Turkey	(Yildirim Tasti & Akar, 2021)	various extracurricular activities were implemented to promote high school students' climate-friendly actions.
9	Australia	(Harker-Schuch et al., 2020)	teach climate science via a 3D interactive digital game and examines the potential of 12–13-year olds as a prepatent group for climate science interventions. After playing a proof-of-concept climate science game that covers the physical causes and mechanisms of climate change
10	Sweden	(Bossér & Lindahl, 2020)	types of classroom discussion on socioscientific issues can encourage students' reasoning skills as expressed in argumentative essays

The learning process is structured so that students think critically about the problem of climate change. Students are faced with problems to then find solutions and solutions to these problems. Students are given experience and given challenges thus enhancing skills in collaboration and communication during the learning process. Teaching in climate change can not be separated from the use of technology and extracurricular activities. The technologies used in teaching provide broader insights for students in the teaching of climate change. In addition to being included in the curriculum process, instilling concern for climate change is also part of student's activities outside of learning in school. Various extracurricular activities support the policy of sustainability of the earth.

Conclution & Discussion

Various literature related to teaching climate change in secondary schools shows that in education every country has a concern for climate change which is shown by various innovations. Each country presents various breakthroughs with a common goal for the sustainability of world life. Various breakthroughs were made in secondary schools to motivate students as future agents of world climate change. Secondary school students who experience meaningful experiences through teaching climate change will understand and become future policymakers to make the world a better place.

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The Implementation of STEM Learning on Renewable Energy In Physics Classroom

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Purpose and Background

Climate change is one of the main problems facing mankind characterized by changes in global weather over a long period of time. The facts of significant changes in the earth's climate have been published, ranging from strong winds, floods and extreme temperatures that cause various atmospheric phenomena. Because climate change is very important in the sustainability of human life, student awareness of climate change needs to be increased because students are the next generation of the future . Although students already know that climate change is getting worse due to human activities and pollution from industry, students need meaningful learning and experience in proper problem solving skills about climate change, such as using renewable energy in daily life.

An alternative approach to provide students with meaningful learning is STEM Learning with project based learning STEM as the model. To implement STEM learning in problem solving of climate change through project-based learning, in this study students had two projects. The first project is a toy solar car and the second project is a renewable energy project. Both projects are implementations of climate change education that are useful for minimizing non-renewable energy consumption.

In this study, the purpose was to determine the learning effectivity on climate change through STEM learning. Therefore, students were given a pretest before the activity and a posttest after the activity. Based on the results of the pretest and posttest, the normalized gain score was determined in order to obtain the learning effectivity criteria.

Materials and Methods

Integrated STEM education is a practical constructivist example of learning (Sanders, 2019). STEM provides a context and framework for organizing understanding of science and mathematics and encourages students to actively build contextual (and applied) knowledge of science and mathematics, thereby enhancing memory and the learning process. There some model of learning strategy of STEM learning, one of them is project based learning developed by Laboy Rush (2010). There are 5 sequences on STEM project based learning (Laboy-Rush, 2010). They are reflection, research, discovery, application, communication.

The method of this study is one group quasi experiment. There are 33 students become participants in the classroom research and follow the sequences in this study. Students was divided into 7 group consist of 4 or 5 members. Each group have to develop and build two project. In the first project students made solar car toy. The apparatus to make a solar car toy are mini solar panel, ice cream stick, glue, rod, mini dynamo and mini gear. Solar car will move under the sun without any battery. The second project was microhydro turbine DIY. In the second project, students have to design a water wheel (mini turbine) connected to dynamo, when water flow rotate the turbine, the dynamo will rotate and generate voltage. The difference between the first project and the second project is that in the first project students got full module and example how to make a toy car, but in the second project, students have to design by their opinion or knowledge about waterwheel (mini turbine).

To get the learning effectivity, students have pretest before learning and postes after the implementation. Based on the pretest – postest, the normalized gain score can be determined by formula :

$$< g >= \frac{T_1^1 - T_1}{T_{\max} - T_1}$$

(Hake, 1998)

The value T_1^I is postest, T_1 is pretest and T_{max} is maksimum score (100) and $<g>$ is normalized gain score. After we got the normalized gain score, we determine the criteria of effectivity based on table below.

<g>	Criteria Category
0,7 < g <= 1,0	High
0,3 < g <= 0,7	Average
0,0 < g <= 0,3	Low

Results and Discussion

The activities of students during the implementation can be seen in table below. In the first lesson (project), students fllow the instruction from the worksheet how to assemble toy car from ice cream stick and connecting some wire to solar panel and mini dynamo. As the result the design and looking of solar car toy almost similar. But when they try to make the toy car moving under the sun, they can see that its moving is not equal. There is a fast moving, slow moving, straight moving and not straight. Students discovered that intensity of sun light influence the speed of the car and the position of the gear influence the path of car moving. In the second implementation, the students make the design using their knowledge. Because of free design, we found various of design of water wheel or mini turbine. Based on the implementation, students found that speed of water and the design of wheel influence the voltage result of dynamo. Students discover that the flow of water and sunlight as renewable energy can be converted into electricity.

STEM LEARNING SEQUENCES AND ACTIVITIES	**1# Project**	**2# Project**
Reflection	Students observe facts of climate change	Students observe fact of use renewable energy in local area (citanduy water turbine)
Research	Students research the causes of climate change	Students research the theory of water turbine (fluid, mechanic energy and electricity)
Discovery	Students discover how to minimalize climate change and choose one as an action (renewable energy), discover kind of renewable energy, discover how to make a protoype	Students discover how to make water turbine for micro flow water to rotate dynamo
Application	Students design, develop solar car toy, try redesign and fixing the product	Students design and develop microhydro turbine, measure the voltage result, redesign and fixing the product
Communication	Students communicate their product	Students communicate their product

In addition, during the lesson most of students were active participating in every sequences. Students' acvitity, creativity and cognitive result can be seen in table below.

Result Finding	1# CYCLE	2# CYCLE
Activity	80% students has high activity in the classroom	88% students has high activity in the classroom
Creativity	Students made solar car toy, but still the same design for every group	Students show their creativity by making various model of microhydro turbine prototype DIY
Cognitive Result	Normalized gain score is 0,66	

Conclusion

Based on normalized gain score, we can see that there is improvement of students' understanding on climate change and renewable energy through STEM Learning. The effectivity of STEM learning on climate change and renewable energy in physics classroom with sequences developed in this study in average category. Furthermore, positive finding from this study that students will show their creativity when they have a challenge in the free project or free design session.

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THE PRESCHOOL TEACHERS' ATTITUDES TOWARDS INCLUSIVE EDUCATION IN SAINT LOUIS COLLEGE - CEBU

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Purpose and Background

Muega (2016) performed a study in response to the fact that little is known in the Philippines concerning educational inclusion. The lack of a national instructional method that is accessible to all students demonstrates the need for a solid conceptual framework for inclusive education (IE). The researchers wanted to identify the teachers' attitudes towards inclusive education due to the following reasons: (1) since teachers are one of the integral components for the successful implementation of inclusive education. (2) It will add to the present literature concerning inclusion within the country. (3) It can aid in the successful implementation of inclusion since a lack of information reinforces the negative effects of excluding children with disabilities from mainstream classes. (4) It can provide the government a better understanding of the problem of inclusive education, allowing the government to enhance inclusionary policies in schools.

Materials and Methods

Inclusionary pedagogy is a recent movement, especially for people with disabilities to be included and accepted in a general education classroom regardless of their specific needs. This study investigated the teachers' attitudes towards inclusive education and the factors that may affect it including Gender, Age, Training, Years of Teaching Experience, Self Efficacy, and Severity of Disabilities. The respondents in this study were six (6) preschool teachers from St. Louis College-Cebu who completed a questionnaire and a written interview. Teachers' Attitude Towards Inclusive Education Scale (TAIS), which analyzes teachers' attitudes toward inclusive education, and Teachers' Sense of Efficacy Scale (TSES), which assesses teachers' perceptions of their own likelihood of success in teaching, were used to gather data.

Results and Discussion

Based on the findings, teachers were generally optimistic about the principle of inclusion. There is no substantial difference when it comes to the aspect of gender as all respondents are female. Age, Teachers' Self-Efficacy, and Training had a moderate impact on Teachers' attitudes on inclusive education. On the other hand, factors such as Years of Teaching Experience, and the Severity of Disabilities had nearly no effect on Teachers' attitudes towards inclusive education. Finally, according to the respondents, adequate training and skills focusing on including kids with SEN in regular classrooms and a committee who will develop laws regarding the implementation of Inclusive Education were perceived to be necessary in implementing Inclusive Education.

Teachers' Attitudes Towards Inclusive Education Data

Components of TAIS Scale	Average
Expected Outcomes	4.72
Inclusion as a value	4.39
Rights of a child	4.58
Workload of a Teacher	4.67
Total Average:	*4.59*

Table 1. *Preschool Teachers' Attitudes towards Inclusive Education in St. Louis - College Cebu*

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Enhancing Tenth Graders' Scientific Argumentation Skills Through Online Socio-Scientific Issues (SSIs)–based Teaching

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Research background

The major objective of international reform of science teaching in many countries is to prepare students to be scientifically literate citizen who can participate in discussion about science and technology issues as a reflective citizen (Organization for Economic Co-operation and Development (OECD), 2019). Scientific Argumentation is regarded as an essential component of scientific literacy (Cavagnetto, 2010). Students who have good scientific argumentation skills can make their claims and warrants, construct counterclaims, offer supportive arguments, and provide evidence for each component (Lin & Mintzes, 2010).

Observing my students in my biology class during the second semester of 2021, I discovered that they lacked scientific argumentation skills because they frequently discussed scientific issues based on emotion, intuition and their experience. Scientific argumentation skills must be developed in my biology classroom in order to improve scientifically literate citizens.

Socio-scientific issues (SSIs) are controversial issues related to science and society in authentic problems occurring in daily lives which create dilemmas and multiple solutions. Many people still debate and discuss in society about the controversial topics, especially the COVID-19 issues and environmental issues; therefore, using socio-scientific issues (SSIs) - based teaching can stimulate students to engage in making arguments on controversial issues (Lin & Mintzes, 2010). As a result of the COVID-19 crisis, which has resulted in the closure of my school and other learning spaces, the researcher must apply SSI-based teaching through online learning.

Purpose

The classroom action research aimed to enhance grade 10 students' scientific argumentation skills through online socio-scientific issues (SSIs)– based teaching.

Materials and methods

This research method was classroom action research according to Kemmis and McTaggart (2005) consisting of four steps; plan, act, observe, and reflect. This research was conducted through an online platform in March - April of the second semester of the academic year 2021. The participants were 10 grade 10 students of the secondary schools at Bangkok, Thailand. They were students in Science and Mathematics program who enrolled in an online Biology extracurricular course. Purposive sampling was used to select participants from their voluntary and full-time attendance.

The four SSIs lesson plans included 16 periods (50 minutes each) integrated into the unit of the Genetics. The four SSIs-related genetics controversial issues currently being addressed in Thai society were 1) surrogacy, 2) marijuana and cancer, 3) COVID-19 lockdown, and 4) Down's Syndrome Screening. The Eilks model (2010) was selected for online SSIs-based teaching. It includes the four steps: 1) Analyzing problems, 2) Clarifying science concepts, 3) Building relationships after students had understood in the scientific concept embedded in the issues, 4) Role-play activity, and 5) Reflection.

The scientific argumentation skills test entitled "Are you going to have an abortion if you know your baby has Down syndrome?" consisted of four open-ended questions that measured five components which were claim, warrant, evidence, counterargument, and supportive argument (Lin & Mintzes, 2010). When students' responses to the tests are unclear or incomplete, the researchers will conduct an informal interview to gather additional information. All research instruments in this research were subjected to content validation by three experts in science education.

Before collecting data for this research, the researcher obtained all students' consent and presented them with detailed information about the research. They were not identified by their real names.

Content analysis was used to analyze students' responses from the scientific argumentation skills tests. The students' responses were then classified into four levels of scientific argumentation skills: poor (1), fair (2), good (3), and, very good (4). Gain scores were used to analyze each component of scientific argumentation skills. The gain scores of each component of scientific argumentation skills were then classified into seven levels of development: a decrease in development (A negative percent), no development (0 percent), an early level of development (1-25 percent), an intermediate level of development (26-50 percent), a high level of development (51-75 percent), and a very high level of development (76-100 percent).

Results and discussion

The finding using content analysis of students' responses from the scientific argumentation skills tests before and after online SSIs-based teaching revealed that one student nine students (90 percent) had the increased development of scientific argumentation skills and one student (10 percent) had no development of their skills.

Another finding using the analysis of gain scores in each component of scientific argumentation skills before and after online SSIs-based teaching revealed that the components of scientific argumentation skills that students develop from high to low are as follows: Claim and warrant, Counterclaim, Evidence, and Supportive argument shown in the table 1.

Table 1: The development of argumentation skills in each component. (n=10)

component	The average score of all students' argument skills		Level of Development (percent)
	Pre-test (4)	Post-test (4)	
1) Claim and warrant	2.8	3.6	High (66.67)
2) Evidence	2.1	3.2	High (57.89)
3) Counterclaim	2.7	3.5	High (61.54)
4) Supportive argument	1.8	2.6	Intermediate (36.36)

Claim and warrant were the components in which the students had the most development at the high level (61.54 percent) because the third step of SSIs-based teaching, that is building relationships after students had understood in the scientific concept embedded in the issues, the researcher provided students with creating online argument maps in order to make two sides of warrants of the socio-scientific issues and discuss together in their group to find a consensus claim before making their valid claim. Using online argumentative mapping in SSIs-based teaching is an effective tool which can enhance scientific argumentation skills, which is consistent with the research of Piboon & Khlaisang (2019). They also found that the experimental group outperformed the control group in terms of scientific reasoning abilities after the experiment. The supportive argument was the component in which the students had the least development at the intermediate level (36.36 percent) because the most students defended their claims, but did not provide a rebuttal to others' arguments due to being afraid to make friends sad.

conclusion

Applying online SSIs-based teaching with using online argument maps can enhance grade 10 students' scientific argumentation skills. The component which the students had the most development was claim and warrants at the high level and the component which the students had the least development was supportive argument at the intermediate level. For future study, the researchers should implement the classroom action research to study the best practices of learning SSIs-based teaching to enhance students' scientific argumentation skills.

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SDGs Workshop

for

Asia & ASEAN High School Students

Purpose of the SDGs workshop

SDGs (Sustainable Development Goals) are important actions to improve and set up a sustainable world. All the seventeen goals raised in the SDGs are critical and urgent issues. We should collaborate to find a way to solve those issues. However, the causes of those issues are diverse even in the local areas, and there is a necessity for collaboration. Therefore, mutual understanding of the causes of the SDGs' matters is vital to reach a starting point for cooperation. This workshop is one way to establish comprehension of SDGs among people in Asia.

We hope you, the workshop participants , will discuss these issues with students from other countries, and deepen your friendship each other. Human networks are essential to solving global issues, and this is an opportunity to start building a network.

Timetable

The timetable is written in Japan time

The workshop topic - SDGs No. 13 (Climate Action)
Among the issues in "Climate Action," we focus on
"Reducing energy waste."
The two significant points in the issues.

(A) Clarify our purpose of energy usage and find the energy waste caused by our modern lifestyle.
(B) How to refine those unfavorable lifestyles for reducing energy waste.

Homework
(A) Find the problem around our life!
1. The students study the issues in your local area before the workshop.
2. Students prepare drawings to explain the different local SDGs issues.

SDGs Workshop DAY1（Jan.30）	
11:00~11:30	Opening
11:30~12:00	1st session Activity, Team making and icebreaking
12:00~12:30	1st session Activity, (A) Students will share the local issues
12:30~12:45	Break
12:45~14:15	2nd, 3rd (A) session & Voting

Homework（SDGs workshop sheet）
(A) & (B) Examine the issue deeply!
Please submit the sheet by Feb. 6, 2022(SUN) to edu-twincle@chiba-u.jp

SDGs Workshop DAY2（Feb.12）	
12:00~13:30	4th session: (B) Find the direction of solving your SDGs No.13
13:30~14:30	Break
14:30~16:00	(A) & (B) Presentation of your solutions
16:00~17:30	wrap up

Members

ROOM1			
Supervisor	Ph.D., Pakdeekul Ratana	Chiang Mai University	Thailand
Facilitator	Jannapha Soonjan		
	Watinee Kwangyoo		
Learner	Juliene Najla Aninditya	SMAN 5 Bogor	Indonesia
	Pei-jung Lee	Taipei Municipal Jing-mei Girls High School	Taiwan
	Yannachai Jeenpong	Chiang Mai University Demonstration School	Thailand
	Jinjuta Luanglertpaiboon	Chulalongkorn University Demonstration Secondary School	Thailand

Members

ROOM2			
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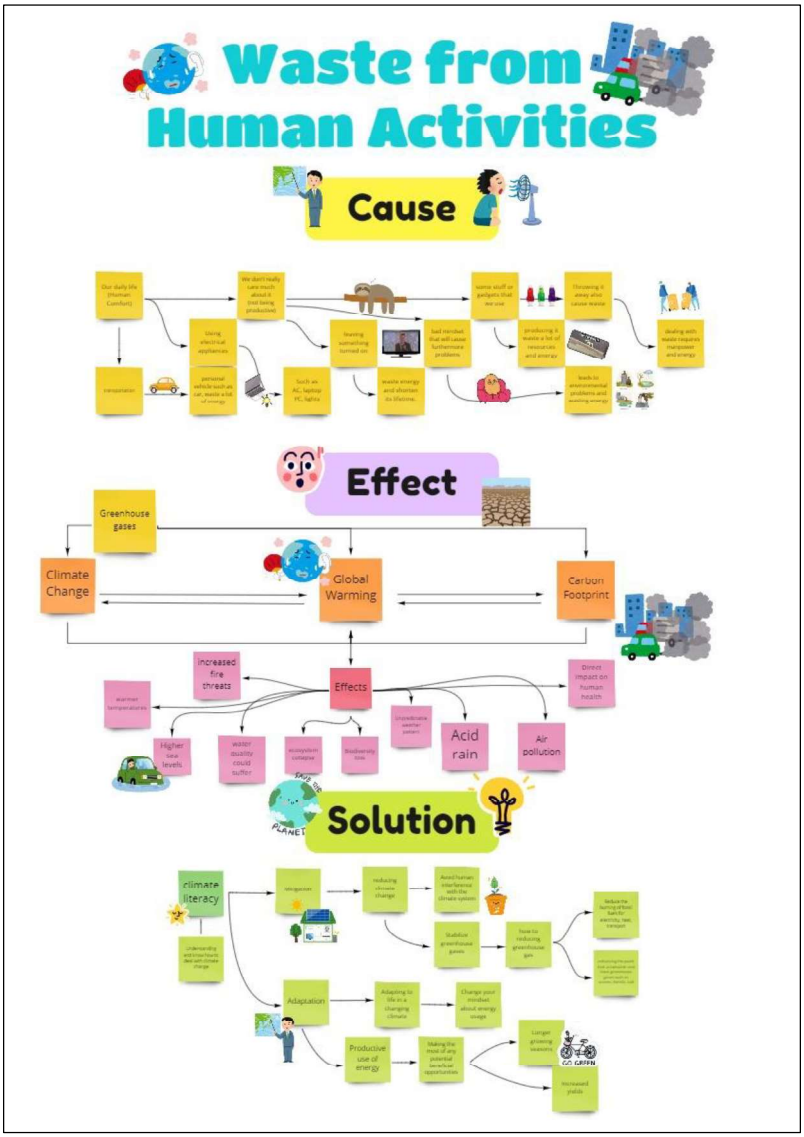
Facilitator	Duantemdoung Dethsuphar		
	Kongkiat Kunsa		
	Teejutha Kongsing		
Learner	Khanza Kineta Amany	SMA Labschool UPI	Indonesia
	Shindo Kanata	Toho Senior High School Affiliated With Toho University	Japan
	Sirasith Patcharopartwong	Kasetsart University Laboratory School, Center for Educational Research and Development	Thailand
	Punnathorn Vivatcharoenchai	Saint Joseph Convent School	Thailand



Members

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	Shaly Wanda Hamzah		
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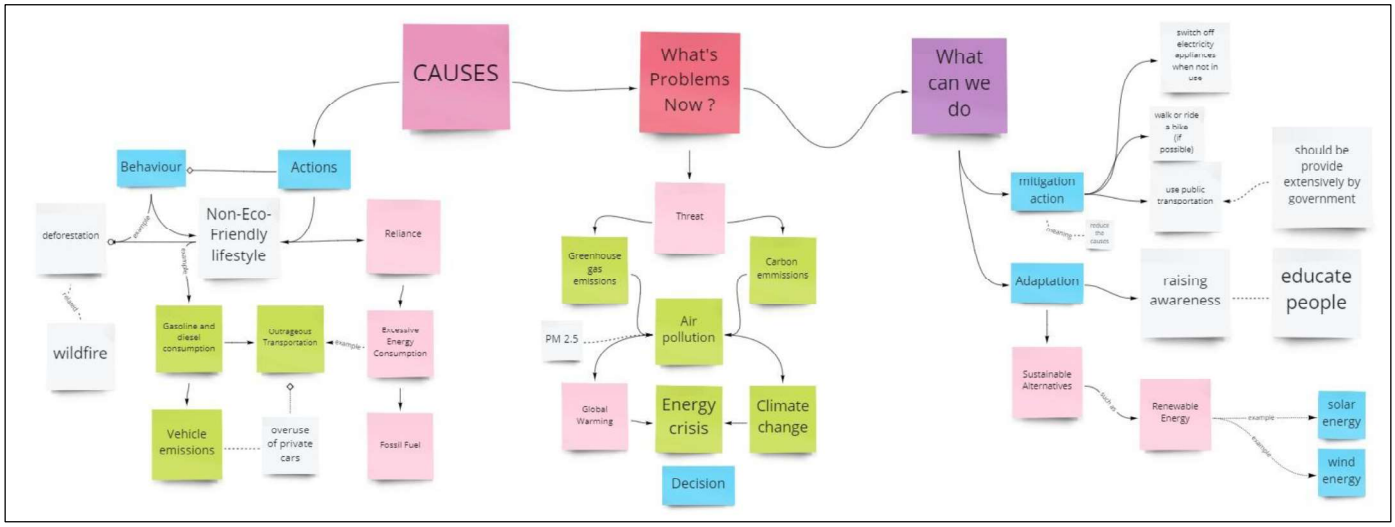
	Archavit Chantasilp	Suankualrb Wittayalai School	Thailand



Members

ROOM4			
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	AHMAD DHUHA HABIBULLAH		
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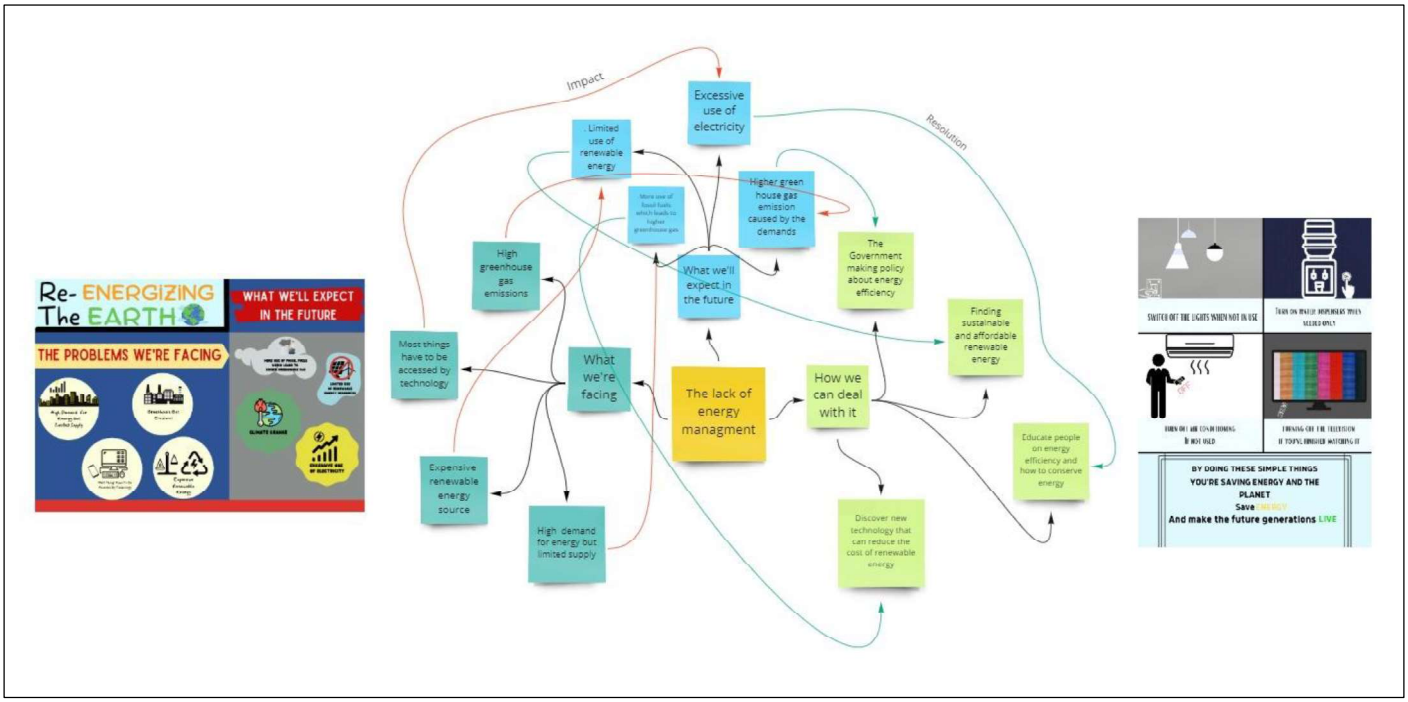
	Sirapop Attapun	Kasetsart University Laboratory School, Center for Educational Research and Development	Thailand
	Rungradit Kulrit	Suankualrb Wittayalai School	Thailand



Members

ROOM5			
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	Waritsara Jangkhan		
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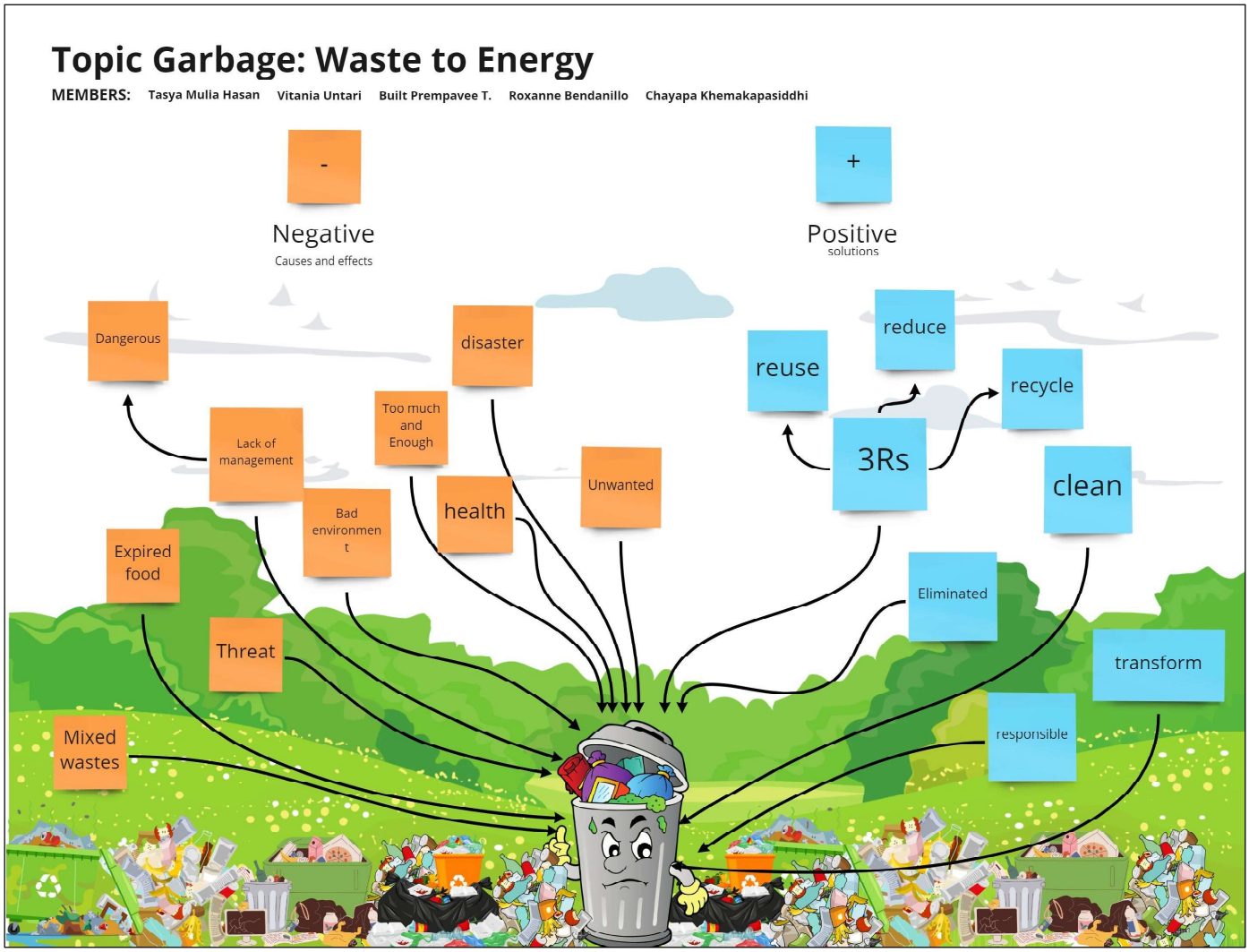
	Prempavee Treevijitpaisan	Darunsikkhalai Science School (SCiUs program)	Thailand



Members

ROOM6			
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	Sarayoot Channakorn		
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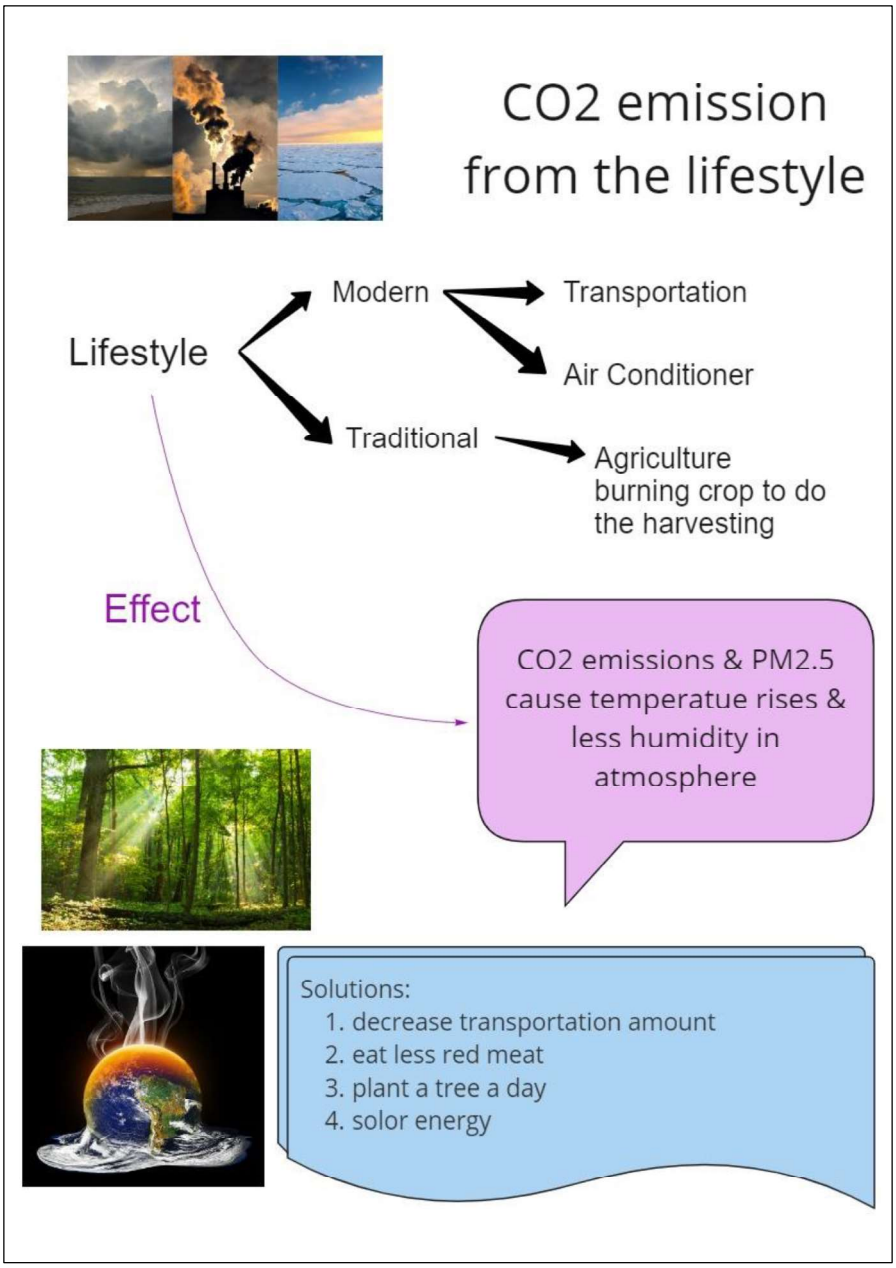
	Lee Chenyu	Chiba Municipal Inage High School	Japan
	Mi, Tien	Yangming Senior High School	Taiwan
	Thanat Manthananont	Chiang Mai University Demonstration School	Thailand



Members

ROOM7			
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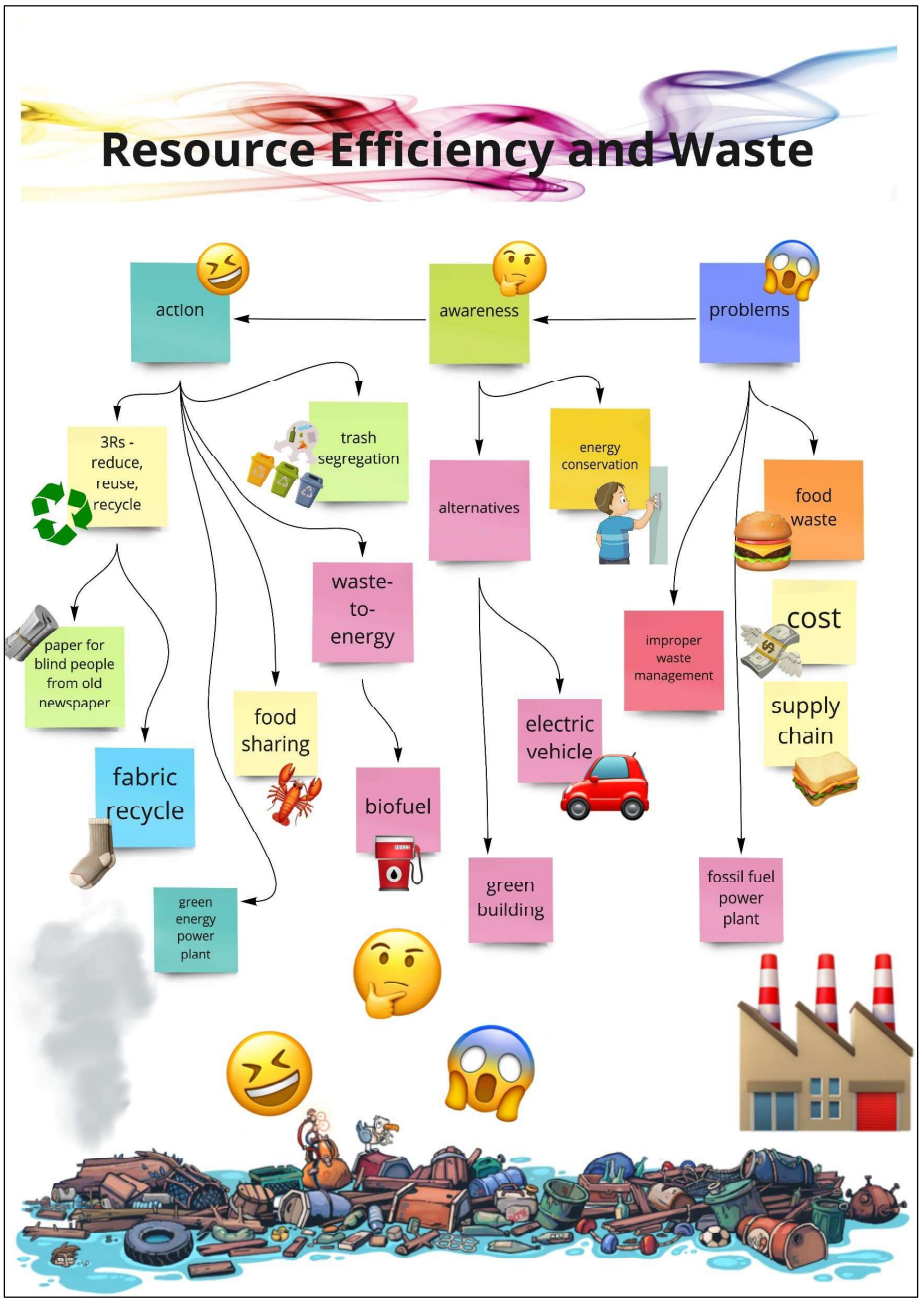

Members

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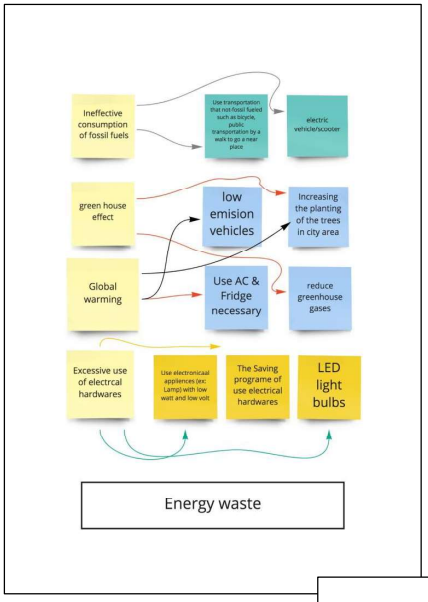

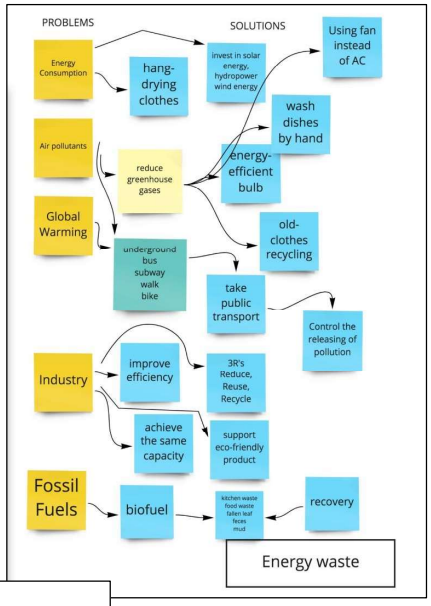

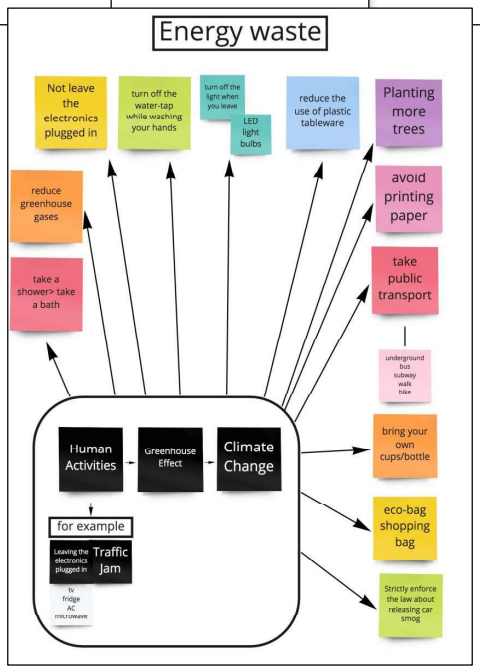

Members

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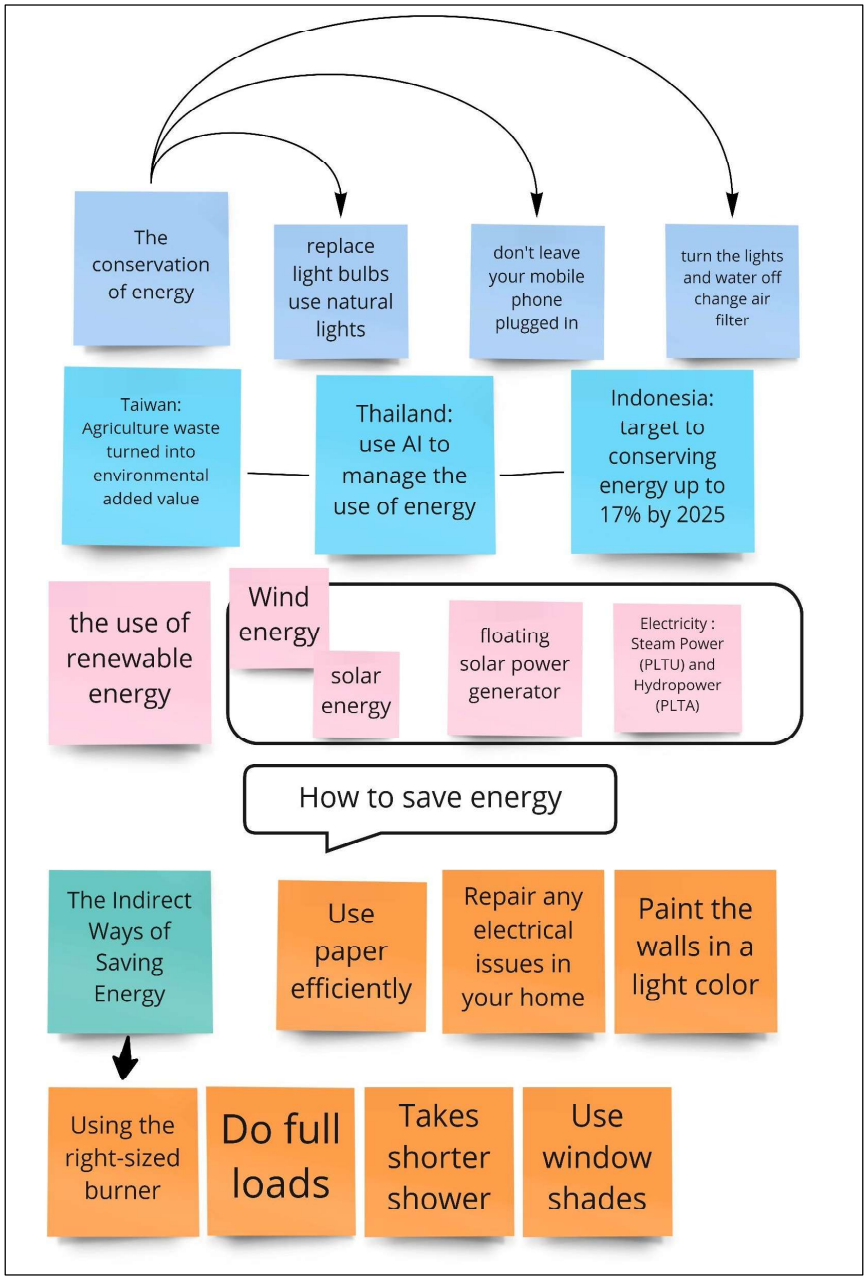

Members

ROOM10			
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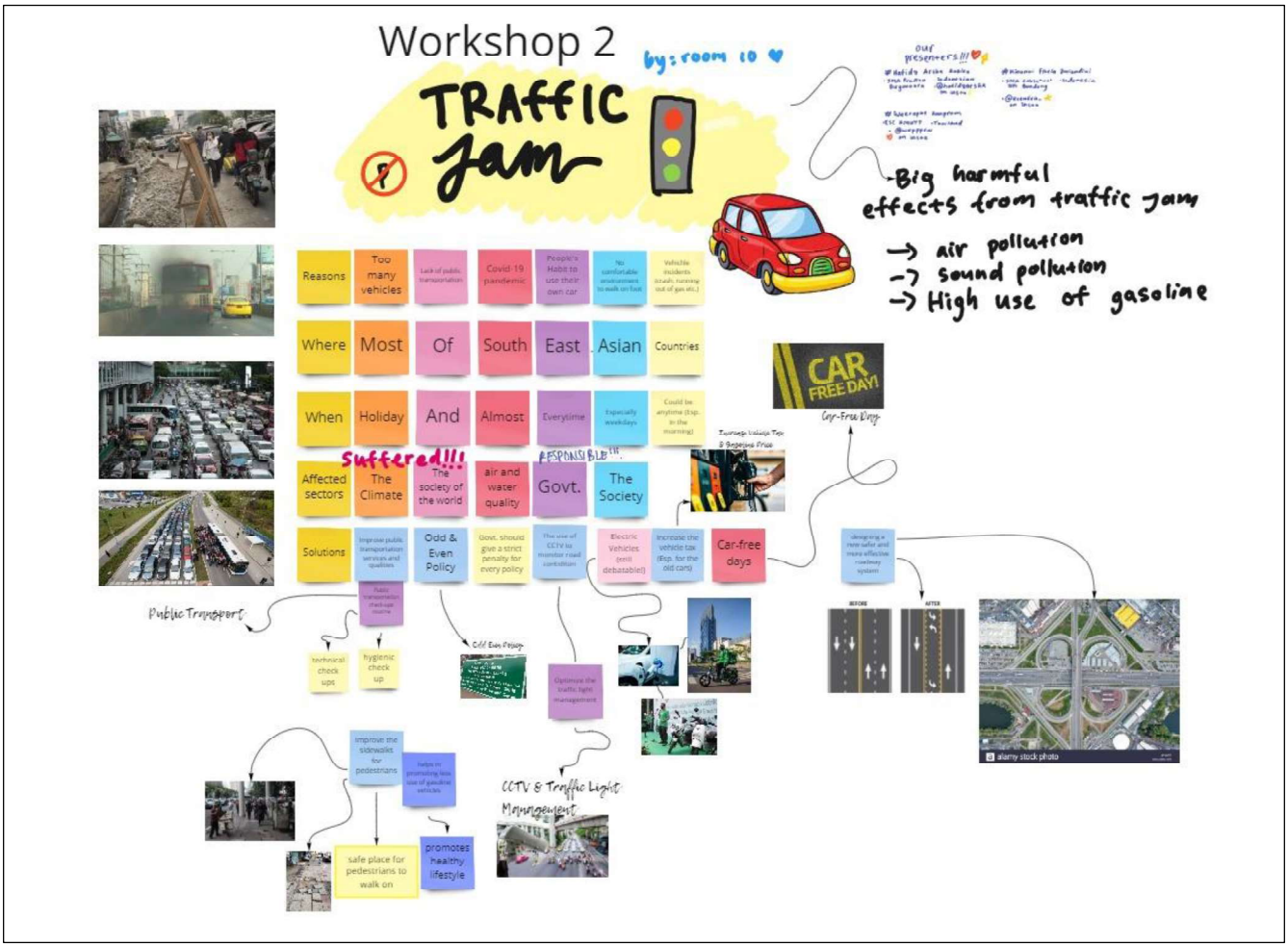

Members

ROOM11			
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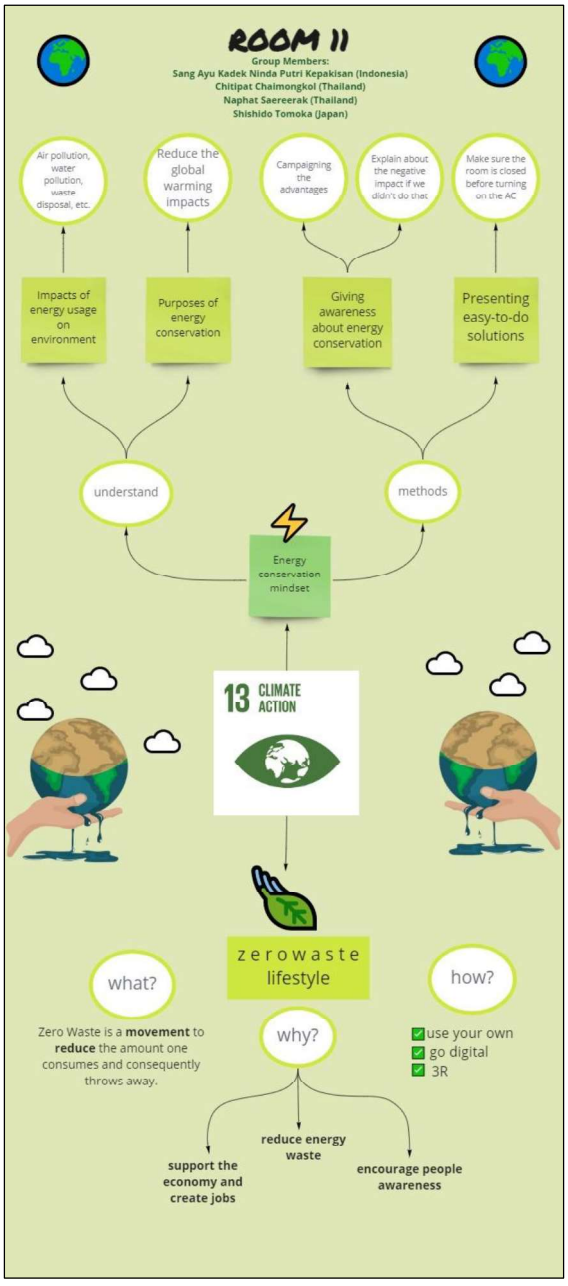

Members

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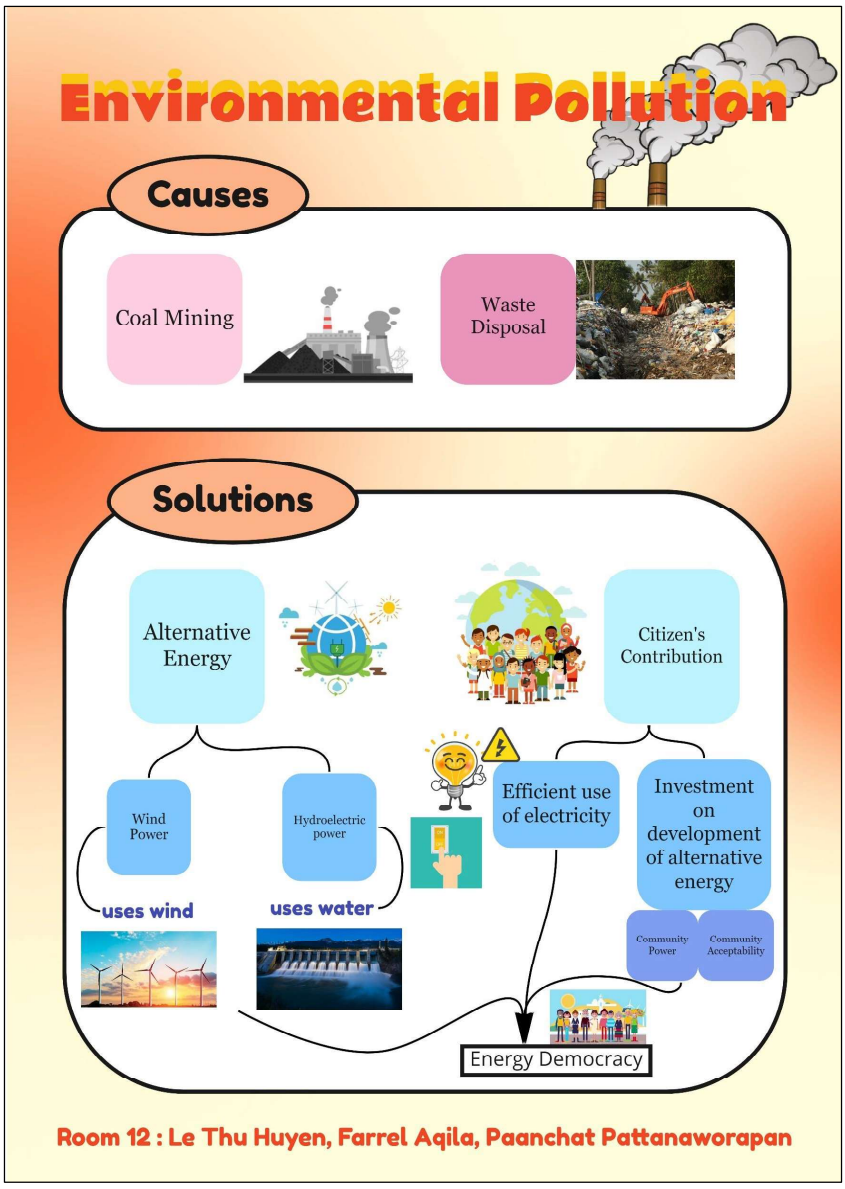

Members

ROOM13			
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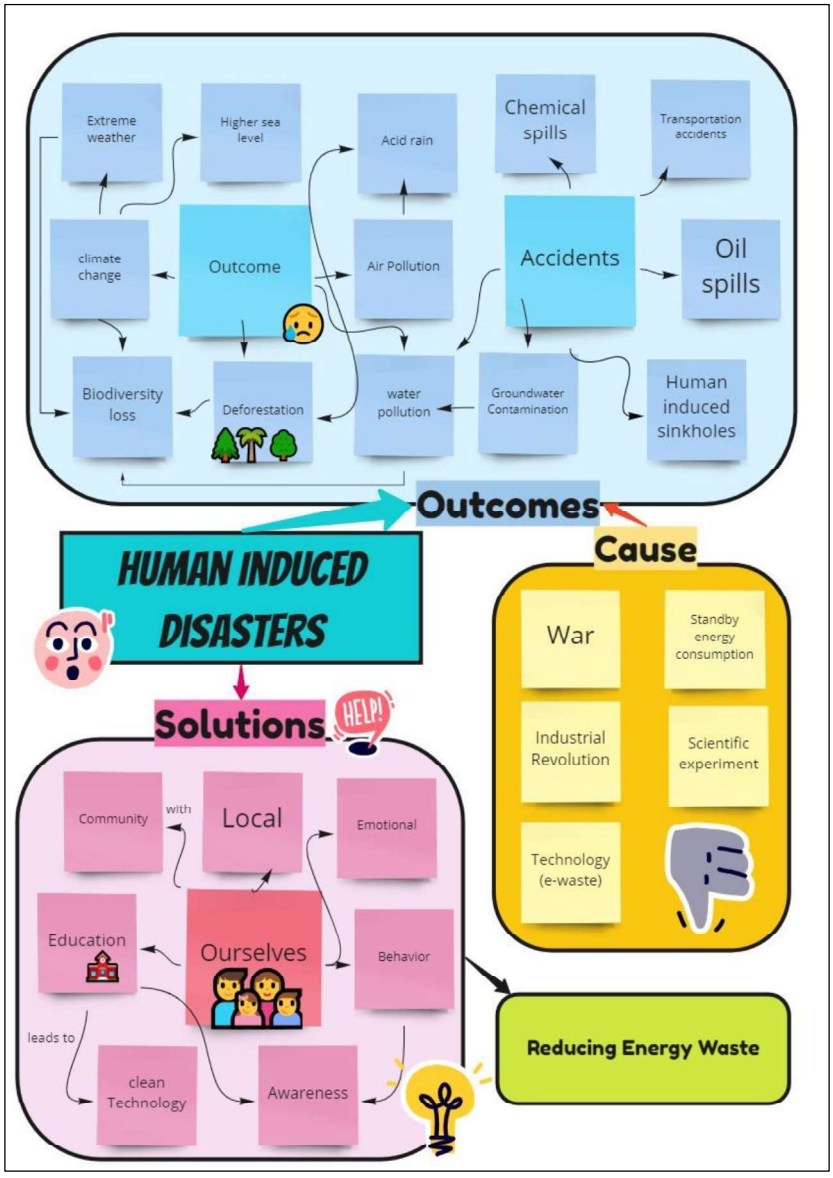

Members

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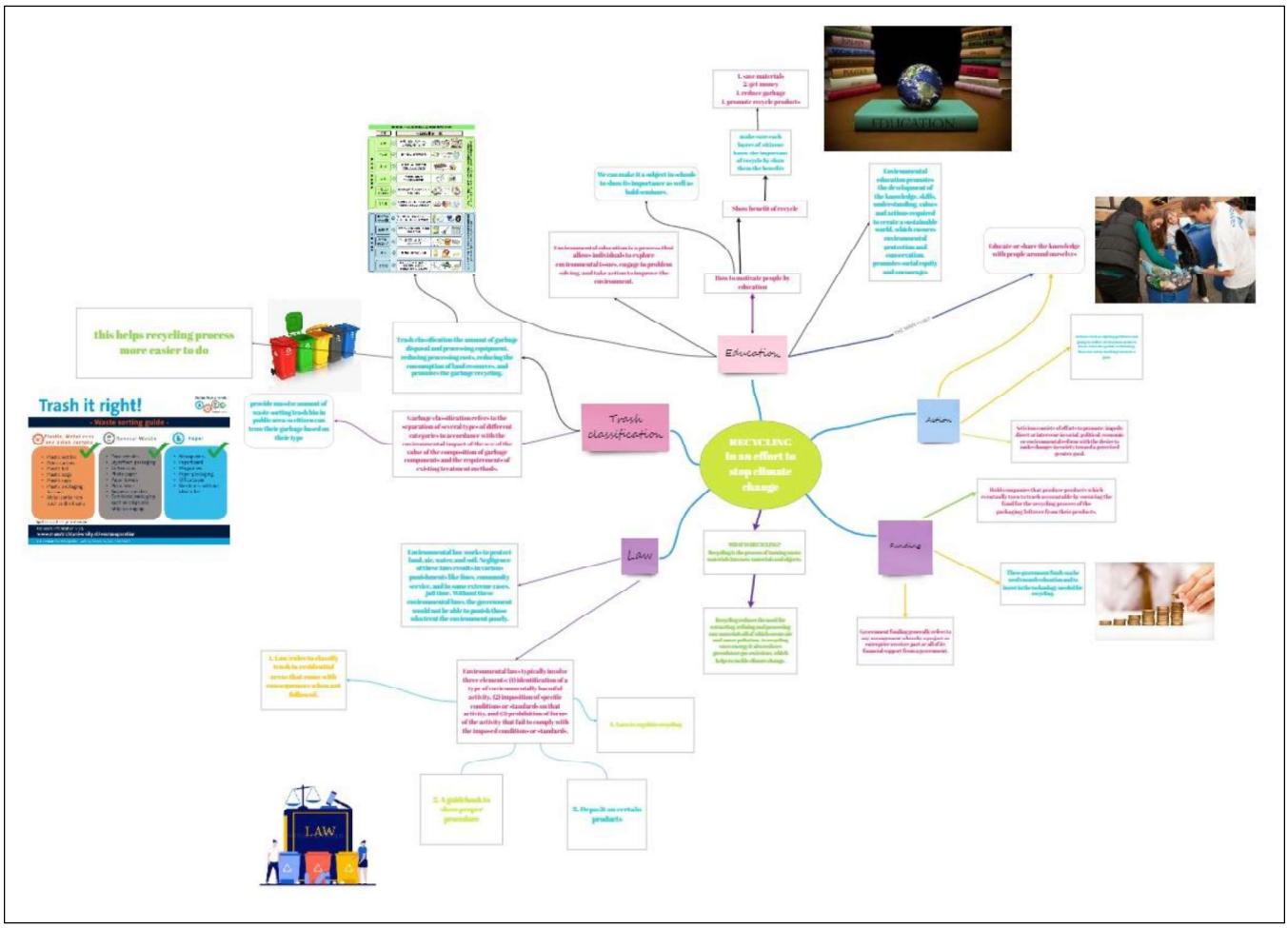

Members

ROOM15			
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	Takahashi Kenta		
	Mizuno Daiki		
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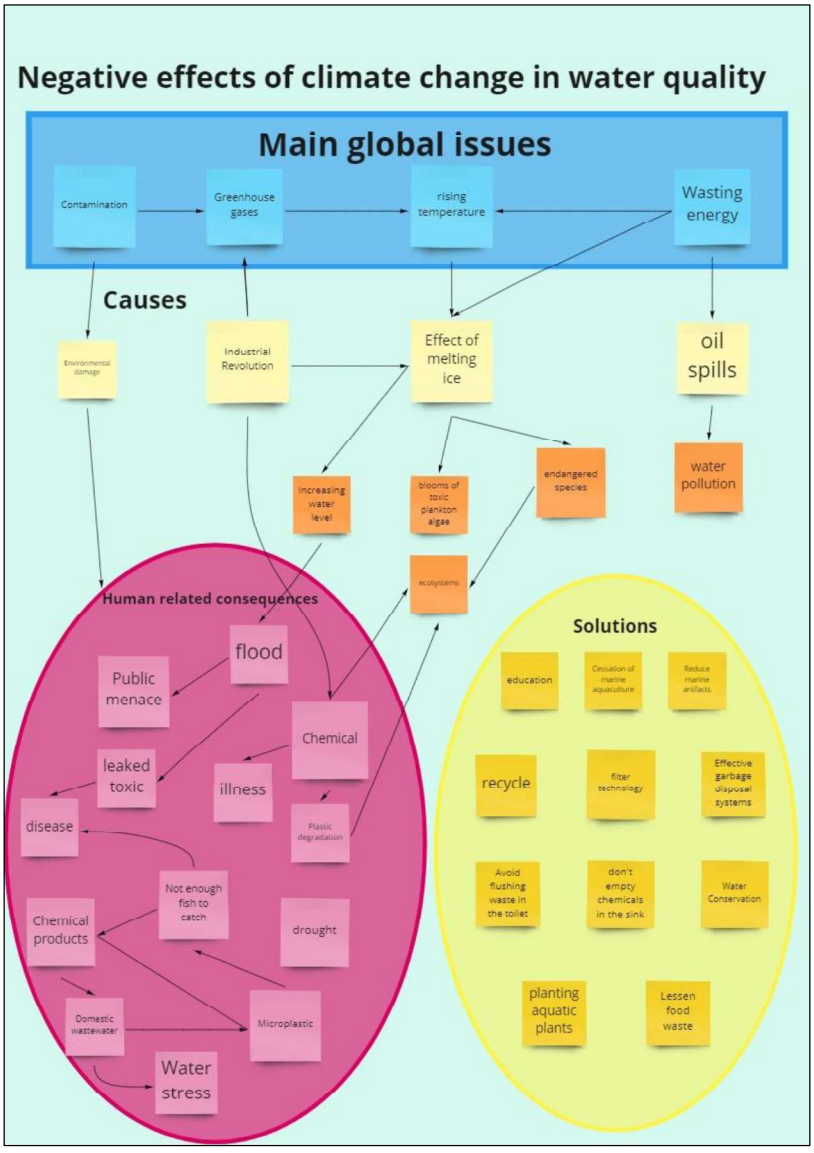
	Alfond Putra Maheast	SMA N 3 YOGYAKARTA	Indonesia
	Yadau Valdez Rajan	Tsukuba Shuei High School	Japan
	Phoebe Liu	Taipei Municipal Jing-mei Girls High School	Taiwan
	Punyanuch Niyomthai	Chulalongkorn University Demonstration Secondary School	Thailand



Members

ROOM16			
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	Ainiwaer Aikeremu		
Learner	Rayn Ravioly Mukti	SMAN 1 Bandung	Indonesia
	Wulan Garnasih	SMA Labschool UPI	Indonesia
	Jittraratch Boonchaisri	Satriwithaya school	Thailand
	Dang Khanh Linh	The Olympia High School	Vietnam