

Annual Report of Asia & ASEAN Center for Educational Research



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Faculty of Education, Chiba University

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Summer Institute of Asia & ASEAN Center for Educational Research

2024.07.28

International Research Session & SDGs Workshop

Place	Time	Details
General Studies Complex	09:00-09:15 (15 min)	Reception
	09:30-09:45 (15 min)	Opening Ceremony
	10:00-11:40 (100 min)	Oral Presentation
	12:00-13:00 (60 min)	Lunch
	13:00-13:30 (30 min)	Lecture
	14:00-16:30 (150 min)	SDGs Workshop · Poster Presentation
	16:45-17:15 (30 min)	Closing Ceremony

Greeting

Jun NOMURA, M.D., Ph.D.

Professor, Faculty of Education
Vice Dean (International Relations, Research Promotion)
Director of Asia & ASEAN Center for Educational Research,
Chiba University



We are proud to host the International Research and Presentation Conference again this year and sincerely appreciate your cooperation. On behalf of the organizers, I would like to say a few words.

This presentation is designed for high school students, university students, graduate students, and current educators to present their latest research findings and share knowledge with each other. We are delighted to see the results of your hard work and dedication in your respective fields being presented and discussed here.

In particular, this time we have emphasized an international perspective, welcoming participants from various countries and regions. It is a valuable opportunity for individuals from diverse backgrounds to come together, learn from each other, and broaden their horizons.

We sincerely hope that this presentation will serve as a source of new inspiration for all of you, and that it will be a significant step forward in your future research and educational activities. We also expect that the insights and networks gained through these presentations will lead to many collaborative relationships and further developments in the future.

Lastly, I would like to express my deep gratitude to everyone who has contributed to the organization of this presentation. I sincerely wish all participants a meaningful and fruitful time.

Thank you very much.

International Research Session

Purpose of the Research Session

The ability of young researchers to formulate crucial topics related to the development and sustainability of the world is important and speaks to the appreciation of their responsibility as leaders of the next era.

Communicating these critical topics to other young people in the intellectual community is a mutually empowering activity. Therefore, this International Research meeting aims at providing a platform for fostering the next-generation of leaders in the fields of science and education.

In this meeting, presenters will show their achievements in science and educational activities. Please find the output of various scientific activities, and exchange knowledge and friendship at the meeting site.

We hope every presenter finds positive suggestions and solutions for the progress of his/her research.

International Research Session

Room G3-11 (Environmental Biology, Biology, Environment, Physics, Education)		
Chair Person	NOMURA Jun	Professor, Chiba University
Panelist	Cristina Roselle Mitra	Chiba University
Panelist	Iago Carvalho Silva	Chiba University
Panelist	Nasuha Bunyameen	Chiba University
Panelist	Marvin Gilberto Escobar Leiva	Chiba University
Panelist	Victor Ibrahim Mbeya	Chiba University
Presenter 1	PEI-HSUAN HUNG National Taiwan Normal University Experiences of Pre-service Teachers in the International Baccalaureate (IB) Teacher-Training Program at National Taiwan Normal University (NTNU)	
Presenter 2	NUNOKAWA AI Showa Gakuin Shuei Senior High School Optimization of Openness in Coastal Disaster Prevention Landscape Design	
Presenter 3	NABILLA HADISTIA Universitas Pendidikan Indonesia Effectiveness of Wooden Biochips as a Catalyst for S-FRB (Smart Food Waste Recycling Bin)	
Presenter 4	JIAXIN LI Mahidol University Efficacy of Traditional Chinese Music Therapy on Children with Autism	
Presenter 5	EN-QIAN LIN National Taiwan Normal University Implementation of Problem-Based STEAM Curriculum for Junior High School Students: Inquiry Course on Paper Dragonflies	
Presenter 6	FUKUDA KOTARO Chiba Prefectural Sakura High School The History and Present of Entomophagy in Japan: Preparing for the Global Food Crisis	
Presenter 7	LING CHEN Li National Taiwan Normal University Determine the Refractive Index of a Dielectric Material Using Thin Film Interference	
Presenter 8	KOMED NACHAENG Kasetsart University Challenges Faced by Physics Teachers in SSI-Based Teaching Towards Developing Scientifically Active Citizens	

International Research Session

Room G3-12 (Biology, Physics, Education)		
Chair Person	KATO Tetsuya	Professor, Chiba University
Panelist	Julia Brotzman	Chiba University
Panelist	Loraine Bainto	Chiba University
Panelist	Patrick Onyelukachukwu Nwaokocha	Chiba University
Panelist	Yu-Lim Chen	National Taiwan Normal University
Presenter 1	YU-HSUAN YEH LIU National Taiwan Normal University Exploring the Effect of Integrating Creativity on Students' Language Learning: A Case Study	
Presenter 2	ORRANAN CHUACHART Chulalongkorn University PROTECTED AREA SIZE AFFECTING HABITAT FRAGMENTATION: A CASE STUDY OF PROTECTED AREAS IN THAILAND	
Presenter 3	NARITA MOMOKA Chiba Prefectural Funabashi High School Identification of diatoms inhabiting indoor aquariums and comparison of lipid production capacity of different species	
Presenter 4	WEN-YEN WU National Taiwan Normal University Franck-Hertz Experiment	
Presenter 5	UCHIYAMA YUKI Friends Girls Senior High School Analysis of fungi in urban birds	
Presenter 6	SADILLA MUHRENI KASTRO Universitas Pendidikan Indonesia Preliminary Study: Project Based Learning Design Development Based on Education for Sustainable Development (ESD) on the Topic of Petroleum to Strngthen High School Students' Scientific Literacy	
Presenter 7	SHU-CHEN LIU National Taiwan Normal University Optical Sensor	
Presenter 8	PARINYA MUTCHA Kasetsart University Revealing formative assessment to help students improve their learning in STEM activities	

International Research Session

Room G4-24 (Mathematics, Physics, Energy, Education)		
Chair Person	TSUJI Koji	Professor, Chiba University
Panelist	Fajriah Sulaiman	Chiba University
Panelist	Kiagus Aufa Ibrahim	Chiba University
Panelist	Qahramani Kousar	Chiba University
Presenter 1	YUN SHUO, YU National Taiwan Normal University DIFFERENCES IN ENGLISH VOCABULARY LEARNING STRATEGIES BETWEEN HIGH & LOW ACHIEVERS	
Presenter 2	SHOFIA KARIMA Bandung Institute of Technology IDENTIFICATION OF THE INDONESIAN WATER MASS DUE TO INDONESIAN THROUGHFLOW IN 2018	
Presenter 3	NGUYEN VU THU AN University of Education, Vietnam National University COMPARING APPROACHES IN TEACHING GEOMETRY FOR LOWER SECONDARY SCHOOL STUDENTS IN JAPAN & VIETNAM	
Presenter 4	TANAPAT CHATCHAWATWIMOL Chulalongkorn University Applications of sound wave analysis in identifying frog's species	
Presenter 5	YOU-JIA HUANG National Taiwan Normal University Dual Gate Bottom Contact MoS₂ FET with van der Waals High-k Dielectrics	
Presenter 6	WASSANA LEKKLA King Mongkut's University of Technology Thonburi Fabrication of Flexible Perovskite Solar Cells on Transparent Substrates	
Presenter 7	LI SILIN Mahidol University Conceptual Exploration on Metaverse Education: A Focus on the User Experience	
Presenter 8	YUN-YI ZHANG JIAN National Taiwan Normal University Integration of Smartphone into Physics Teaching – Understanding the Progress and Application of Acceleration Measurement	

International Research Session

Room G4-34 (Sports Science, Remote Sensing Application, Music, Humanities and Social Sciences, Education)		
Chair Person	SHIMONAGATA Shuji	Professor, Chiba University
Panelist	Ahmet Melik Bas	Chiba University
Panelist	Afsana Begum	Chiba University
Panelist	Rizvon Suleimanov	Chiba University
Panelist	Savira Aristi	Chiba University
Presenter 1	CHAYANAN KITTITEERATHAMRONG Mahidol University The effect of treatments on shoulder function and pain in overhead athletes with myofascial pain syndromes: A pilot study	
Presenter 2	YI-HSUAN SHIH National Taiwan Normal University Investigating the Effects of Inquiry and Practices Course on High School Students' Motivation toward Science Learning	
Presenter 3	NGUYEN NGOC HOA University of Education, Vietnam National University Association between Physical Activities and Academic Achievements among Vietnamese 12th Graders	
Presenter 4	MATSUOKA UINA Tokyo Metropolitan Koishikawa Secondary School Exploring Historical Influence on the Transformation of Japanese Music	
Presenter 5	AGIL AKBAR FAHREZI Universitas Gadjah Mada COMPARISON OF DETAILED LAND COVER MAPPING BASED ON SNI CLASSIFICATION SCHEME USING CONVENTIONAL AND RANDOM FOREST MULTISPECTRAL CLASSIFICATION	
Presenter 6	HSIANG-CHING CHENG National Taiwan Normal University A Study on the Application of ChatGPT in Collaborative and Autonomous Learning Outcomes for High School Students	
Presenter 7	NAKAJIMA JOE Showa Gakuin Shuei Senior High School Potato Addiction	
Presenter 8	YU-CHUN CHEN National Taiwan Normal University Latent Profile Analysis of Scientific Inquiry Skills Among Taiwanese High School Students	

Proceedings

(High School Students)

Optimization of Openness in Coastal Disaster Prevention Landscape Design

Ai Nunokawa

Showa Gakuin Shuei High School , Japan

Purpose and Background:

Makuhari Beach is located in Chiba, Japan, in a densely populated city called Kaihin-Makuhari. The beach faces problems such as underuse and a lack of appeal. This problem is thought to be due to the obstruction of the landscape by the coastal disaster prevention forest. This study aims to revitalize Makuhari Beach by optimizing the openness of its coastal landscape design while maintaining disaster prevention functionality.







Materials and Methods:

First, a literature review was conducted on the functions of coastal disaster prevention forests, examples of their creation, and their openness. From the literature review on openness, we focused on seven evaluation indicators that are thought to contribute to openness in coastal areas. I conducted a survey of 18 men and women in July 2024 to assess their perception of openness. The survey includes questions about the following: demographic information, frequency of beach visits, activities engaged in at the beach, perceived level of openness in different areas of the beach, and opinions on the current landscape design. In particular, for the perceived level of openness, six photographs (Table 1) were collected to cover the various landscapes of Makuhari beach and rated using a 7-point Likert scale from not at all to very much. These six photographs allowed for a more multifaceted analysis. A Kruskal-Wallis test was performed to confirm that there was a significant difference in the openness ratings for each image ($p < 0.05$). The median, mean, and standard deviation of the evaluated value of openness for each image were also calculated.

Results and Discussion:

The results (Table 1) showed that smaller values for the indices of green visibility and depth, and larger values for the indices of road ratio, sea visibility, sky visibility, and light tended to increase the sense of openness. In terms of directionality, horizontally expansive views (left and right) tended to provide a greater sense of openness than vertically expansive views (up and down). Based on these results, we would like to develop design proposals that combine a sense of openness with disaster prevention functions, such as designs that improve visibility of the sea.

Table 1: Evaluation results for openness of landscape elements

	Image1	Image3	Image5	Image2	Image6	Image4
photograph						
median	2	4	4	6	6	7
mean value	2.44	3.83	4.06	5.56	5.83	6.22
standard deviation	0.92	0.92	0.94	0.7	0.86	1.11
green view rate	large	large	medium	small	very small	×
depth	large	large	large	small	×	×
road ratio	small	large	large	large	×	×
sea view rate	×	×	×	×	small	large
sky view factor	small	small	medium	large	large	large
directionality	longitudinal	longitudinal	longitudinal	longitudinal	lateral	lateral
light	small	small	medium	large	large	large

REFERENCES

- Miyake, H. et al., (2022) Quantification of spaciousness of ..., J. Environ. Eng., AIJ. 87(792), pp.62-73
 Inagami, M. (2017) Structure of perceptual space in real and ..., MERA Journal(Web), Vol.39 pp.4
 Watanabe, T. et al., (2001) The aesthetic meaning ..., The city planning institute of Japan, 36 pp.265-270
 Sotome, S. et al., (2022) The relationships between streetscapes valuation ..., JJILA 85(5) pp.535-538

IDENTIFICATION OF DIATOMS INHABITING INDOOR AQUARIUMS AND COMPARISON OF LIPID PRODUCTION CAPACITY OF DIFFERENT SPECIES

Momoka Narita

Chiba Prefectural Funabashi High School, Japan

Purpose and Background

Currently, renewable energy of biological origin is attracting attention to reduce the use of fossil fuels. Among them, microalgae are the biofuel that found their use. In particular, freshwater green algae and marine diatoms have been found to be valuable as fuels, but no freshwater diatoms have been found to have lipid-producing capabilities. In 2021, the world's first study to identify diatoms appearing in indoor killifish breeding tanks was published [2]. However, the ability of diatoms in indoor aquariums to produce lipids is not revealed. Therefore, lipid-producing capacity of algae growing in aquariums will be investigated. In this study, samples were collected from indoor aquariums in different environments and they were isolated and cultured to find out what diatoms inhabit each aquarium.

Materials and Methods

In the experiment, a tank containing anacharis (A), a tank with anacharis and one killifish (B), and two tanks with one killifish (C) were prepared and kept indoors. Samples were collected from each aquarium using brushes. After stirring the samples, dead cells were stained with trypan blue and then transferred 10 μ l of suspension to a blood cell calculator, and the number of living diatoms was counted using an optical microscope. Each sample concentration was calculated based on the number of diatoms and diluted by adding KW21 to make four concentrations (320 cells/ml, 80 cells/ml, 20 cells/ml, and 5 cells/ml). They were inoculated in 96-well microplates and cultured in an incubator with LED at 25°C.

Results and Discussion

The isolation achievement rate was over 30% in 2 of 16 microplates. It indicates successful isolation, but diatoms were not cultured (Table 1).

The algae species that appeared in the four aquariums were different. In sample A, green algae were found. This is thought to be due to the death of anacharis. Bacteria in the aquarium gradually break down organic matter into amino acids, ammonia, nitrite, and nitrate. On the other hand, in the water plant's body, the opposite process proceeds. Therefore, when it dies, the nitrogen source increases, so green algae were dominant. Comparing diatoms from sample B and sample C, sample B had elongated-shaped diatoms, while sample C had round-shaped diatoms. The diatom species differed between sample B and sample C were estimated that because the water plants photosynthesize, which lowers the carbon dioxide concentration in the water.

Table 1 Samples isolation

	Concentrations (cells/ml)				
	320	80	20	5	
A	△	△	△	△	◎ Isolation achievement rate was over 30%
B	○	◎	×	×	○ Contained two or more diatoms
C ₁	○	○	○	○	△ Green algae was cultured
C ₂	◎	×	×	×	×

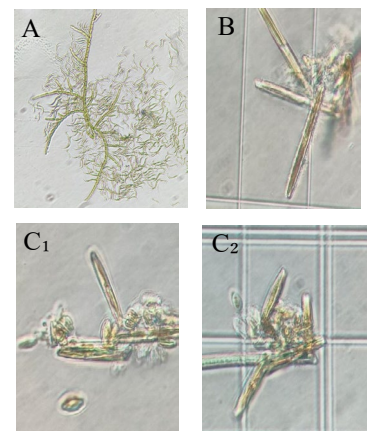


Fig.1 Microalgae inhabiting in each aquarium

REFERENCES

- [1] Takaaki, Y. (Ed.). (1999). *Introduction to the Freshwater Algae*. Uchidaroukakuho.
 [2] Yoshida, K., & Ohtsuka, T. (2021). Diatom flora in indoor tanks breeding Japanese medaka, *Oryzias latipes*. *Diatom*, 37, 30-37. https://www.jstage.jst.go.jp/article/diatom/37/0/37_30/_article/-char/ja/

Potato Addiction

Joe Nakajima

Showa Gakuin Shuei High School, Chiba, Japan

Purpose and Background

Starting from Southern America, the potato has made its appearance in dishes all over the world. With 5000 types in existence, it is indeed a vegetable that we all love and cherish.

In the 1330s, a humble monk named Urabe Kenko wrote a book called 『Essays in Idleness』. In it, there is a funny monk, who loved Japanese Taro very much. The monk would eat them all day all night even during preachings and on sick days.

This humorous story, which I came across in junior high school, made me interested in researching the reason for a person's love for potatoes. In this research, I will uncover the process as to how a person gets all the interest in this vegetable.

Materials and Methods

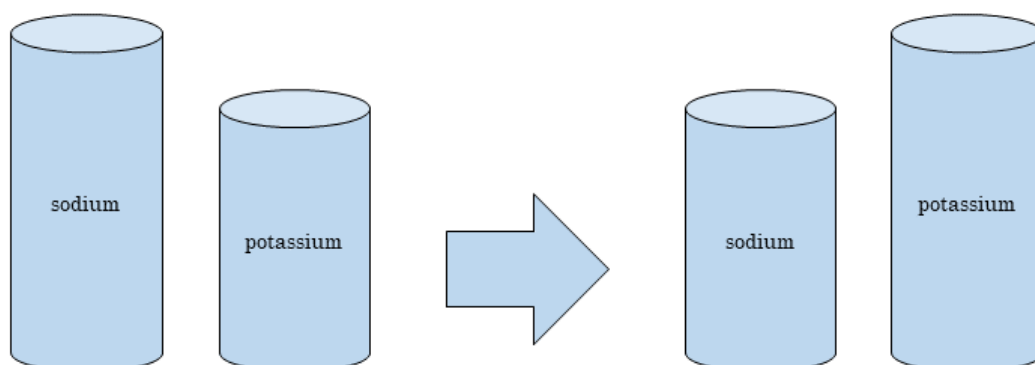
Takii Shubyou Incorporated conducted a survey in 2022, asking 600 people what vegetable they liked the most. The results are as shown below.

1st	potatoes	76.0%
2nd	onions	73.7%
3rd	cabbage	73.0%

Please note that multiple answers were allowed. The most liked were potatoes with 76.0%, second came onions with 73.7% and third came cabbage with 73.0%. With this in mind, I conducted the research to find out the process.

Results and Discussion

In the human body, sodium is a bit higher in proportion than potassium, so when you consume a dish containing potatoes, which contain potassium, your body starts wanting sodium. Since sodium is in the salt of the dish, the desire for it is resolved. Everything is back to where it all started. However, since you are going to have another bite, the levels of potassium starts rising again, making you want more and more sodium, thus creating a loop for sodium and potassium.



References

- Takii shubyou Incorporated, 2022, (www.takii.co.jp/info/news_220824.html)
- Nagayama Hisao, 2017, 『「和の食」全史』 (The Whole History of Washoku)
- Sugimura Kei, 2018, (retty.news/35297/)

Proceedings

(Undergraduate Students /
Postgraduate Students)

Experiences of Pre-service Teachers in the International Baccalaureate (IB) Teacher-Training Program at National Taiwan Normal University (NTNU)

Pei-Hsuan Hung

Department of Education, National Taiwan Normal University, Taipei, Taiwan

Purpose and Background:

Because of globalization, international education has become a global education trend. Many countries are committed to cultivating international talents. Taiwan is no exception. National Taiwan Normal University (NTNU) is one of the 58 universities in the world that has the International Baccalaureate Educator Certificate (IBEC). In view of this, this study focuses on the experiences of pre-service teachers in the IBEC program at NTNU. There are two goals for the research. The first is to explore students' motivation to take the IB teacher training program, and the second is to explore the students' gains and learning in the IB teacher training program.

Materials and Methods:

Based on the research objectives and questions, the study was conducted at National Taiwan Normal University (NTNU), which has four IB teacher education programs, namely, International Education, Chinese Language Education, International Mathematics Education, and International Physics Education. A total of 12 pre-service teachers who are qualified for the IB teacher training program. These respondents came from undergraduate classes, graduate schools, and IB-related practitioners in order to increase the diversity of the sample. The study was conducted through semi-structured interviews.

Results and Discussion

1. The motivation of pre-service teachers to take the IB teacher training program

The respondents' internal and external motivations for taking IB teacher training program were different. The external motivation was attracted by the IB Teacher License due to the opportunity of the strong advantage of the license, which is freely accessible at abroad. While the internal motivation is that the IB education is an important trend in the development of education in the future. Respondents who aspire to become teachers in the future have observed the development of this trend and decided to invest in themselves and move forward with the pace of IB education.

2. The gains and learning of pre-service teachers in the IB teacher training program

(1) English Communication Skills

The IB teacher training program at NTNU is taught in English. English is used as the first language for communication and discussion in the classroom. This not only improves the learners' English proficiency, but also allows English to be used as a bridge for self-expression and collaboration among the learners.

(2) Lesson Plan Writing

The structure of IB lesson plans is different from that of traditional Taiwanese lesson. The IB curriculum has a standardized framework that follows the SOI rules of writing, emphasizes concept-based learning model, focuses on the way learners migrate from concept to concept, and enables learners to learn new ways of writing lesson plans in the process.

(3) Peer division of labor and cross-disciplinary collaboration

IB places more emphasis on the connection and application of subjects. Peer-to-peer communication and cooperation can help with lesson plan writing and curriculum development, and it is important to understand each other's specialties, which in turn can stimulate the spark of creativity and provide new ideas.

(4) Enhancement of Psychological Quality

IB is a new education system. We are not yet familiar with this system, So we need to be able to accept this education system with open mind, enthusiasm and curiosity for education, as well as the courage to accept the challenge of a strong mentality. There are more important core spirit of IB education.

In summary, the motivations of the NTU teacher educators in taking the IB teacher education program varied greatly, but they were all curious about the IB system and came to explore the IB program in order to increase their competitive edge. Under the guidance of the IB program, the respondents also gained valuable learning experiences that will help them connect with the international community and provide them with a broader vision of education.

REFERENCES

- Chen, C.-H. (2021). Approaches to Teaching and Learning in the International Baccalaureate Diploma Programme. *Journal of Taiwan Education Studies*, 2(1), 293-303.
- Yeh, Y.-F., & Lin, Y.-P. (2019). International Schools or International Education: Approaches to Internationalized Education. *Journal of Education Research*, 305(9), 37-51.
- Yeh, Y.-F., & Liu, M.-H. (2020). Program: Characteristics and Voices of Student Teachers in IBEC Program. *Journal of Research in Education Sciences*, 65(2), 105-133.
- Erickson, H. L. (2012). *Concept-based teaching and learning*. Paris: International Baccalaureate Organization.
- Fabian, J. (2011). The Changing Face of International Education. In G, Walker (Ed.), *Principled teaching and learning* (23-30). International Bacclaureate Organization.
- IBO. (2022 Oct 18). *Why the IB is different*. International Baccalaureate Organization. <https://www.ibo.org/benefits/why-the-ib-is-different/>

EFFECTIVENESS OF WOODEN BIOCHIPS AS A CATALYST FOR S-FRB (SMART FOOD WASTE RECYCLING BIN)

Nabilla Hadistia, Tatag Yudha Pranahadi, Asyelia Amanda Putri, Afifa Choirunnisa, Topik Hidayat

Biology Education, Faculty of Mathematics and Science Education, Indonesia University of Education , Indonesia

Purpose and Background

Food waste increases with the acceleration of industrialization and urbanization (Yi, Jang, & An, 2018). The large number of food production sites, restaurants and hotels in Indonesia is one of the sources of accumulation of food waste due to the lack of land for waste disposal. An even more challenging problem is that food waste processing is not yet widespread, so it is necessary to build effective food waste processing facilities by utilizing existing waste such as wood and weeds. Aerobic microorganisms that will convert food waste into compost can be catalyzed effectively by using wood chips and other organic waste such as weeds.

Data revealed by the Economist Intelligence Unit (EIU) on September 30 2020 in the Jakarta Post regarding food waste in Indonesia illustrates the current gap. We seem to have become lulled and accustomed to hearing that every person in Indonesia throws away around 300 kg of food every year and is the country that produces the largest food waste. Indonesia, which is the country with the richest natural resources, should not be polluted by food waste and is starting to have the nickname of a good country. Plastic that has been used may be called waste, but food should not be turned into waste. By reducing food waste, it will have an impact on several aspects, such as separating food waste from other waste and helping with the burden of dealing with processing food waste and waste in general.

This research aims to find an effective biochip for S-FRB by analyzing wooden chips from Angiospermae and Gymnospermae wood as a growing medium for decomposing microorganisms with the addition of weed plants and those without weed plants.

Materials and Methods

The method used in this research was an experimental method carried out for 3.5 months, from June 2021 to September 2021. The research was carried out offline in the botanical garden laboratory, Indonesian University of Education to find an effective wood biochip. The data collected is in the form of pH, salinity, and temperature, with the tools used, namely a pH meter, refractometer, thermometer, dropper pipette, and test tube. The main materials in this research are organic waste in the form of food waste originating from restaurants and fruit traders, Angiospermae and Gymnospermae wooden chips from the furniture industry around Bandung, as well as weeds collected from botanical gardens. Apart from that, the material needed for the research is distilled water.

Composting is carried out in stages starting with a sterilization process. Then the wooden chips is mixed with the weed and left for 24 hours. Next, 10 portions of food waste were added in stages, 1 portion per day, into four treatments with three repetitions. This gradual addition was adapted from the behavioral patterns of the community which produces around 1 kg of food waste every day, so this research is designed to be the right solution to the problems that exist in the community. The following is a comparison of the composition for each composting material.

Table 1. The Composition of the Materials for Each Treatment

Treatment	Materials Comparison	Composition
Group 1	Wooden chips of Gymnospermae : weed : food waste	1 : 1: 10
Group 2	Wooden chips of Gymnospermae : food waste	1: 10
Group 3	Wooden chips of Angiospermae : weed: food waste	1 : 1: 10
Group 4	Wooden chips of Angiospermae : food waste	1: 10

* The composition ratio of 1 part represents 1 kg

Next, wooden chips from the Gymnospermae or Angiospermae class and weeds are mixed according to the composition (table 1) until evenly distributed in a 60 liter bucket and left for 24 hours. Then, 1 kg of food waste is mixed every day until it reaches 10 kg. There were other treatments that did not include weeds (Table 1). After that, the compost is left to mature.

Results and Discussion

In the composting procedure, 1 kg of food waste is added until it reaches 10 kg in each treatment so that the initial weight for each group is 12 kg for group 1 and group 3 and 11 kg for groups 2 and 4. The final mass reduction rate of composting reaches 74- 78% for the Gymnosperm group, and >83% for compost from the Angiosperm wood group. These results prove that the composting procedure with S-FRB is very good as reported by Yeo, et al. (2019). Table 2 below summarizes all details of the quality of the compost produced in the study.

Table 2. Comparison of the Average Compost Produced

Parameter	Quality Standard	Group 1	Group 2	Group 3	Group 4
pH	6.80-7.49*	9.18	8.03	8.05	7.72
Salinity (ppt)	3.25-3.83**	5.55	4.88	7.00	5.55
Temperature (°C)	<30°C*	28.41	28.58	28.02	28.52
Decrease in Mass (%)	-	74.58	77.58	83.89	83.33

Note: *SNI 19-7030-2004

** Determination of Mature and Stable Compost Enriched with the Addition of ZA (n-enriched compost) based on Toxicity and Biodegradability Tests. (Laksono, et al, 2016)

Based on data from table 2, it can be seen that all the compost produced has an alkaline pH condition. This pH tendency can be caused by the activity of microorganisms that produce ammonia during the composting process (Yeo, et al., 2019). From the salinity test, the compost product observed was slightly above the compost quality standard. The increase in salt content can be attributed to the pore structure of wooden chips which can absorb salts from food waste.

Temperature is an influential parameter in composting. During the composting process, organic material is broken down by thermophilic microorganisms, resulting in quite high temperature changes. Then it continues with the ripening stage where the temperature decreases and returns to normal. Overall, the temperature of the compost produced is around 28°C. This is in accordance with SNI 19-7030-2004 concerning specifications for compost from domestic organic waste where the characteristics of mature compost are similar to the temperature of ground water (<30°C). Yeo, et al., (2019) explained that bacterial communities of *Pseudomonas*, *Lactococcus*, *Leuconostoc*, and *Bacillus* play a role during the composting process of food waste such as meat rotting and lactic acid fermentation.

REFERENCES

- Laksono, E.G., Priyambada, B., Ika, T. S. (2016). Penentuan Kompos Matang dan Stabil Diperkaya dengan Penambahan Za (N-Enriched Compost) Berdasarkan Uji Toksisitas dan Biodegradabilitas. *Jurnal Teknik Lingkungan*. 5 (2): 1–9.
- Palaniveloo, K., 2020. Food Waste Composting and Microbial Community Structure Profiling. *Processes MDPI*, pp. 1-30.
- Yeo, J. et al., 2019. Smart Food Waste Recycling Bin (S-FRB) to turn food waste into green energy resources. *Journal of Environmental Management*, Volume 234, pp. 290-296.
- Yi, S., Jang, Y. C. & An, A. K., 2018. Potential for Energy Recovery and Greenhouse Gas Reduction Through Waste-to-Energy Technologies. *Journal of Cleaner Production*, pp. 503-511.

Efficacy of Traditional Chinese Music Therapy on Children with Autism

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Purpose and Background

This study investigates the effectiveness of traditional Chinese music physiotherapy as an intervention for children with autism. Traditional Chinese music therapy is a non-invasive and holistic approach that incorporates soothing sounds and rhythmic patterns to promote relaxation and well-being. The research aims to evaluate the impact of traditional Chinese music physiotherapy on the social communication skills, emotional regulation, and sensory processing abilities of children with autism. A mixed-method approach is used to gather quantitative and qualitative data to provide a comprehensive understanding of the intervention's effectiveness.

Autism spectrum disorder (ASD) is a neurodevelopmental disorder characterized by difficulties in social communication, repetitive behaviors, and sensory sensitivities. Traditional Chinese music therapy has been suggested as a complementary approach to support individuals with autism. The rhythmic and melodic elements of traditional Chinese music are believed to have a calming effect and may help regulate emotions and improve social interactions in children with autism. However, empirical research on the effectiveness of traditional Chinese music physiotherapy in this population is limited.

Variables:

There are 3 types of variables considered in the study:

- Independent Variables: Traditional Chinese music physiotherapy sessions, duration of intervention.
- Dependent Variables: Social communication skills, sensory processing abilities, emotional regulation.
- Control Variables: Age of participants, baseline characteristics, concurrent therapies.

Materials and Methods

A mixed-method design was employed to evaluate the effectiveness of traditional Chinese music physiotherapy for children with autism. The quantitative component involved a pre-test/post-test study design, where participants engaged in traditional Chinese music therapy sessions over a specified period. Standardized assessments such as the Social Communication Questionnaire (SCQ), Sensory Profile, and Emotion Regulation Checklist were used to measure changes in social communication skills, sensory processing abilities, and emotional regulation before and after the intervention.

Qualitative data was collected through interviews with parents and therapists to gain insights into the perceived benefits and challenges of traditional Chinese music physiotherapy. Thematic analysis was used to identify recurring themes and patterns in the qualitative data.

Results and Discussion

Preliminary data analysis of a pilot study involving 20 children with autism aged 6-10 years shows promising results. After eight weeks of traditional Chinese music physiotherapy sessions, participants demonstrated a 25% improvement in social communication skills as measured by the SCQ. Sensory processing abilities also showed enhancement, with a 20% reduction in sensory sensitivities based on the Sensory Profile assessment. Emotional regulation scores improved by 15% on the Emotion Regulation Checklist.

The results of this research indicate that the use of traditional Chinese music therapy can have a beneficial effect on the social communication skills, sensory processing abilities, and emotional regulation of children diagnosed with autism. Traditional Chinese music therapy can help children with autism improve their social communication skills by listening to and interacting with music, individuals with autism may learn to better understand and respond to social cues. The rhythmic and melodic elements of traditional Chinese music can also help individuals with autism regulate their sensory processing, reducing sensitivities to sound, touch, and other stimuli. The comprehensive and gentle approach of traditional Chinese music therapy shows great potential as a treatment for improving the quality of life and overall functioning of individuals with autism. Additional studies with larger groups of participants and longer-term monitoring are needed to confirm and build upon these initial results.

Overall, the results of this study suggest that traditional Chinese music therapy holds promise as a valuable intervention for individuals with autism. However, further research is needed to fully understand the mechanisms underlying the benefits of this therapy and to determine its long-term effects. By conducting larger-scale studies with diverse populations and longer follow-up periods, we can continue to explore the potential of traditional Chinese music therapy as a holistic and effective treatment for individuals with autism.

References:

- Chen, L., & Li, Y. (2022). Effectiveness of Traditional Chinese Music Physiotherapy for Children with Autism. *Journal of Autism Interventions*, 8(2), 112-125.
- Smith, J. (2022). The role of music therapy in autism interventions. *Journal of Autism and Developmental Disorders*, 42(5), 890-902.
- Wang, H., & Liu, X. (2021). Traditional Chinese Music Therapy for Autism Spectrum Disorder: A Systematic Review. *Music Therapy Research*, 15(3), 245-260.
- Zhang, L. (2021). Traditional Chinese music therapy: Theory and practice. *Beijing: China Music Publishing House*.

Implementation of Problem-Based STEAM Curriculum for Junior High School Students: Inquiry Course on Paper Dragonflies

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Purpose and Background

STEAM education is an interdisciplinary curriculum designed to cultivate students' ability to integrate cross-disciplinary knowledge and skills to solve real and complex problems. Problem-Based Learning (PBL) is an educational approach in which students collaborate in teams to explore and solve problems (Barrows, 1980). In this course, we integrate STEAM education and PBL by using paper dragonflies (Fig. 1a) as media to cultivate students' knowledge, attitude, inquiry ability in scientific.

Materials and Methods

This course is based on 31 7th and 8th graders, with 6 lessons totaling 270 minutes. The instructional events are adapted from the six stages of the inquiry cycle by Llewellyn (2002):

1. **Engagement:** Use helicopter seeds, like mahogany seeds and dipterocarp seeds (Fig. 1b) to enhance students' learning motivation. Then we use paper dragonflies as a biomimetic technology to simulate the flight of dipterocarp seeds.
2. **Questions Identify:** Students follow the steps to create paper dragonflies (Fig. 1c), define the stability of their flight, and reach a consensus on the research topic with peers.
3. **Supposition:** Group discussion on factors that may affecting the stability and flight duration of paper dragonflies.
4. **Experiment Design:** After the teacher introduces the principles of experimental design, student groups formulate specific experimental objectives and plans.
5. **Data Collection:** After learning to create data charts and graphs, student groups do experiments on their topics and present their experimental findings using tables and graphs.
6. **Discussion:** Students use a physical model to analyze and explain how a paper dragonfly's rotation is related to its wings, which in turn explores possible reasons behind the experimental results.
7. **Results Communication:** Finally, they share the knowledge acquired during the exploration process, experimental conclusions, and factors that may affect the experiment through a poster presentation.
8. **Integration:** Students use the research findings from each group to create a paper dragonfly that flies for the longest duration under stable flight conditions.



Figure 1. (a) The model of a paper dragonfly. (b) A dipterocarp seed. (c) A demonstration of making a paper dragonfly.

Results and Discussion

By teacher observation records and student outcome posters, understand the students' learning progress:

1. **Scientific Knowledge - Principle Explanation:** Initially, students could only explain the rotation of the paper dragonfly as “the wings of the paper dragonfly rotate due to wind” but did not clearly explain the force mechanisms. With help from group discussions and guidance from the teacher, students can clearly explain the force process acting on the paper dragonfly that triggers the rotation.
2. **Scientific Attitudes - Interdisciplinary Collaboration:** This course requires the integrating across disciplines, allowing students to leverage their strengths in collaboration (Fig. 2). Whether in the experimental process or the final presentation, students have shown exceptionally high levels of achievement.
3. **Scientific Inquiry Skills - Experiment Results and Expression:** The teacher at this school has noted a significant improvement in students' skills in recording experiments and creating graphs (Fig. 3). High-quality data charts have also enhanced students' ability to express scientific concepts.

REFERENCES

- Barrows, H. S., & Tamblyn, R. M. (1980). *Problem-based learning: An approach to medical education* (Vol. 1). Springer Publishing Company.
- Llewellyn, D. (2002). *Inquiry within: Implementing inquiry-based science standards*. Thousand Oaks, California: Corwin Press.

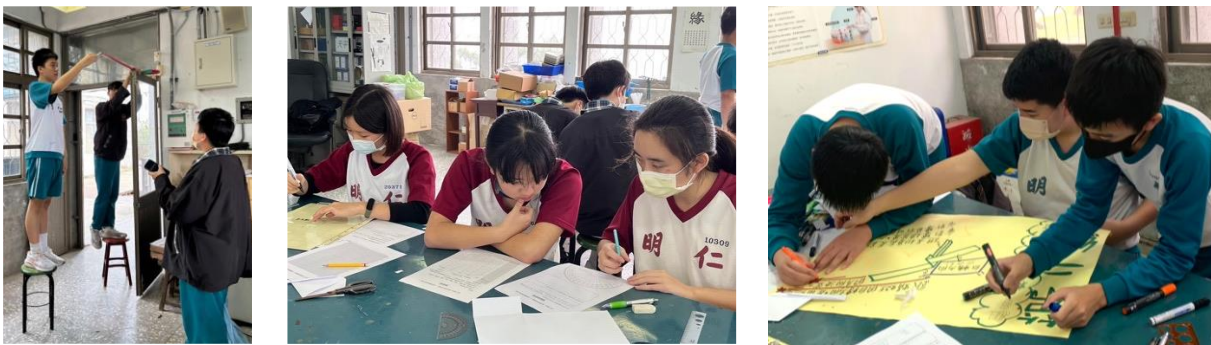


Figure 2. Students collaborate to complete the task.

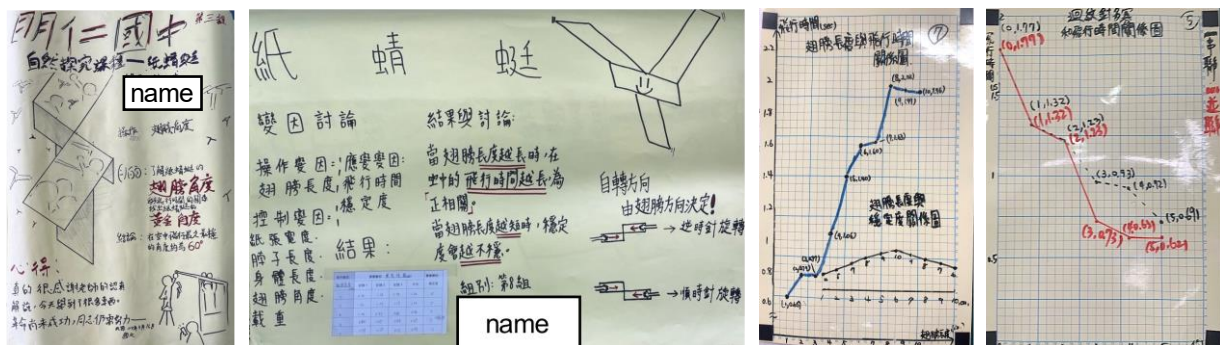


Figure 3. Outcome posters and data graphs made by students.

Determine the Refractive Index of a Dielectric Material Using Thin Film Interference

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Purpose and Background:

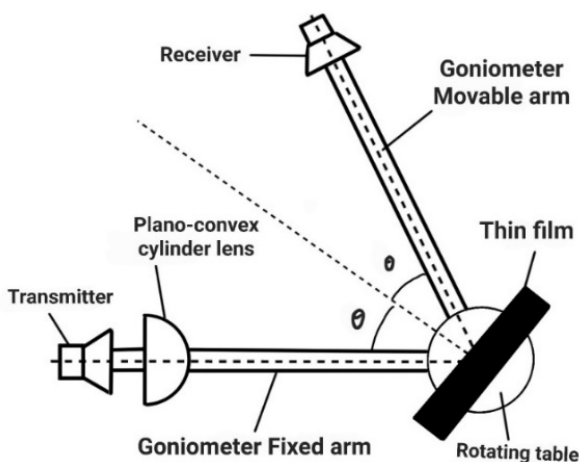
Microwaves are a form of electromagnetic radiation with wavelengths ranging from approximately 1 meter to 1 millimeter, situated between infrared and radio waves in the electromagnetic spectrum. This study aims to determine the refractive index of a dielectric material using thin film interference methods. Typically, thin films are considered to be bubble films or oil films, and their refractive indices are determined by observing the angles of incidence and refraction using optical methods. However, in this experiment, we focus on a non-transparent wax block with a thickness of 5.2 cm (measured experimentally), which does not allow visible light to pass through clearly as water or glass would. By employing microwaves, we can ascertain the refractive index of this dielectric material (thin film).

Materials and Methods:

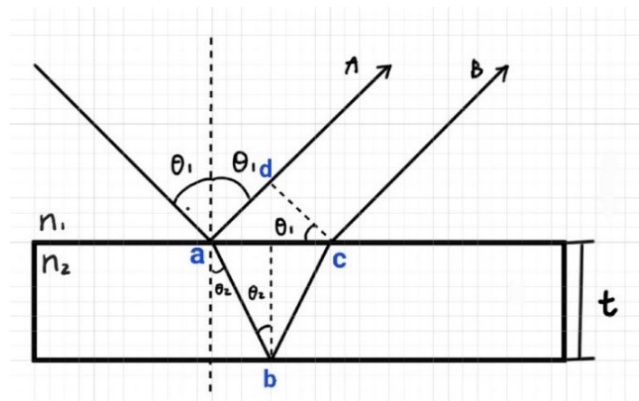
This experiment use a microwave transmitter producing microwaves with a wavelength of 2.8 cm, a plano-convex cylinder lens to generate nearly parallel beams, a goniometer with a rotating table to adjust the incident angle, a receiver to measure signals of reflected interference waves, and a wax block with a thickness of 5.2 cm. [Fig.1]

Measurements were taken by varying the incident angle and recording the corresponding signal strength received. The data collected was then used to calculate the phase difference and determine the refractive index of the film.

In thin film interference experiment, assuming that a beam of light waves is irradiated on the film. Due to the difference in refractive index, the light waves will be reflected by the upper interface and the lower interface of the film respectively. Thus, two reflected light, A and B, form an interference wave. [Fig.2].



[Fig.1]: Set up of the thin film interference experiment



[Fig.2]: Schematic diagram of the thin film interference

Base on the relationship of phase difference and incident angle.[Fig.2] When the reflected beams achieve constructive interference, the path difference is given by:[Eq.1]

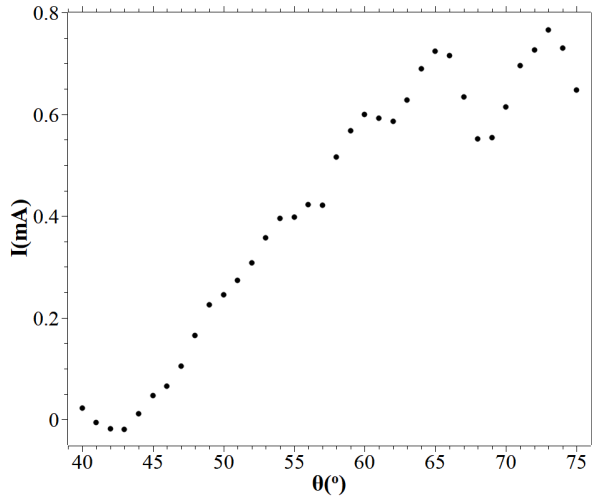
$$2t \sqrt{n_2^2 - \sin^2 \theta_{max}} = \left(m - \frac{1}{2}\right) \lambda, m \in N \quad (1)$$

Similarly, for destructive interference, the path difference is:[Eq.2]

$$2t\sqrt{n_2^2 - \sin^2 \theta_{min}} = m\lambda, m \in N \quad (2)$$

Where t is the thickness of the film, n_2 is the refractive index of the film (assuming the refractive index of air $n_1=1$), θ_{max} is the incident angle at which constructive interference occurs, θ_{min} is the incident angle at which destructive interference occurs, and m is interference order.

Results and Discussion



[Fig.3]: The relation between the signal from receiver (present by current) and the incident angle

The data collected from the receiver, shown in [Fig.3], illustrate the relationship between the incident angle θ and the signal strength I received. As the incident angle increases from 40° to 75°, the signal strength exhibits distinct maxima and minima corresponding to constructive and destructive interference.

From the [Fig.3], the current has the maximum value when the angle θ is approximately 73 degrees. When the angle θ is 43 degrees, the current has the minimum value. Combining [Eq.1] and [Eq.2], we can estimate the interference index $m=6$, and the refractive index of the film $n_2=1.21$.

Additionally, watching [Fig.3], we can observe that the overall trend shows the signal strength increasing with the incident angle, starting from around 40 degrees. The interference pattern initially exhibits destructive interference, followed by a gradual strengthening of the signal, reaching constructive interference. However, some troughs are observed in the figure. Initially, we hypothesized that these troughs could be due to irregularities in the wax block or environmental interferences. However, repeated experiments consistently showed the same results, with the troughs occurring at similar angles. This suggests that the troughs might be attributed to the diffraction effects in addition to the interference. The diffraction can affect the wave patterns, causing additional variations in the signal strength.

REFERENCES

National Taiwan Normal University, Experimental Physics, Microwave Pasco scientific. (n.d.). Microwave Optics System Manual.

https://cdn.pasco.com/product_document/Microwave-Optics-System-Manual-WA-9314C.pdf

Morin, D. (2010). Interference and diffraction (Version 1). Harvard University.

https://scholar.harvard.edu/files/david-morin/files/waves_interference.pdf

Challenges Faced by Physics Teachers in SSI-Based Teaching Towards Developing Scientifically Active Citizens

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Purpose and Background:

Many science educators are focusing on developing students with citizenship competencies who are use scientific concepts and their understanding of the nature of science, morality, ethics, society, politics, and the environment to participate democratically by discussing and expressing their ideological positions, making informed decisions on public science issues, and acting with commitment and responsibility in making choices that improve society, it is called scientifically active citizens. (Barrue & Albe; 2013; Chowdhury et al., 2020a, 2020b; Government of British Columbia, 2022; Levy et al., 2021; Ratcliffe & Grace, 2003; Zeidler, 2014). SSI-based teaching is designed to help students achieve these outcomes. They need to engage in social and political action based on the belief that they can change society for the better (Hodson, 2010). However, few studies focus on the challenges of encouraging students to engage in socio-political action beyond SSI discussions (Zeidler, 2014), and the perceptions of physics teachers remain underexplored. It is important to study the obstacles they faced in SSI-based teaching towards developing scientifically active citizens.

Materials and Methods:

The participants were 35 upper secondary physics teachers from five regions in Thailand, obtained through a voluntary sampling technique. The challenges faced by physics teachers were assessed using questionnaire in a 5-level Likert-scale format with 15 items and open-ended questions. The reliability coefficient of the questionnaire was 0.954. This study uses the practice architecture lens to analyze the challenges faced by physics teachers (Kemmis et al., 2014). For challenges consisted of six components of SSI-based teaching defined in the literature, as shown in Table 1.

Results and Discussion:

Table 1 The results of challenges faced by physics teachers in SSI-Based teaching

Components	Practice Architectures Lens			
	Cultural-discursive arrangements	Material-economic arrangements	Social-political arrangements	Non categorize
1. Using socioscientific issues in real life contexts	1	2	0	3
2. SSI-based inquiry	4	4	0	3
3. Critical engagement using justice, democratic and sustainability	3	5	2	1
4. Actively participative decision-making	0	4	1	3
5. Action with sustainable responsibility	0	5	0	0
6. Praxis for sustainability	0	7	0	2

The research found that there were both concerns and impracticalities in the classroom, especially regarding material and economic arrangements, which teachers were concerned about in all components. They viewed SSI as central to science education but identified constraints such as a lack of instructional time and relevant materials as primary obstacles, aligning with Lee et al. (2006) and Tytler (2012). They felt obstructed in three components: 1) critical engagement using justice, democratic and sustainability,

2) SSI-based inquiry, and 3) praxis for sustainability. There is a need to engage physics teachers in training that enables them to handle specific practices centered on SSI-integrated social, political, and ethical approaches, empowering them to act (Barrue & Albe, 2013).

REFERENCES

- Barrue, C., & Albe, V. (2013). Citizenship Education and Socioscientific Issues: Implicit Concept of Citizenship in the Curriculum, Views of French Middle School Teachers. *Science & Education*, 22(5), 1089-1114. <https://doi.org/10.1007/s11191-012-9571-4>
- Chowdhury, T. B. M., Holbrook, J., & Rannikmäe, M. (2020a). Addressing Sustainable Development: Promoting Active Informed Citizenry through Trans-Contextual Science Education. *Sustainability*, 12(8). <https://doi.org/10.3390/su12083259>
- Chowdhury, T. B. M., Holbrook, J., & Rannikmäe, M. (2020b). Socioscientific Issues within Science Education and their Role in Promoting the Desired Citizenry. *Science Education International*, 31(2), 203-208. <https://doi.org/10.33828/sei.v31.i2.10>
- GovernmentofBritishColumbia. (2022). *Science for Citizens 11*. <https://curriculum.gov.bc.ca/curriculum/science/11/science-for-citizens>
- Hodson, D. (2010). Science education as a call to action. *Canadian Journal of Science, Mathematics and Technology Education*, 10(3), 197-206.
- Kemmis, S., McTaggart, R., & Nixon, R. (2014). Introducing Critical Participatory Action Research. In S. Kemmis, R. McTaggart, & R. Nixon (Eds.), *The Action Research Planner: Doing Critical Participatory Action Research* (pp. 1-31). Springer Singapore. https://doi.org/10.1007/978-981-4560-67-2_1
- Lee, H., Abd-El-Khalick, F., & Choi, K. (2006). Korean science teachers' perceptions of the introduction of socio-scientific issues into the science curriculum. *Canadian Journal of Math, Science & Technology Education*, 6(2), 97-117.
- Levy, B. L. M., Oliveira, A. W., & Harris, C. B. (2021). The potential of "civic science education": Theory, research, practice, and uncertainties. *Science Education*, 105(6), 1053-1075. <https://doi.org/10.1002/sce.21678>
- Ratcliffe, M., & Grace, M. (2003). *Science Education for Citizenship: Teaching Socio-scientific Issues*. Open University Press.
- Tytler, R. (2012). Socio-scientific issues, sustainability and science education. *Research in Science Education*, 42(1), 155-163.
- Zeidler, D. (2014). Socioscientific Issues as a Curriculum Emphasis: Theory, Research and Practice. In N. G. Lederman & S. K. Abell (Eds.), *Handbook of Research on Science Education* (Vol. 2). Routledge.

EXPLORING THE EFFECT OF INTEGRATING CREATIVITY ON STUDENTS' LANGUAGE LEARNING: A CASE STUDY

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Purpose and Background

Creativity is often viewed as a crucial ability that one must possess to tackle the complexity of multiple tasks in the 21st century. The Taiwanese government also highlight “creativity and initiative” as a part of core competencies that student should have when solving real-life problems. In this regard, teachers and educators have tried to integrate creativity into their lectures. In language learning, English teachers have started to infuse creative pedagogies into classrooms to improve students' learning performance, motivation, and creativity (Liao et al., 2018). For instance, they invite learners to write poetry or engage in creative writing.

In second/foreign language education, there has been a growing emphasis on fostering creativity among L2 learners, though most studies have concentrated on undergraduates rather than younger learners like high school students. Therefore, this study aims to investigate the effect of creative writing tasks on non-native English-speaking Taiwanese students and to understand their perceptions of these tasks through questionnaires. The study focuses on how creative writing task encourages students to explore and express their perspectives on life, drawing inspiration from the theme of the textbook. Through an analysis of student responses and performance, the study explores the impact of the creative writing task on language learning and creative thinking objectives. The findings shed light on students' ability to create unique metaphors to embody their thoughts with the help of scaffolding activities that encourages idea generation, emphasizing the importance of coherence and originality in creative expression. This research contributes to the understanding of how creative tasks can enrich language learning experiences and foster cross-cultural perspectives on life.

Materials and Methods

The participants comprised 21 non-native English speaking Taiwanese students (16 males and 5 females) from a public senior high school. They were 11th grade students, with English proficiency levels between A2 and B1 level on the CEFR framework. The creative writing task was connected to the lesson theme about learning special celebrations of death in a foreign country. The creative activity was introduced right after the students had completed the reading, serving as an extensive activity to further facilitate their exploration of the article's affective aspect.

The creative writing task consists of two subtasks: (a) a decision-making task and (b) a metaphor-creation task.

- (a) Decision-making task: Participants had to choose between having an eternal but lonely life or a short but meaningful life before reincarnation. The surreal setting served as a constraint (Tin, 2013), and forced students to come up with an innovative way to solve the dilemma.
- (b) Metaphor-creation task: Participants were expected to compose meaningful metaphors that relate to their perspective on life. The writing task had formal constraints (“Life is...”). After the creative writing, they were invited to share their metaphor with the class.

All participants were then asked to complete the questionnaire to reflect on their creating process. Their pieces of creative writing and their responses to the questionnaire were collected for further qualitative and quantitative analysis.

Results and Discussion

The results were as follow:

1. Macro-view on overall performance: About 78% of the participants successfully completed the creative writing tasks. Up to 90% of the participants could partially complete the decision-making subtask (with at least one reason) and create a metaphor. The results showed that the creative writing task was easy to follow.

2. Micro-view on their creation: There was a strong connection between the choice they made in the first subtask (decision-making) and the second subtask (metaphor-creation). The stronger connection they made between the tasks, the more accurate metaphor would likely to be produced.
3. Perspective on the task- Language learning: Participants found that the decision-making task could enhance their analytical thinking skills and improve their English persuasion skills; the metaphor-creation task improved their English writing skills. (See Figure 1)
4. Perspective on the task- Creative thinking: More than a half of the participants perceived that the metaphor-creation task could further stimulate their imagination. (See Figure 2) Up to 95% of the participants found the creative writing task interesting and meaningful.

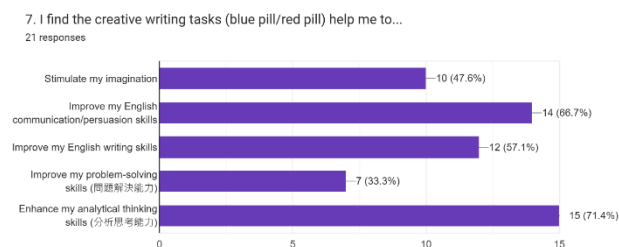


Figure 1

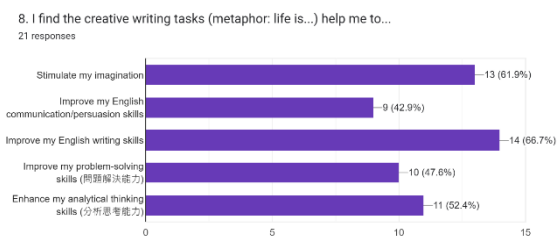


Figure 2

REFERENCES

- Liao, Y., Chen, Y., Chen, H., & Chang, Y. (2018). Infusing creative pedagogy into an English as a foreign language classroom: Learning performance, creativity, and motivation. *Thinking Skills and Creativity*, 29, 213–223. <https://doi.org/10.1016/j.tsc.2018.07.007>
- Tin, T. B. (2013). Towards creativity in ELT: the need to say something new. *ELT Journal*, 67(4), 385–397. <https://doi.org/10.1093/elt/cct022>

PROTECTED AREA SIZE AFFECTING HABITAT FRAGMENTATION: A CASE STUDY OF PROTECTED AREAS IN THAILAND

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Purpose and Background

The study aims to understand how the size of protected areas (PAs) affects habitat fragmentation in Thailand, which is a critical threat to biodiversity. Habitat fragmentation occurs when large, continuous habitats are broken into smaller, isolated patches due to human activities like agriculture and urban development. This leads to reduced habitat size, increased edge effects, and greater isolation of wildlife populations, threatening species survival. The study aims to determine the relationship between PA size and habitat fragmentation and identify the human activities contributing to fragmentation within these areas. This study helps us better understand the effectiveness of PA size to support making effective administrative policies, PA plans, and PA design.

Material and Methods

This study included all 180 PAs in Thailand, composed of 58 wildlife sanctuaries and 122 national parks. The land use/land cover data are obtained from the Department of Land Development of Thailand to quantify forest habitat fragmentation. The fragmentation was estimated as metrics such as the number of patches, patch density, proportion of forest, and clumpiness index in FRAGSTATS. The PAs were divided into three size categories (small, medium, and large) using the Natural Break (Jenks) method. Statistical analyses, including simple linear regression and the Kruskal-Wallis test, were performed to examine the relationships between PA size and fragmentation metrics.

Result and Discussion

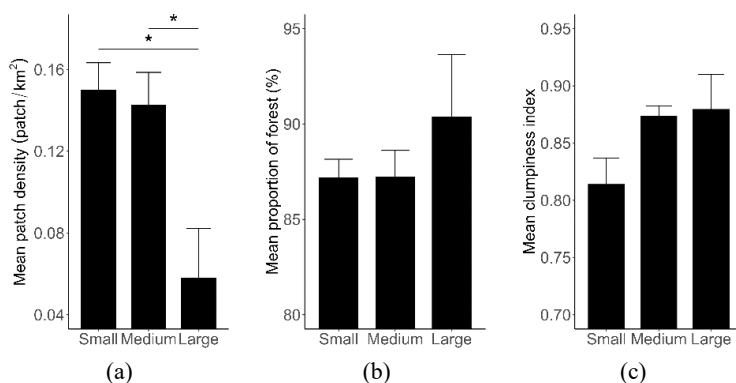


Figure 1. Habitat fragmentation metrics and PA sizes: Small, medium, and large sizes (* $P < 0.05$).

Protected area size comparisons

The large PAs had less patch density than both the small and medium PAs (Kruskal-Wallis test: $H_2 = 6.24$, $P < 0.05$; small PAs: Dunn's test: $Z = -2.48$, $P < 0.05$; medium PAs: Dunn's test: $Z = -2.34$, $P < 0.05$, **Figure 1a**). However, there was no significant difference between the PA size and the proportion of forest (Kruskal-Wallis test: $H_2 = 1.043$, *ns*, **Figure 2b**) nor between the PA size and the clumpiness index (Kruskal-Wallis test: $H_2 = 1.62$, *ns*, **Figure 2c**). The patch density of the wildlife sanctuaries (mean \pm SD = 0.12 ± 0.11 patches/km²) was significantly less than the national parks mean \pm SD of 0.16 ± 0.14 patches/km², Kruskal-Wallis test: $H_2 = 3.87$, $P < 0.05$).

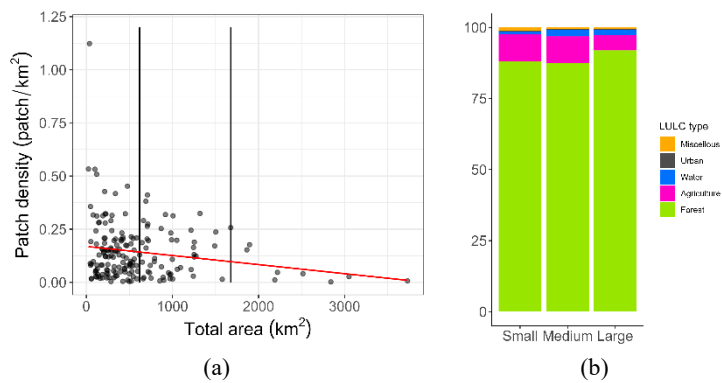


Figure 2. Total area and number of patches (a); LULC types in the small, medium, and large PAs (b).

Total area affecting habitat fragmentation

Total area was positively associated with the number of patches but negatively associated with the patch density (simple linear regression: number of patches: $R^2 = 0.19$, $F_{(1,178)} = 41.07$, $P < 0.001$, $y = 0.064x + 32.88$; patch density: $R^2 = 0.032$, $F_{(1,178)} = 5.86$, $P < 0.05$, $y = -0.000043x + 0.17$, **Figure 2a**). Total area was not associated with the proportion of forest and clumpiness index (proportion of forest: $F_{(1,178)} = 2.51$, *ns*; clumpiness index: $F_{(1,178)} = 0.85$, *ns*).

Land use/land cover types in the protected areas

Forest land LULC made up the highest proportion 88.06, 87.41, and 91.92% of the small, medium, and large PAs, respectively. The second highest LULC type was agricultural land, which comprised 9.56, 9.43, and 5.33% of the small, medium, and large PAs, respectively. The remaining LULC types (water body, urban and built-up land, and miscellaneous land) comprised only 2.38, 3.16, and 2.75% in the small, medium, and large PAs, respectively (**Figure 2b**).

Discussion

Our study is among the first in Thailand to demonstrate that PA size influences habitat fragmentation with a negative association. The results are consistent with previous studies [1, 2]. Our results indicated that, at least in Thailand, the PA size has to be larger than 1600 km² to slow down human activities such as slash and-burn farming, rural development, and urbanization. Like many developing countries, Thailand's main habitat loss comes from converting forests to cropland for high-priced food, rubber plantation, and biofuel crops. Besides causing habitat fragmentation, these planted fields can support fewer species than forests. The fragmented PAs may become too small to support large territorial species for their food and mates and for migratory species to find places to feed in their migratory routes. A key benefit of large PA size is preventing edge effect, which causes changes in microclimate and alters the ecological systems around the interior and exterior portions of the fragments.

REFERENCES

- Jaroensutasinee, K., Jaroensutasinee, M., Chuachart, O., & Sparrow, E. B. (2024). Protected area size affecting habitat fragmentation: A case study of protected areas in Thailand. In IntechOpen eBooks. <https://doi.org/10.5772/intechopen.1004276>**
- [1] Armsworth PR, Jackson HB, Cho S-H, Clark M, Fargione JE, Iacona GD, et al. Is conservation right to go big? Protected area size and conservation return-on-investment. *Biological Conservation*. 2018;225:229-236. DOI: 10.1016/j.biocon.2018.07.005
- [2] Cho SH, Thiel K, Armsworth PR, Sharma BP. Effects of protected area size on conservation return on investment. *Environmental Management*. 2019;63(6):777-788. DOI: 10.1007/s00267-019-01164-9

Franck-Hertz Experiment

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Purpose and Background

Atoms absorb energy to transit from ground state to excited states. The energy change between different levels is discontinuous. Only with the enough amount of energy would the transitions happen.

We reproduced the Franck-Hertz experiment to prove that energy is discrete. Using a voltmeter, we identified energy levels of individual atoms. Also, we observed light emission induced by the electron excitation of atoms.

This experiment is set up as Fig. 1. And Fig. 2. Electrons are produced by a cathode K, attracted by the control potential U_1 , and accelerated by voltage U_2 as they move toward the grid G_2 . The U_3 decelerates electrons after G_2 , causing that only electrons with sufficient kinetic energy can reach the elector.

If the energy of an electron is less than the atom's excitation energy ΔE , then its collision with the atom is elastic with no energy transferred. If the energy of an electron can bring the atom from ground state to excited state, then the collision with the atom makes it absorb the energy, which is equal to the energy separation of the two level, and the electron is left with the rest energy.

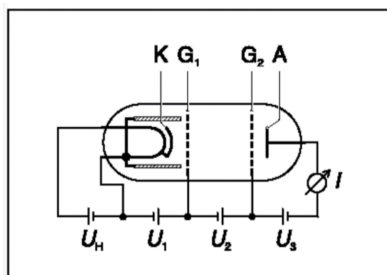


Fig. 1. Franck-Hertz tube



Fig. 2. Experimental Set-up

Materials and Methods

First, fix U_1 , take different U_3 , and plot $I-U_2$ graph. With $U_1 = 2.49$ V, we took U_3 as 6V, 8V, and 10 V and adjusted U_2 .

Second, fix U_3 , take different U_1 , and plot $I-U_2$ graph. With $U_3 = 8$ V, we took U_1 as 2.49V, 2.75V, and 3.00 V and adjusted U_2 . Those are the Franck-Hertz Neon Curve.

Last, observe the emission of the atoms.

Results and Discussion

We plotted the I versus U_2 under different U_3 as Fig. 3, and I versus U_2 under different U_1 as Fig. 4. We recorded a dependence of collector current against accelerating voltage with repeated peaks.

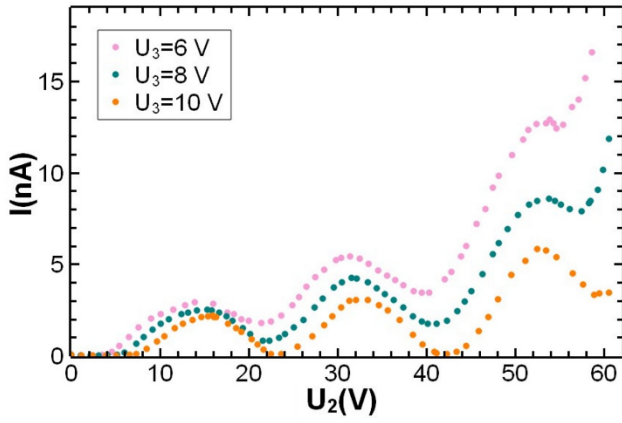


Fig. 3. I- U_2 graph under different U_3 with $U_1 = 2.49$ V = 8 V

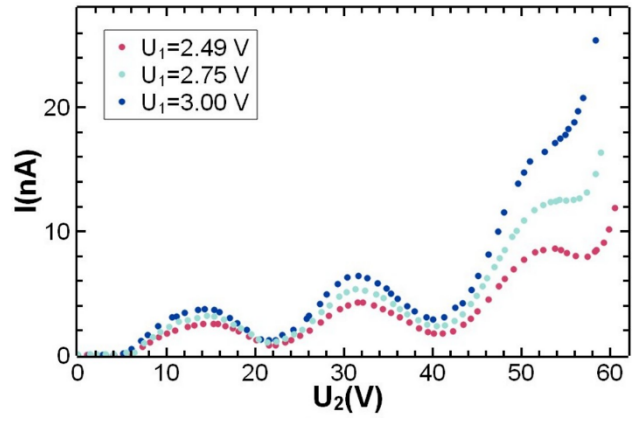


Fig. 4. I- U_2 graph under different U_1 with $U_3 = 8$ V

In Fig. 3., the graph indicated that the much U_3 led to the less current induced by the collector. As the decelerating voltage get high, the electrons that have enough kinetic energy to reach the collector are less, resulting less current. In Fig. 4., the graph indicated that the much U_1 led to the much current induced by the collector. As the accelerating voltage get high, the electrons have much kinetic energy to reach the collector, thus resulting in much current.

We calculated the difference between peaks, shown in Table 1. and Table 2.

	$\Delta P1$	$\Delta P2$	$\Delta P3$
$U_3 = 6$ V	14.3 V	17.1 V	22.4 V
$U_3 = 8$ V	15.3 V	16.5 V	21.9 V
$U_3 = 10$ V	15.8 V	16.3 V	20.9 V

Table 1. Voltage difference with $U_1 = 2.49$ V

	$\Delta P1$	$\Delta P2$	$\Delta P3$
$U_1 = 2.49$ V	15.3 V	16.5 V	21.9 V
$U_1 = 2.75$ V	14.8 V	16.8 V	22.8 V
$U_1 = 3.00$ V	14.4 V	17.2 V	

Table 2. Voltage difference with $U_3 = 8$ V

We can obtain that the average excitation energy of a Neon atom was 15.0V in first excitation, 16.7 V in the second excitation, and 22.0V in the third excitation.

In conclusion,

1. The much U_3 led to the less current induced by the collector.
2. The much U_1 led to the much current induced by the collector.
3. The excitation energy of a Neon atom was 15.0V in first excitation, 16.7 V in the second excitation, and 22.0 in the third excitation.

REFERENCES

- Department of Physics, Michigan Technological University, *Franck-Hertz Experiments with Neon and Mercury Atoms*
- R.D. White et al. 2012, Eur. Phys. J. D, 66, 117
- Gerald Rapio et al. 2006, Am. J. Phys. 74, 423x

Preliminary Study: Project Based Learning Design Development Based on Education for Sustainable Development (ESD) on The Topic of Petroleum to Strangthen High School Students' Scientific Literacy

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Purpose and Background

Education must be able to prepare students to be able to survive and contribute actively in various ways. One of them is that teachers must be able to teach students to learn to be responsible for themselves and future generations, based on the concept of sustainable development. This is in line with the statement of Perna et al. (2022) that promoting scientific literacy and sustainable development through future-oriented education is the most important thing. Programme for International Student Assessment (PISA) shows that the scientific literacy ranking of Indonesian students in 2018 is at number 69 out of 77 countries, with an average score of 396 out of a maximum score of 600, which means that the scientific literacy abilities of Indonesian students are still not good compared to other countries. A person's low scientific literacy ability also indicates their low concern for environmental issues (Suhartinah et al., 2019). Environmental damage arising from humans' lack of attention to environmental sustainability in the development process has led UNESCO (2005) to provide a solution through the concept of Education For Sustainable Development (ESD). The main goal of ESD is to form a young generation who is responsible for the future and has environmental awareness to prevent environmental damage. The contribution of chemistry education is considered to have a central role in ESD (Bradley, 2005; Burmeister & Eilks, 2012). This is based on the core role of chemical science and the chemical industry in sustainable development because many products in our daily lives are based on chemistry.

Materials and Methods

This research uses a type of evaluation research with a qualitative and quantitative approach that emphasizes phenomena in actual conditions using needs assessment (needs analysis). Needs analysis is a mismatch between a set of existing conditions and a set of desired conditions, usually carried out before the development of the required program. The targets of this research were seven high school teachers. The sampling used was purposive sampling to find out the true picture regarding didactic design needs and the availability of learning tools in high schools. The data obtained from this preliminary study are descriptions of learning conditions, learning designs used by Chemistry High School teachers in the independent curriculum to strengthen scientific literacy, as well as available learning resources, and PjBL learning tools based on Education for Sustainable Development. The instrument is a survey using Google-form which includes 12 closed and open questions. The 12 questions in the preliminary survey are described as follows.

Table. Question Variable and Indicators

Question Variables and Indicators
Kompetensi Literasi Sains
1. Ketersediaan sumber-sumber belajar yang menunjang kompetensi literasi sains
2. Kebutuhan dan alasan adanya sumber-sumber belajar yang dapat digunakan untuk mengembangkan kompetensi literasi sains
Hubungan ESD dengan SDG's
3. Konsep Education for Sustainable Development
Project Based Learning bermuatan ESD
4. Kebutuhan dan alasan pembelajaran Project Based Learning (PjBL) yang bermuatan Education for Sustainable Development.
5. Kebutuhan dan alasannya dibutuhkan sumber sumber pembelajaran yang menunjang PjBL dan bermuatan Education for Sustainable Development
Project Based Learning bermuatan ESD pada Materi Minyak Bumi
6. Kebutuhan dan alasan Project Based Learning (PjBL) yang bermuatan Education for Sustainable Development dalam materi minyak bumi
7. Kebutuhan dan alasan dibutuhkannya sumber belajar topik minyak bumi yang bermuatan ESD.

Result and Discussion

Based on the results of a preliminary survey using a qualitative descriptive method and a quantitative approach conducted with several chemistry high school teachers using Google-form, some information was obtained from the 12 questions contained in the survey. Questions in the survey included the scientific literacy competencies in high school, the relationship between Education for Sustainable Development and Project Based Learning, as well as the design of PjBL (Project Based Learning) with petroleum materials.

- **Scientific Literacy Competencies in High School**

The results of a survey regarding scientific literacy showed that all high school teachers were familiar with scientific literacy competencies. According to one high school teacher, "Scientific literacy skills are needed because they can improve one of the profiles of Pancasila students, namely critical thinking. Through scientific literacy, students train their ability to understand facts, identify and draw conclusions from activities and phenomena." Yuliati (2017) explains that the position of scientific literacy in learning has an important role for students to think more logically. Scientific literacy is applied in everyday life as scientific knowledge to identify, make decisions and draw conclusions related to interactions with science, the environment, technology and society. However, the availability of learning media to strengthen scientific literacy is not yet available. The results of the survey showed that 2 teachers answered that it was available, the other 4 were still not available.

- **The Relationship Between Education for Sustainable Development and Project Based Learning**

The survey results show that 5 out of 7 teachers know about education for sustainable development. However, all teachers agree with PjBL learning which contains Education for Sustainable Development. By combining the ESD concept with PjBL according to high school teachers, "PjBL which contains ESD will certainly empower students to change their behavior and take action for sustainable development by making the issue of sustainable development the theme of a project, so it is hoped that students can produce a project that is collaborative and beneficial to the wider community." This is in line with McKeown, (2002) that education is a tool to achieve sustainable development goals. Project-based learning model (PjBL) is a strategy, approach or learning method that aims to provide meaningful experiences for students and develop students' critical thinking skills through problem solving activities. With PjBL learning, students are able to solve problems using information obtained so as to form a concept by showing a solution to the problem (Furi, et al., 2018).

- **The Design of PjBL with Petroleum Materials.**

All teachers gave the opinion that they agreed with the concept of ESD on the topic of petroleum, one of the reasons was "Awareness of Environmental Impacts, learning resources that integrate ESD help students understand the impact of petroleum exploitation on the environment, such as water and air pollution, climate change, and ecosystem damage". This is in line with A.A Jayanti, et al (2024). Even though this lesson material is very relevant to everyday life, especially global climate change and the use of plastic, this lesson material is often abstract and challenging for students to directly observe. Learning media can help students overcome their inability to comprehend and comprehend chemical substances comprehensively..

REFERENCES

- Burmeister, M., &etc., 2012., Education for Sustainable Development (ESD) and Chemistry Education., *Chemistry Education Research and Practive.*, Vol.13
- OCED. (2017). PISA for Development Assessment and Analytical Framework. *OECD Publishing*, 1(1), 1–198.
- OECD, 2018., How Does PISA for Development Measure Scientific Literacy

Optical sensor

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Purpose and Background

The purpose of this experiment is to explore the basic characteristic of semiconductor lasers. We will measure and calculate the fraction of the linear polarization of the collimated laser beam by using a pair of polarizers and a photoconductor and determine the maximum value of the power increase per current increment of the collimated laser.

The photoconductor, the light-sensing device in this experiment, is made of semiconductor. When a photoresistor is exposed to light, its resistance decreases because the light energy causes electrons in the material to detach from their atoms, becoming free electrons, thereby increasing the material's conductivity. Consequently, when the light intensity is high, the resistance value of the photoresistor becomes very low.

In the semiconductor laser, the light-emitting device in this experiment, can combine electrons and holes to emit photons. The average fractional number of photons generated by an electron-hole pair is called the quantum efficiency.

Materials and Methods

The experiment is been separated into three parts :

- Experiment 1 : Light response of the photoconductor

First, without P2, adjust P1 so that the PC resistance reaches a minimum. Then, by rotating the angle of P2, plot the conductance values as the function of the relative angle between P1 and P2.

- Experiment 2 : The fraction of the linearly polarized laser light

The task in this part is to determine the fraction β of the laser light that is linearly polarized.

$$\beta = \frac{J_{max} - J_{min}}{J_{max} + J_{min}}$$

J_{max} and J_{min} are the maximum and minimum light intensity detected by PC while rotating P1. (From Malus' law, $J = J_0 \cos^2 \theta$.)

- Experiment 3 : The differential quantum efficiency of the collimated laser diode (CLD)

The task of this part is to characterize the relative light intensity versus the current through the CLD and determine the differential quantum efficiency η .

First, control the CLD current and measure the corresponding PC resistance values. Then, plot the PC conductance versus CLD current. Find the region around the maximum slope and plot the relative light intensity (J) versus CLD current (I) by using the result of experiment 1.

The maximum radiating of the CLD is assumed to be exactly $P_{max} = 3.0 \text{ mW}$. Calculate the maximum slope and transfer it into the value of $G \equiv \frac{\Delta P}{\Delta I} |_{max}$, and finally, determine the Differential Quantum Efficiency η of CLD by using the value of G obtained above. (Laser wavelength = 650nm. Plank's constant = $6.63 \times 10^{-34} \text{ J} \cdot \text{s}$. Light speed = $3 \times 10^8 \text{ m/s}$.)

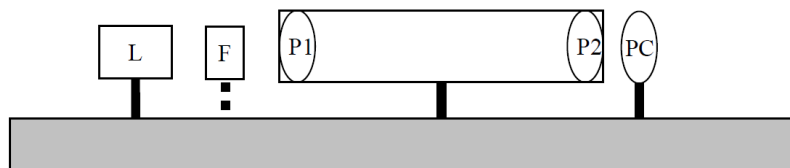


Figure 1. Experiment setup

Results and Discussion

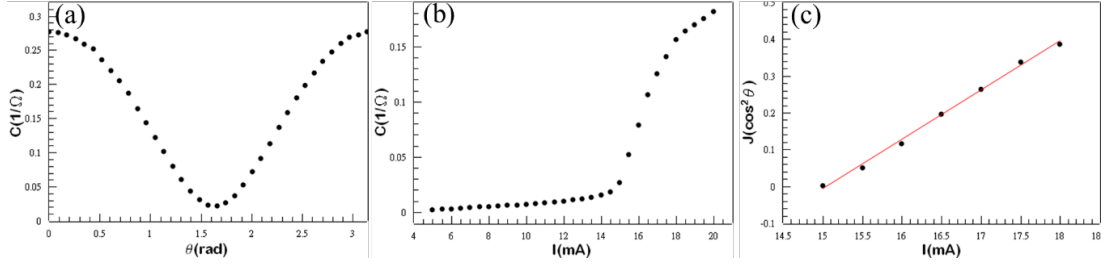


Figure 2. (a) The graph of PC conductance and the relative angles. (b) The graph of PC conductance versus CLD current. (c) The graph of relative light intensity (J) versus CLD current (I) around the maximum slope.

Figure 2a illustrates the characteristics of the polarizer, which only allows light of a specific polarization direction to pass through. Therefore, by rotating the polarizer P1, the polarization direction of the incident light can be determined.

The fraction β we calculate is 73.14%. Ideally, the value of β would be 100%. However, the surface of the polarizer reflects a portion of the incident light, and the polarizer itself also absorbs some of the incident light, so the actual value will be lower than 100%.

Figure 2b shows the graph of PC conductance versus CLD current. We extract the region with the maximum slope and plot it. Then, using Figure 2a, we transform the PC conductance into the relative light intensity and plot figure 2c, and we can use the slope to calculate $G = 0.919 \pm 0.27$ (W/A). Therefore, the

Differential Quantum Efficiency η is defined as $\eta \equiv \frac{\Delta N_{\text{photon}}}{\Delta N_{\text{electron}}} = \frac{\Delta P / E_{\text{photon}}}{\Delta I / e} = \frac{Ge\lambda}{hc} = 0.48 \pm 0.14$. As the external source injects electrons and holes into the device, they can combine to emit photons. Ideally, the combination of one pair of electron and hole can generate one photon. Realistically, there are also nonradiative processes through which an electron-hole pair recombines without generating a photon. Thus the number of photons generated is not equal to the number of electron-hole pairs recombined.

REFERENCES

National Taiwan Normal University, Experimental Physics II, Optical sensors

Revealing formative assessment to help students improve their learning in STEM activities

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Purpose and Background

Formative assessment (FA) is a key tenant of quality STEM/technology education, as it acknowledges student progress (ITEEA, 2004). Formative assessments are used during instruction to monitor student ability and adjust the presentation of content or instructional strategies as necessary. While many forms of formative assessment can be used for quick check-ins during all types of lessons. Educators should understand that assessment is a continuous process to discover students understanding and reshape students move forward with learning. This is the primary reason why the formative assessment has gained importance and started to be utilized in classroom settings (Masters, 2015). In a typical education system, which focuses to the grading as an indicator of achievement in the schools, most of the teachers lack information of assessing the learning outcomes of the integrated STEM curriculum. This approach results students to focus on test scores instead of focusing on develop learning strategies through self-improvement and understanding. teachers either do unplanned assessments or they use the results of the assessments as feedback to their own teaching process. (Ceran et al, 2021) In STEM activities, the correlation between engineering design and scientific inquiry is often viewed as a unidirectional system. STEM education encompasses problem-solving tasks associated with the design process and scientific inquiry, effectively integrating insights from various STEM disciplines to cultivate a holistic skill set relevant to the STEM domain. A thorough understanding of the core principles of each subject is essential for leveraging knowledge effectively.

The goal of formative assessment is to enhance and advance each student's learning. It has to do with how I observe, acknowledge, interpret, and react to what their students are learning. Nevertheless, little is known about the essential components of FA in STEM education activities. This action research is to examine how I use FA to enhance students' learning during integrated STEM activities. The participants were forty eleven-year-old students taking chemistry classes.

Materials and Methods

Three types of data were gathered: reflections from teachers, students, and classroom observations. An inductive procedure was utilised to analyse the data.

Results and Discussion

The findings showed that I thought one of the most crucial FA learning objectives was the STEM learning objectives, such as students' scientific explanation. I engaged the students aware of what was expected of them, which helped them see where they fit in. To assess the students' thinking, the teacher used evidence that comes up during STEM lessons and questions. After interpreting the evidence, the students were asked to respond thoughtfully. Additionally, classroom discussions aid in students' understanding of their learning path. There is a discussion of how formative assessment can help with other STEM learning objectives.

REFERENCES

- ITEEA. (n.d.) K-2 engineering design process. Retrieved from <https://www.iteea.org/File.aspx?id=114271&v=2634d8ad&source=generalSearch>
- Masters, G. (2015). Rethinking formative and summative assessment. *Formative assessment. Professional Practice*. Retrieved from <https://www.teachermagazine.com.au/columnists/geoff-masters/rethinking-formative-and-summative-assessment>.
- Ceran, Esra & Doğan, M & Kertil, Mahmut & Akgül, Mustafa. (2021). Exploring Teachers' Formative Assessment Practices in the Context of Integrated STEM Education. 10.13140/RG.2.2.33677.05609.

DIFFERENCES IN ENGLISH VOCABULARY LEARNING STRATEGIES BETWEEN HIGH & LOW ACHIEVERS

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Purpose and Background

Vocabulary learning has always been one of the most important yet difficult parts of learning English since there are no standard steps or processes that can be followed. Even as an English major, I find it difficult to acquire a new word solely by memorizing it without using strategies. Furthermore, if we know how English learners at different levels utilize different strategies to learn a word, it would be beneficial not only for English teachers to adopt various teaching methods but also for students themselves to find suitable strategies, thus, vocabulary can be memorized more efficiently.

The purpose of this research is to find whether there are similarities or differences between high and low English achievers in terms of English vocabulary learning strategies; on top of that, trying to see whether we can find any educational implications from this research.

Materials and Methods

This paper takes a quantitative research approach. By using a questionnaire survey, I asked 35 high achievers and 34 low achievers about their vocabulary learning strategies. After collecting the data, I have listed the top five most commonly used strategies of high and low achievers individually. Also, based on the participant's English test results (GEPT, TOEIC, TOEFL, or IELTS), I use CEFR standards to categorize high and low achievers. For high achievers, their level should be at least above CEFR B2 (B2, C1, C2); for low achievers, it will be below B1 (B1, A2, A1).

The questionnaire was designed based on research from Bennett (2006) and 廖玉霜 (2012), which contained five domains: (A) Determination strategy, (B) Social strategy, (C) Memory strategy, (D) Cognitive strategy, and (E) Metacognitive strategy. The questionnaire is presented in Likert scales, in which participants will evaluate their strategies usage and choose from never to very often, indicating how frequently they use a certain strategy to learn vocabulary. For each option, I gave a certain score to it for convenience, for instance, choosing never will get 1 point and very often will get 5 points. Finally, I calculated them and ranked every strategy from the highest scores to the lowest. Also, compared the similarities and differences between high and low achievers as well.

	I do this...					I think this is...						I do this...					I think this is...				
	never	seldom	sometimes	often	very often	not useful	not sure if useful	quite useful	very useful	extremely useful		never	seldom	sometimes	often	very often	not useful	not sure if useful	quite useful	very useful	extremely useful
When I find a new English word that I don't know, I...	頻りに単語を見つけたとき、私は...										When I want to remember new words and build my vocabulary, I...	新しい単語を覚える、辞書を調べたりしたい時、私は...									
A1 Check the new word's form (prefix, suffix, etc.) 新出単語の語形(接頭辞、接尾辞、等)を確認する											D1 Repeat the words aloud many times. 新しい単語を頻りに繰り返す										
A2 Look for any word parts that I know (impossible, colorful) 単語の中で知っている部分を探して覚える											D2 Write the words many times. 新しい単語を頻りに書く										
A3 Break the word in an appropriate word (spoon, スプーン) カタカナの音節として日本語でも使われているか探してみる											D3 Make lists of new words. 新しい単語のリストを作る										
A4 Use any pictures or gestures to help me guess. 絵、イラスト、手書きのジェスチャーが助けになる											D4 Use flashcards to record new words. 単語カードを作る										
A5 Guess from context. 文脈から推測する											D5 Take notes on spelling of new words or class. 新出単語の綴りやクラスをノートに取る										
A6 Use a Japanese-English dictionary. 日英辞書を使う											D6 Put English labels on physical objects. 英語のラベルを物理的なものに貼る										
A7 Use an English-English dictionary. 英英辞書を使う											D7 Keep a vocabulary notebook. 単語ノートを作る										
D1 Ask the teacher to give you the definition of a sentence. 先生に文章の意味を教えてください											D8 Use English-English media (songs, movies, television, etc.) 英語のメディア(音楽、映画、テレビ番組、等)を使う										
D1 Ask your classmates for the meaning. クラスメイトに意味を聞く											D9 Get words of the word lists. 単語リストから単語を覚える										
											D10 Study new words daily. 毎日新しい単語を覚える										

Table 1&2: Examples of the questionnaire.

Results and Discussion

Knowing how different levels of learners would use different strategies can be constructive for teachers to modify their teaching methods. The results show that among the top five commonly used strategies, three are identical for high and low achievers: (A) Guessing from the context, (C) Studying the sound of the word, (D) Taking notes or highlighting new words in class. Besides, there are no Social strategies shown in either achiever. As for the differences, Using English language media to learn new words is in third place among high achievers but not low achievers. Overall, both achievers are prone to use the Memory strategy compared to the other four, and Metacognitive strategies are used frequently and favored by high achievers (overall higher scores) but not low achievers (lower scores).

The results are surprising since they reflect not only how high and low achievers study but also how students in Taiwan study vocabulary generally. Firstly, the overall usage of Memory strategies indicates how our traditional teaching method emphasizes using it. However, it is not very effective since solely memorizing will not lead to successful vocabulary acquisition, even memorizing from different aspects like collocations, synonyms, and registers.... Learning new words also requires adequate exposure, which is why high achievers use more metacognitive strategies. Using English media, testing oneself, and studying new words many times help strengthen memory, thus, when finishing a lesson, we should not just leave all the vocabulary behind. Instead, we should keep reminding the previous words in the new lessons and give homework or tests that include previous words.

Second, the usage of Social strategies is astonishingly low in both achievers' cases (Including asking teachers or peers if he or she does not know a word). I suppose it is probably due to the study attitude of Asians, which are traditional and take learning as a competition, causing students to be shy and introverted to ask questions. Nevertheless, an authentic, cooperative communicative learning environment is actually beneficial for language learning (Richards. 2006). As an English Teacher, we should also encourage students to take vocabulary learning as an interesting thing rather than a competition. After all, while testing vocabulary knowledge is a way to assess students, if they cannot use it in real-life communication or produce it naturally, it is not a successful vocabulary learning.

In the research, we can find some good strategies that are used by high achievers, still, our vocabulary learning can be improved more by adopting various strategies. Social strategies are the ones that are rarely used but are crucial in learning new words and Metacognitive strategies are frequently used by high achievers but rarely low achievers. By knowing how learners acquire new words, we can improve not only our teaching but also learner's English proficiency.

REFERENCES

- P. Bennett. (2006). An Evaluation of Vocabulary Teaching in an Intensive Study Programme.
J. Richards (2006). Communicative Language Teaching Today.
廖玉霜 (2012)。應用多元化字彙學習策略於建構自我管理之英文學習環境。

IDENTIFICATION OF THE INDONESIAN WATER MASS DUE TO INDONESIAN THROUGHFLOW IN 2018

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Purpose and Background

Indonesian Throughflow (ITF) is one of main route in Indonesian waters, as a part of global circulation, thermohaline. The water mass characteristics that flow with the ITF is important to be identified, as it directly facilitates the exchange of several properties of sea water, including heat, salinity, temperature, and fresh water budget) and plays a role in maintaining heat balance and water volume between the Pacific Ocean and the Indian Ocean (Gordon, 2005; Feng et al., 2018).

In this research, water mass identification by TS (temperature-salinity) diagram will be carried out at several points at the ITF route location to see the changes in water mass due to the input from ITF. Water column stability calculations were also conducted to see its relationship with the water mass on the ITF route. The analysis begins by looking for temperature and salinity data, then calculating the Brunt Väisälä frequency and identifying the water mass.

Materials and Methods

The data used in this study is temperature, salinity, and density at 8 points around Makassar Strait, Lombok Strait, and the southern part of Banda sea (Figure 1). The data obtained from CTD data that available at World Ocean Database.

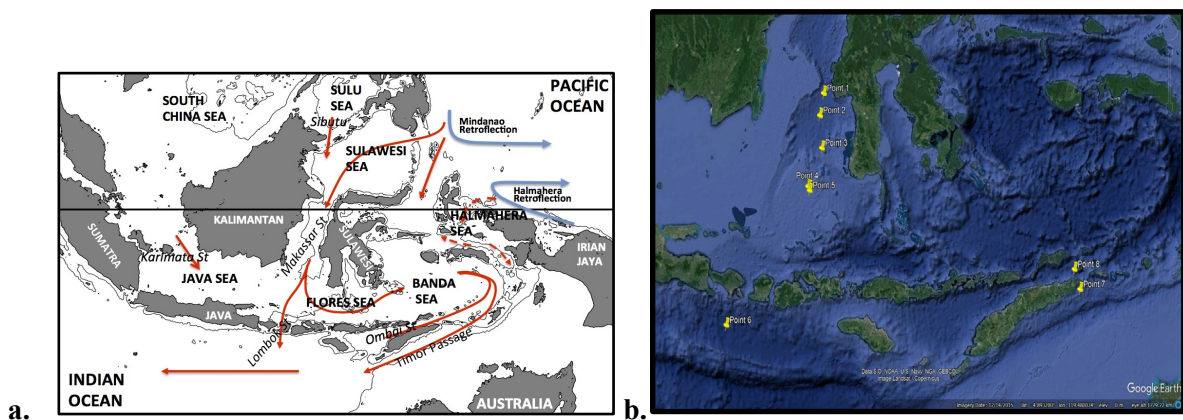


Figure 1. a. Indonesian Throughflow (red line)(source: <http://national-oceanographic.com/article/mengenal-arus-lintas-indonesia-ITF>), and b. The eight (8) locations of data observed

Result and Discussion

The Sulawesi Sea and the Makassar Strait are passed by the ITF (Figure 1.a) (Ffield and Gordon, 1992). Previous research stated that there was a water mass transformation along this route (Hautala et al., 1996 in Hatayama, 2004). An example of the transformation that occurs has been proven by Ffield and Gordon (1992) is the salinity value at the entrance to the ITF route which is maximum in the thermocline layer and then disappears along the western route of the ITF route. The characteristics of this water mass can be identified with a TS diagram which will show the relationship between temperature and salinity (TS) with density and depth from the data taken (<https://curry.eas.gatech.edu>).

The transformation of water masses that occurs along the Indonesian cross-flow route occurs due to the strong vertical mixing that occurs in Indonesian waters (Hatayama, 2004). The cause of vertical mixing is due to instability of the water column and varying topographic configurations of the bottom of the waters (Pickard and Emery, 1978). The instability of the water column can be seen from the results of Brunt Väisälä's frequency calculations.

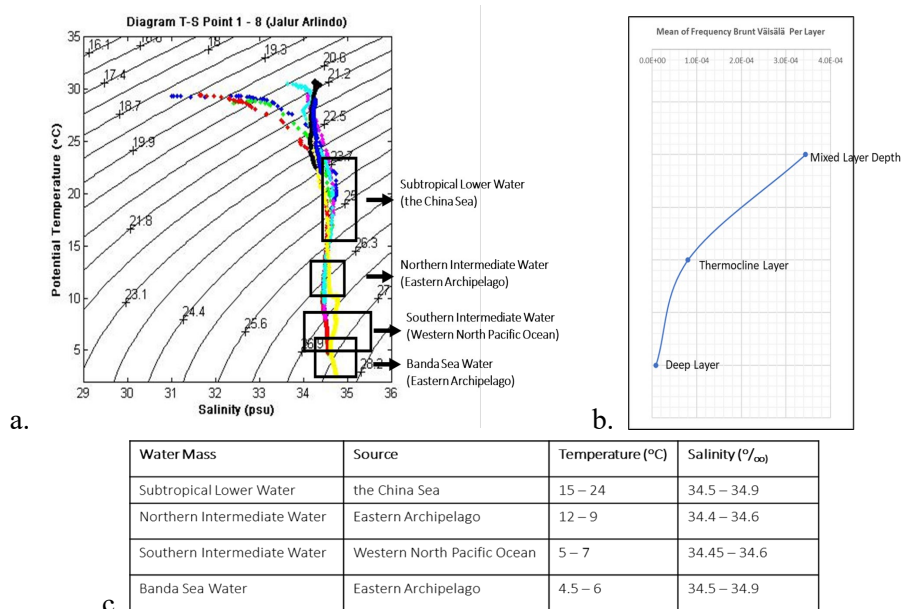


Figure 2. a. TS Diagram b. Brunt Väisälä Frequency and c. The water mass characters according to TS Diagram

The water masses found at observation points along the ITF route are: Subtropical Lower Water, Northern Intermediate Water, and Southern Intermediate Water. There are characteristics of the Banda Sea water mass at point 6 (south of Lombok Island). Even though they are in different locations, the water mass looks quite uniform (except in the mixed layer depth layer).

The highest stability of the water column is in deep water, while the lowest stability is in the mixed layer depth layer. The waters of the Savu Sea (points 7 and 8) have lower stability than other locations, confirmed by the results of plots of temperature, salinity and density data in this area which have small changes with depth.

REFERENCES

Feng, M., Zhang, N., Liu, Q., dan Wijffels, S. 2018. The Indonesian throughflow, its variability and centennial change. *Geosci. Lett.*, 5(3), 1-10.

Fofonoff, N.P., Millard Jr, R.C. 1983. “Algorithms for computation of fundamental properties of seawater”. UNESCO Tech. Pap. in Mar. Sci, 44, 25- 28.

Gordon, A.L. 2005. Oceanography of the Indonesian Seas and Their Through-flow, *Oceanograp.*, 18:14-27.

Gordon, A. L., Susanto, R. D., Ffield, A., Huber, B. A., Pranowo, W., dan Wirasantosa, S. 2008, Makassar Strait Throughflow, 2004 - 2006, *Geophysical Research Letter*, doi:10.1029/2008GL036372.

Gordon, A. L. 1986. Interocean exchange of thermohaline water. *J. Geophys. Res.*, 91:5037-5046.

<https://curry.eas.gatech.edu>

COMPARING APPROACHES IN TEACHING GEOMETRY FOR LOWER SECONDARY SCHOOL STUDENTS IN JAPAN & VIETNAM

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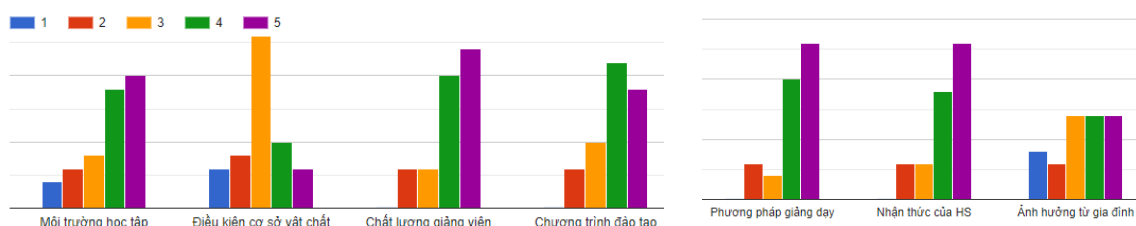
Purpose and Background:

The project is carried out to study about how to implement geometry teaching in Japanese intermediate schools and improve teachers' geometry teaching methods in the digital transformation period. Specifically, through its approach to geometry, the project focuses on providing an overview, including fundamental concepts, principles, and rules regarding Geometry and so forth, to foster the desire and attitude in students to deepen their understanding of the basic concepts and properties of plane and solid figures and to use them in reasoning and making judgments. Furthermore, the research accentuates helping teachers create a practical learning environment where students can experience the joy of mathematical activities and the values of mathematics - what is aiming for after innovating Japan's education program in 2011.

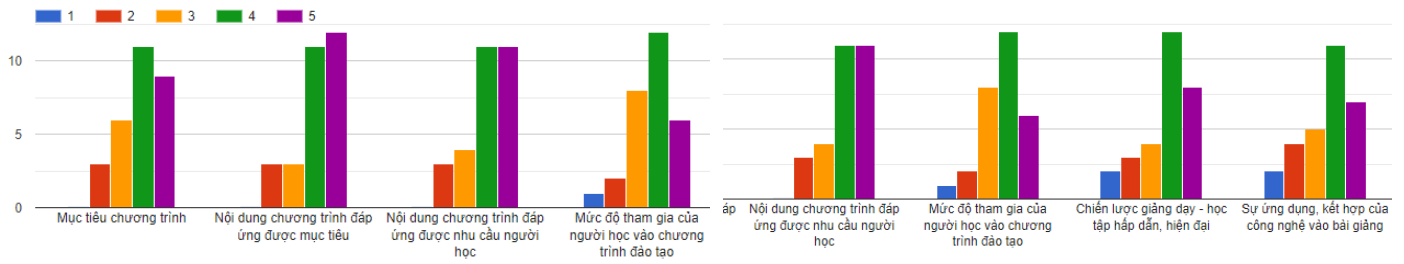
Materials and Methods:

At the initial phase, the project will be conducted remotely in Hanoi, Vietnam. The team's first focus is to analyze innovations in the goals, content, and teaching methods of Geometry in the 2011 Education program. Specifically, the team aims to explain and evaluate the importance of Japan's program reform and evaluate the factors that determine the effectiveness of the Geometry Figures teaching process at secondary schools. The succeeding phase of the project is: Direct implementation in Vietnam. The research will be developed in two methods, accounting for two subjects: conducting a survey of students at lower secondary schools using a Google Forms multiple-choice questionnaire; interviewing teachers using a questionnaire form to fill in specific answers. In addition, the team will discuss about the curriculum and textbooks at the schools to differentiate the two learning programs in Vietnam and Japan. After observing, researching, and collecting sufficient data during the student's learning process, the data will be analyzed in the form of numbers, charts, etc. The research will conclude to find optimal solutions to improve the quality of teaching Geometry Figures in secondary schools. Finally, the results drawn from the project will be posted on the personal page and related platforms within the University of Education - Hanoi National University, receiving contributions and comments from the community to continue editing and perfecting.

Results and Discussion



As we can see from this chart, teaching methods, student's awareness, and teacher's quality are important factors that determine student's geometry learning outcomes. This is an easy-to-understand result because teachers, as instructors and cheerleaders, will guide learners on methods and ways to learn geometry effectively and appropriately for each suspect.



For teaching curriculum, the program needs to meet the goals and needs of learners. Nowadays, in the era of technological development, teachers need to take the learner as the main motivation for teaching.

Conclusion:

In summary, the experiment's results suggest that the impact of many factors on student's geometry learning. Further research, including studies on the specific problem about learning geometry present in the substance, as well as student's test about geometry would provide a deeper understanding.

References.

https://ncm.gu.se/media/kursplaner/andralander/Japanese_COS2008Math.pdf

Link:

https://www.canva.com/design/DAGJnhZhVUA/Ye4vI5nc7gdeb5fq4itO_A/edit?utm_content=DAGJnhZhVUA&utm_campaign=designshare&utm_medium=link2&utm_source=sharebutton

Applications of sound wave analysis in identifying frog's species

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Purpose and Background

When we think about physics, we would think about numeral, calculation, formula, theory, problem-solving, inanimate objects and it is distant. Traditional instruction in physics courses focused on problem-solving and ignores important procedural goals and is usually concerned mostly with mathematical operations (Dufresne and Gerace, 2004 as cited in Ceberio et al., 2016) and usually leads to poor achievement in terms of developing skills and procedures associated with problem-solving (Ceberio et al., 2016). Therefore, we need to apply physics concepts to broaden other subjects and show the importance of physics. Applying physics concepts to broaden other subjects and demonstrate the importance of physics can help students learn physics in a meaningful way.

Previous research studies have applied physics concepts to other fields of study. For examples, Jaromír and colleagues (2013) describe the application of acoustic emission (AE) recording the activity of bee colonies in different seasons. This information will provide the basis to create a more comprehensive view on problems of the honey bee and information about the activities of bees gives a comprehensive perspective on using of AE in the field of biological research. Schmid and Bogner (2019) describe the application of a structured inquiry-based lesson integrates the subjects of biology and physics for 15 years old students. They learn in hands-on experiments about sound formation and properties; the human outer, middle, and inner ear; and limits to human hearing, both natural and resulting from damage to the inner ear. The research found benefit of integrating both physics and biology concepts lead to long-term retention of content knowledge and reduce the gender gap in science subjects. It is evident that integrating different disciplines can benefit science learning.

This study, therefore, applies the concept of sound in physics to study calls of frogs in the same species but compare with different regions. Mukhlesur's Narrow-mouthed Frog, *Microhyla mukhlesuri* is one of the most common amphibian species in Thailand. We need fundamental information of them and one of the most important information is advertisement call, that used in breeding communication and is specific in each species. Therefore, the purposes of this study are to study advertisement call structures of *M. mukhlesuri*, to compare those difference among populations and adapt the knowledge or analysis solution for physics teaching.

Materials and Methods

We collected *M. mukhlesuri* calling samples from 13 males in different part of Thailand including Chiang Mai represent the North of Thailand (x5 males), Saraburi represent the Central region of Thailand (x6 males) and Nakhon Si Thammarat represent the South of Thailand (x2 males). Moreover, we collected the data of SVL, weight, temperature and field elevation.

We considered 6 parameters of frog calling including dominant frequency (DF), call duration (CD), call interval (CI), number of notes (NN), note duration (ND) and note rate (NR) (Köhler et al., 2017) and analyze all the parameters of by using RavenPro 1.6. After that, we get the data of each parameter.

We describe advertisement call through mean \pm SE in each parameter and do statistical comparison among populations by using Kruskal-Wallis H test and Post Hoc Multiple Comparison Test (mean rank comparison). We use IBM SPSS Statistics Version 25 for doing all the statistical comparison.

Our solution to adapt sound wave knowledge to lower secondary school student instructions is proposal that need to develop in the future.

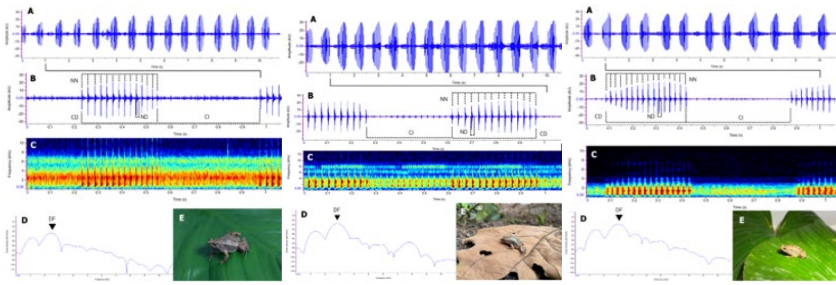


Figure 1 The advertisement call analysis from every region in Thailand

Results and Discussions

The results present that the advertisement call structure of Mukhlesur's Narrow-mouthed Frog from three regions have DF $2,864.8411 \pm 0.2307$ Hz, CD 0.3223 ± 0.0000347 seconds, CI 0.4160 ± 0.000133 seconds, NN 14.1744 ± 0.001061 notes, ND 0.008645 ± 0.000000119 seconds and NR 43.9840 ± 0.002146 note/second. Then, we compare difference among populations and found that the advertisement call of population from Chiang Mai is significantly different from Saraburi and Nakhon Si Thammarat. (Kruskal-Wallis H test, $P < 0.05$) However, if there are more frog samples from other areas, it would be better to show the differences among populations. The results of this study reveal that advertisement call study is fundamental knowledge to identify the species of anurans and is important to biodiversity study of anurans in Thailand and we can use this knowledge in order to conservation in the future.

Implication for Physics Learning

We can adapt this knowledge to lower secondary school student instructions to broaden their knowledge. For examples, we can use Spectrogram to show the relationship between frequency over time and we can show the benefits of sound wave components such as frequency and amplitude.

REFERENCES

- Ceberio, M., Almudi, J., M. and Franco, A. (2016). Design and Application of Interactive Simulations in ProblemSolving in University-Level Physics Education. *J Sci Educ Technol*, 25, 590–609. 10.1007/s10956-016-9615-7
- Jaromír, T., Michal, Č., Antonín, P., Petr, D. (2013). Application of the selected physical methods in biological research. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 10.11118/ACTAUN201361010215
- Köhler, J., Jansen, M., Rodríguez, A., Kok, P.J.R., Toledo, L.F., Emmrich, M., Glaw, F., Haddad, C. F.B., Rödel, M.O. and Vences, M. (2017). The use of bioacoustics in anuran taxonomy: theory, terminology, methods and recommendations for best practice. *Zootaxa*, 4251, 1–124. 10.11646/zootaxa.4251.1.1
- Schmid, S., Bogner, F., X. (2019). Hearing: An Inquiry-Based Learning Module Linking Biology & Physics. *American Biology Teacher*, 10.1525/ABT.2019.81.7.485

Dual Gate Bottom Contact MoS₂ FET with van der Waals High-k Dielectrics

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Purpose and Background:

Transition metal dichalcogenide (TMD) materials are known for their layered structure, mechanical flexibility, high carrier mobility, direct bandgap in monolayers, and light-sensing properties. The general formula for this material family is MX_2 , where M represents a transition metal (such as Mo, W, or Te) and X is a chalcogen (such as S, Se, or Te). Monolayer TMDs have been proven to be excellent candidates for 2D semiconductor materials used in logic gates and photodetectors. However, the high-temperature deposition processes for oxide dielectrics in current industrial practices can cause thermal damage to TMDs. Therefore, identifying a low-growth temperature dielectric with a high dielectric constant and van der Waals (vdW) interface insulator is crucial for development.

Materials and Methods:

Sb₂O₃ meets these requirements, with a high dielectric constant of 9.73, a low growth temperature of around 450°C, and thermally evaporated lattices featuring vdW interfaces in the 110 lattice direction[1]. The transfer process, essential for fabricating 2D material devices, inevitably leaves polymer residues on the surface in both wet and dry transfer methods[2]. To address this, we utilized a bottom contact approach instead of the conventional top contact. This method ensures that residues, such as PMMA from wet transfers, only adhere to the top surface, thereby creating a Fermi-level pinning-free metal contact[3]. Additionally, the contact metal work function decreases in the bottom contact configuration, which is beneficial for intrinsic n-type semiconductors like MoS₂. For instance, the low work function of contact metals, such as bismuth, can facilitate Ohmic contact in n-type semiconductors.

Results and Discussion:

In this study, we used the CVD method to grow continuous monolayer MoS₂. We then transferred it onto a SiO₂/Si chip with pre-patterned source and drain bismuth electrodes at the same altitude as the Sb₂O₃ middle layer, which serves as the bottom gate. Subsequently, we employed thermal evaporation to deposit the top gate dielectric Sb₂O₃ on MoS₂, followed by transferring graphene as the top gate electrode to avoid thermal damage to the 2D materials. Cross-sectional tunneling transmission electron microscope (TEM) images revealed vdW interfaces between MoS₂ and Sb₂O₃. Back gate I_{SD} - V_{BG} results for the bottom contact device showed n-type doping compared to the top contact device, indicating that Sb₂O₃ can diffuse n-type dopants into MoS₂. The bottom contact I_{SD} - V_{SD} curve also demonstrated Ohmic contact. Dual-gate experiments showed that with channel enhancement from the back gate, the top gate could induce more carriers and lower the subthreshold swing (S.S.). This process addresses the Fermi-level pinning issue and offers a low-temperature back-end solution. We believe this work significantly advances the application of 2D materials.

REFERENCES:

- [1] Gwan-Hyoung Lee et. al. ACS Nano 2024, 18, 13098–13105
- [2] Vincent Tung et. al. ACS Nano 2024, 18, 23, 14841-14876 (Review)
- [3] Won Jong Yoo et. al. Adv. Electron. Mater. 2021, 2001212

Keywords: MoS₂, Sb₂O₃, bottom contact, doping, dual gate

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Fabrication of Flexible Perovskite Solar Cells on Transparent Substrates

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Purpose and Background

Perovskite solar cells (PSCs) are a new generation of solar cell research due to their outstanding power conversion efficiency (PCE). Perovskite solar cells utilize a thin film, called perovskite, which has an ABX_3 crystal structure to absorb light. This film is approximately 500 nm thick and can absorb light efficiently, resulting in perovskite solar cells achieving more than 25% power conversion efficiency in the past decade, while silicon solar cells have a power conversion efficiency of 26.1% [1]. Perovskite solar cells have many advantages over silicon solar cells, such as high flexibility and inexpensive raw materials. They can be coated onto lightweight plastic substrates for fabrication of flexible perovskite solar cells (FPSCs), making them suitable for various applications such as solar vests, solar rechargeable backpacks, solar leaves, flexible solar panels, flexible solar cells for space applications [2]. These outstanding features make PSCs an attractive option for large-scale and low-cost commercial deployment of solar energy in the near future.

Materials and Methods

The flexible transparent substrates were washed in isopropanol for several seconds and dried with nitrogen airflow. Thin films with four layers were sequentially coated on the substrates to fabricate flexible perovskite solar cells [3]. The electron transport layer (ETL), SnO_2 , was coated on the substrates by spin-coating at 3,000 rpm for 30 s. The SnO_2 films were then dried at 150°C for 30 min and cleaned for 15 min using an UV-ozone cleaner. The halide perovskite solution was then prepared. The perovskite solution was then coated by spin-coating process with two steps: (1) spinning at 500 rpm for 5 s and (2) spinning at 3000 rpm for 30 s. The anti-solvent (250 μL) was suddenly dropped onto the substrates at approximately 5 s before the end of the spin-coating process. To form a crystalline perovskite layer, the coated substrates were annealed at 70°C for 5 s and 100°C for 45 min. The hole transport layer (HTL), Spiro-OMeTAD precursor, was deposited on the perovskite layer by spin coating at 6000 rpm for 30 s. Finally, an Ag back electrode was deposited on the HTL layer using thermal evaporation technique.

Results and Discussion

The efficiency of solar energy conversion into electrical energy (power conversion efficiency: PCE) was measured by a solar simulator which was calibrated to ensure the light intensity is equal to 1 Sun. An image and a photocurrent density-voltage (J-V) curve of a flexible perovskite solar cell with the structure of PET/ITO/ SnO_2 /perovskite/spiro-OMeTAD/Ag are shown in Fig. 1. The results demonstrated that the device has the power conversion efficiency of 12% with a short current density (J_{sc}) of 17 mA/cm^2 , an open-circuit voltage (V_{oc}) of 1V, and a fill factor (FF) of 70%, which is comparable with the recently reported flexible perovskite solar cells.

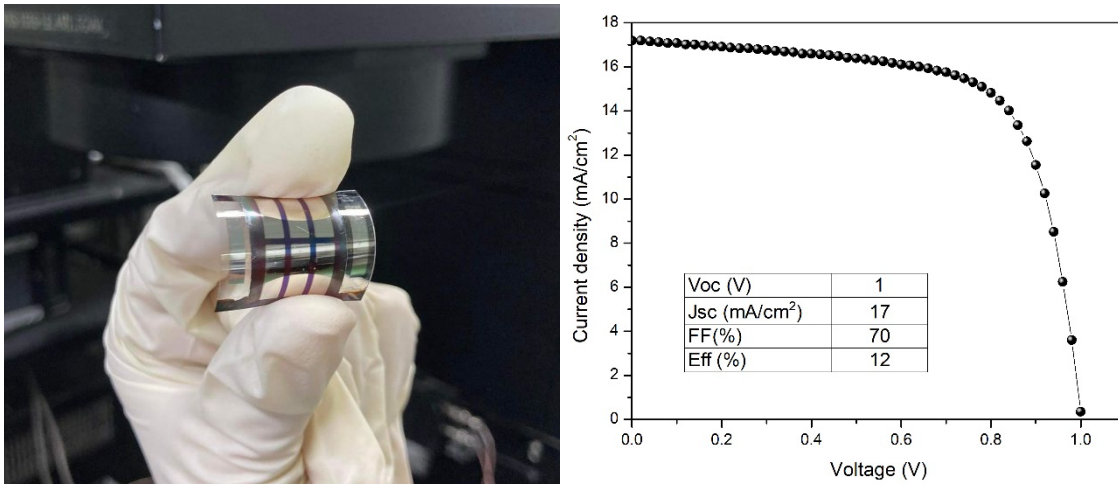


Figure 1: An image and a photocurrent density-voltage (J-V) curve of a flexible perovskite solar cell (FPSC).

REFERENCES

- [1] Best Research-Cell Efficiency Chart. (n.d.). Photovoltaic Research | NREL. <https://www.nrel.gov/pv/cell-efficiency.html>
- [2] Jiang, Y., & Qi, Y. (2021). Metal halide perovskite-based flexible tandem solar cells: next-generation flexible photovoltaic technology. *Materials Chemistry Frontiers*, 5(13), 4833–4850. doi: 10.1039/d1qm00279a
- [3] Sanglee, K., Sakunkaewkasem, S., Piromjit, C., Nukunudompanich, M., Kanjanaboos, P., Chuangchote, S., Suttiruengwong, S., Sahasithiwat, S., Limmanee, A., & Krajangsang, T. (2023). Intermediate matching layer for light-induced performance and removable clip-on applications of four-terminal perovskite/silicon heterojunction tandem solar cells. *Solar Energy Materials & Solar Cells/Solar Energy Materials and Solar Cells*, 253, 112235. doi: 10.1016/j.solmat.2023.112235

Conceptual Exploration on Metaverse Education: A Focus on the User Experience

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Purpose and Background:

The purpose of this research is to explore and optimize user experiences within metaverse education. The metaverse is a virtual environment that allows the users, often referred to as avatars, to interact with each other. In the context of the field of education, the metaverse allows students to have a “cyber-physical” experience with learning (Salloum et al., 2023). The notion of metaverse education presents an opportunity to blend traditional academic experience with digital information, and this digital information can take the form of a replication reality, essentially a digitalization of the real world. Alternatively, it can manifest into a virtually created environment, or even a fusion of elements from the real and digital-generated constructs for users to have different experiences.

User experience often relates to the perceptions of expectations associated with the use of a product, system, or service, which encompasses both personal and emotional aspects (Morales et al., 2023). It is often a subjective domain that can evolve throughout the stages of product or service usage - before, during, and after interaction (Zarour & Alharbi, 2018). As a result, how users perceive such technology has been deemed crucial according to previous studies. The existing body of research on metaverse education has predominantly concentrated on technologies and digital infrastructure. Nevertheless, there’s still an underexplored realm where user experiences remain to be fully understood and optimized. Therefore, this research will place its emphasis on exploring the perceived importance that scholars need to consider when designing a metaverse educational space.

Materials and Methods:

This research uses a quantitative approach to provide a preliminary analysis of students’ perceived importance of metaverse education on the user experience aspect. A 5-point Likert scale online questionnaire was created and distributed to undergraduate students at a public university in China, where 1 indicates “not very important” and 5 indicates “very important”. The questionnaire was modified based on the usability test items by Lee and Gu (2022) and falls under 5 categories, each containing 1-3 questions. The categories are: 1) User Control; 2) Information Architecture; 3) Graphic User Interface; 4) Contents; 5) System Support and Setting.

Results and Discussion:

The analysis of the mean scores for the five components of the metaverse education user experience reveals insights is presented in table 1, of a total of 90 valid responses. Overall, the mean score is 3.58 with a standard deviation of 0.48, suggesting a moderate level of perceived importance for user experience. When considering each component in particular, "User Control" received the highest mean score of 4.15 with a standard deviation of 0.48, indicates a high perceived perception of enhancing user control elements. For instance, the metaverse platform needs to be easy for users to understand, learn, and interact with each other. Moreover, the mean score of 3.88 with a standard deviation of 0.50 also indicates a high perceived importance of information architecture, such as whether the menu items are logically arranged and the clarity of labels and icons. For graphic user interface with a mean score of 3.02, this suggests a moderate level of perceived importance for metaverse education environment, regarding the suitability for the metaverse space for

educational purposes. For contents and system support, received a 3.62 and 3.22 mean score, respectively, suggests that high perceived importance of ensuring the contents are consistently organized and also system running smoothly for the users.

Table 1. Mean and Standard Deviation for Perceived Importance of Metaverse Education

Category	Mean	Standard Deviation	Level
User Control	4.15	0.48	High
Information Architecture	3.88	0.50	High
Graphic User Interface	3.02	0.45	Moderate
Contents	3.62	0.51	High
System Support and Setting	3.22	0.47	Moderate
Overall	3.58	0.48	Moderate

Note: 1.00-1.80 = Lowest, 1.81-2.60 = Low, 2.61-3.40 = Moderate, 3.41-4.20 = High, 4.21-5.00 = Highest (Best & Khan, 2003)

The COVID-19 pandemic has disrupted traditional learning methods and acted as a catalyst for metaverse education development. This shift is revolutionary as it can address accessibility for those who have difficulties reaching schools. This research aims to provide a glimpse of potential aspects that researchers need to be mindful of when they incorporate metaverse within the context of education.

REFERENCES

- Best, J. W., & Kahn, J. V. (2003). *Research in education* (9th ed.). Allyn and Bacon.
- Lee, H. J., & Gu, H. H. (2022). Empirical research on the metaverse user experience of digital natives. *Sustainability*, *14*(22), 14747. <https://doi.org/10.3390/su142214747>
- Morales, J., Cornide-Reyes, H., Rossel, P. O., Sáez, P., & Silva-Aravena, F. (2023). Virtual reality, augmented reality and Metaverse: Customer experience approach and user experience evaluation methods. literature review. *Social Computing and Social Media*, *554–566*. https://doi.org/10.1007/978-3-031-35915-6_40
- Salloum, S., Marzouqi, A. A., Alderbashi, K. Y., Shwede, F., Aburayya, A., Saidat, M. R. A., & Al-Marroof, R. S. (2023). Sustainability Model for the Continuous Intention to Use Metaverse Technology in Higher Education: A Case Study from Oman. *Sustainability*, *15*(6), 5257. <https://doi.org/10.3390/su15065257>
- Zarour, M., & Alharbi, M. (2018). User experience framework that combines aspects, dimensions, and measurement methods. *Cogent Engineering*, *4*(1), 1421006. <https://doi.org/10.1080/23311916.2017.1421006>

Integration of Smartphone into Physics Teaching—Understanding the Progress and Application of Acceleration Measurement

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Purpose and Background

In today's classrooms, nearly every student owns a smartphone, often let students be distracted. However, rather than viewing smartphones as adversaries, why not turn them into allies to enhance learning efficiency? By integrating smartphones into classroom learning, we aim to use visual programming language like APP Inventor to help students understand app operation and sensor functionality. Through inquiry-based experiments using Phyphox, students will explore the world of physics using their smartphones.

Materials and Methods

This course is designed for seventh-grade students (12~13 years old), focusing on a common and easily observable physics topic in daily life—acceleration. Students will first learn basic programming logic using code.org and gain a basic understanding of AI2 via a graffiti software for app developing. They will then be guided to explore functions relevant to acceleration measurement such as data input, plotting, and result output. Finally, using Phyphox, students will engage in inquiry-based experiment about the acceleration measurement via their smartphones.

Topic	Time Duration (mins)
Introduction to Block Programming : code.org	60
Introduction to AI2 : Graffiti Program	90
Acceleration Measurement : Result and Plotting	90
Acceleration Measurement : Result Output	90
Thesis Experiment w/ Phyphox	90
Data Analysis	90

Table 1 The syllabus for this course

Results and Discussion

By integrating smartphones into teaching, this course provides students with a practical tool for conducting real-life experiments and encourages them to explore the physics world independently. Implementation of the course has shown that integrating smartphones into physics teaching helps students grasp abstract concepts more concretely. Discussions and hands-on experiments during the course foster a direct connection between acceleration theory and its application in real-world scenarios. However, it was noted that students require more scaffolding and guidance from teachers in analyzing and interpreting data and graphs. This area will be emphasized in future implementations of the course.

REFERENCES

洪曜正等 (2022) 。寫APP玩轉物理實驗。高雄市：全華圖書

The effect of treatments on shoulder function and pain in overhead athletes with myofascial pain syndromes: A pilot study

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Purpose and Background:

Overhead athletes are more likely to experience shoulder problems because they frequently move their shoulders rapidly and through with a wide range of motion (Tooth et al., 2020). One of several problems in overhead athletes is myofascial trigger points (MT) in the upper trapezius muscle (Huang et al., 2022). These problems negatively affect power generation and performance capacity (DAS & JHAJHARIA, 2022). There were several studies on the most effective treatment protocol to decrease symptoms of MT, particularly in overhead athletes, have been limited. This study employed three techniques that are major contributing factors to MT incidence including deep tissue massage (DTM), a technique used in applying traditional Thai massage court-style that pressure points to relieve trigger points (Srikaew et al., 2022). Secondly, extracorporeal shock wave therapy (ESWT) is a treatment that focuses on injuries to human muscles, bones, and other tissues, aiming to reverse pathological conditions and increase blood flow (Suputtitada, 2017). The last method, repetitive peripheral magnetic stimulation (PMS), affect local changes in muscle relaxation and nerve function (Diao et al., 2023). The purpose of this study is to identify the most effective method for reducing myofascial pain and maintaining athletes' performance during training and competition.

Materials and Methods:

Overhead athletes with MT in the upper trapezius were recruited. The participants received a treatment technique randomly. The treatment was given 20 minutes per time total of 4 times (2 times/week) on the symptom side by the therapist. ESWT group will receive focused ESWT 2000 pulses and 0.1 mj /mm² (Luan et al., 2019). DTM group will be given the series of DTM by thumbs with more pressure gradually to the muscles until the participants respond with relaxation (Majchrzycki, Kocur, & Kotwicki, 2014). For PMS group, a total of 20 bursts consisting of 6,000 stimuli with a 20 Hz frequency were applied (Renner et al., 2019). Data was collected before and after the treatments, including pressure pain threshold (PPT) measured by algometer and shoulder performance by seated single-arm shot-put test (SSPT). All statistical data analyses were performed using SPSS® version 26.0. PPT and SSPT were assessed using Wilcoxon signed-rank tests. This study was approved by Mahidol University Central Institutional Review Board study number 2024/020.1601.

Results and Discussion

We enrolled nine overhead athletes (6 males, 3 females) from several sports (basketball, volleyball, badminton, football) average age of 27.11 ± 7.8 years. After 4-time treatments, the results of three treatments showed significant differences in SSPT (P-value = 0.008) (Table 1), however, there was no significant difference in PPT (Table 2). The results indicated the effectiveness of the three techniques could maintain shoulder performance. However, there were no observable changes in pain reduction. The findings from each technique could be applied to decrease MT symptoms for athletes during both training and competition. This study would highlight the advantage of the DTM technique, which requires no additional devices for treatment. Nonetheless, its result showed similar performance maintenance compared to other techniques. In conclusion, these three methods (DTM, ESWT, and PMS) effectively alleviate myofascial trigger points in overhead athletes, leading to improved performance, with no severe adverse effects reported.

Table 1. Show the result of seated single-arm shot-put test

SSPT (inches)	Pre	Post	Diff	SD
ESWT	171.34	196.88	25.53	13.35
DTM	163.37	180.51	17.14	4.01
PMS	177.56	200.44	22.89	23.14
P-value = 0.008			*Significant difference p-value <0.05	

Table 2. Show the result of pressure pain threshold (PPT)

PPT (kg/cm ³)	Pre	Post	Diff	SD
ESWT	3.07	3.13	-0.07	0.18
DTM	2.51	2.50	0.01	0.23
PMS	3.28	3.17	0.12	0.53
P-value > 0.05			*Significant difference p-value <0.05	

REFERENCES

- DAS, R., & JHAJHARIA, B. (2022). Correlation between latent myofascial trigger point and peak torque production of lower limb muscles on sports person. *Journal of Physical Education and Sport*, 22(9). <https://doi.org/10.7752/jpes.2022.09283>
- Diao, Y., Pan, J., Xie, Y., Liao, M., Wu, D., Liu, H., & Liao, L. (2023). Effect of Repetitive Peripheral Magnetic Stimulation on Patients With Low Back Pain: A Meta-analysis of Randomized Controlled Trials. *Arch Phys Med Rehabil*, 104(9), 1526-1538. <https://doi.org/10.1016/j.apmr.2023.03.016>
- Huang, L. L., Huang, T. S., Lin, Y. H., Huang, C. Y., Yang, J. L., & Lin, J. J. (2022). Effects of Upper Trapezius Myofascial Trigger Points on Scapular Kinematics and Muscle Activation in Overhead Athletes. *J Hum Kinet*, 84, 32-42. <https://doi.org/10.2478/hukin-2022-000079>
- Srikaew, N., Kietinun, S., Sriyakul, K., Tungsukruthai, P., & Pawa, K. K. (2022). Effectiveness of court-type traditional Thai massage plus meditation in patients with myofascial pain syndrome on upper trapezius. *Advances in Integrative Medicine*, 9(1), 63-68. <https://doi.org/10.1016/j.aimed.2021.07.006>
- Suputtitada, A. (2017). Update of Extracorporeal Shockwave Therapy in Myofascial Pain Syndrome. *International Physical Medicine & Rehabilitation Journal*, 1(4). <https://doi.org/10.15406/ipmrj.2017.01.00019>
- Tooth, C., Gofflot, A., Schwartz, C., Croisier, J. L., Beudart, C., Bruyere, O., & Forthomme, B. (2020). Risk Factors of Overuse Shoulder Injuries in Overhead Athletes: A Systematic Review. *Sports Health*, 12(5), 478-487. <https://doi.org/10.1177/1941738120931764>
- Luan, S., Zhu, Z. M., Ruan, J. L., Lin, C. N., Ke, S. J., Xin, W. J., Liu, C. C., Wu, S. L., & Ma, C. (2019). Randomized Trial on Comparison of the Efficacy of Extracorporeal Shock Wave Therapy and Dry Needling in Myofascial Trigger Points. *Am J Phys Med Rehabil*, 98(8), 677-684. <https://doi.org/10.1097/PHM.0000000000001173>
- Majchrzycki, M., Kocur, P., & Kotwicki, T. (2014). Deep tissue massage and nonsteroidal anti-inflammatory drugs for low back pain: a prospective randomized trial. *ScientificWorldJournal*, 2014, 287597. <https://doi.org/10.1155/2014/287597>
- Renner, T., Sollmann, N., Trepte-Freisleder, F., Albers, L., Mathonia, N. M., Bonfert, M. V., Konig, H., Klose, B., Krieg, S. M., Heinen, F., Gerstl, L., & Landgraf, M. N. (2019). Repetitive Peripheral Magnetic Stimulation (rPMS) in Subjects With Migraine-Setup Presentation and Effects on Skeletal Musculature. *Front Neurol*, 10, 738. <https://doi.org/10.3389/fneur.2019.00738>

Investigating the Effects of Inquiry and Practices Course on High School Students' Motivation toward Science Learning

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Purpose and Background

Over the past twenty years, worldwide reforms in science education have highlighted the significance of inquiry. Studies have reported the benefits of inquiry-based learning, such as enhancing students' interest and motivation in science (Jocz et al., 2014), improving their conceptual understanding (Fang et al., 2016), and increasing opportunities for collaboration among students (Ellwood & Abrams, 2018). In Taiwan, according to the 108 Curriculum Guidelines, the "Inquiry and Practices" course is mandated in senior high school education to foster students' inquiry skills and deepen their understanding of the nature of science through practical experiences. To successfully implement a new course, it is important to take students' perspectives into account. Students' motivation plays a crucial role in successful science learning. Motivation not only predicts students' emotions in the classroom but also regulates their engagement in science classrooms (Membiela et al., 2023). According to Glynn et al. (2007), students' motivation strongly and directly influences their achievement.

Materials and Methods

This study employed an embedded mixed-methods research design to investigate how the Inquiry and Practices course affected high school students' motivation. We used the "Science Motivation toward Science Learning (SMTSL)" (Tuan et al., 2005) to survey high school students' motivation. This questionnaire includes six dimensions: "Self-Efficacy (SE)", "Active Learning Strategies (ALS)", "Science Learning Value (SLV)", "Performance Goal (PG)", "Achievement Goal (AG)", and "Learning Environment Stimulation (LES)". Latent Profile Analysis (LPA) was used for data analysis to identify the latent profiles of students' motivation toward science learning before and after the Inquiry and Practices course. Qualitative data from the questionnaire were analyzed to explore the possible reasons for maintaining and changing students' science learning motivation profiles.

Results and Discussion

LPA analysis identified three profiles of students' motivation toward science learning. We named them based on the characteristics of different profiles: profile 1 as "Active Learners with High Science Learning Motivation," profile 2 as "Balanced Learners with Medium Science Learning Motivation," and profile 3 as "Performance-Driven Learners with Low Science Learning Motivation." Students' changes of motivation before and after Inquiry and Practices is in Table 1. The qualitative data analysis revealed that the hands-on tasks in Inquiry and Practices, students' emotions during the course and students' peer interactions were the major factors affecting the maintenance and change of students' science learning motivation profiles.

Figure 1. LPA results

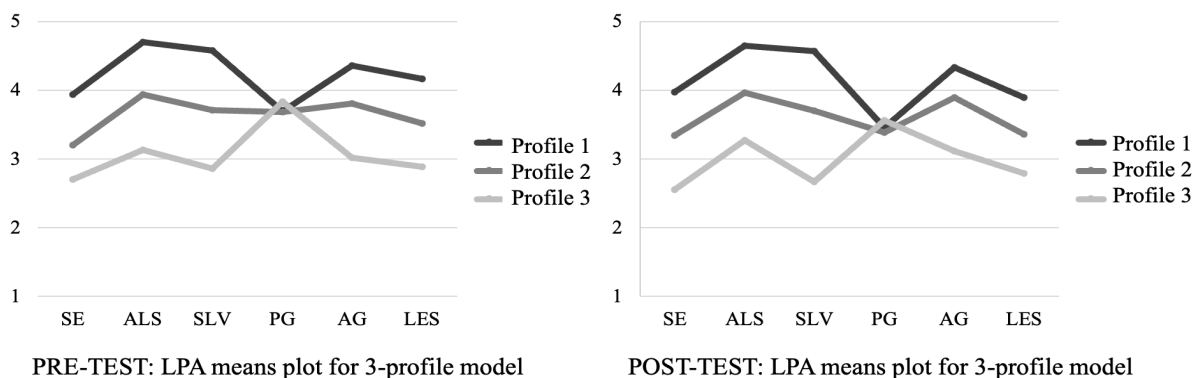


Table 1. Students’ maintenance/change of motivation before and after Inquiry and Practices

Before \ After	High motivation	Medium motivation	Low motivation	Total number
High motivation	70 (maintain)	14 (increase)	0 (increase)	84
Medium motivation	42 (decrease)	99 (maintain)	15 (increase)	156
low motivation	5 (decrease)	22 (decrease)	9 (maintain)	36
Total number	117	135	24	276

The qualitative data analysis revealed that the hands-on tasks in Inquiry and Practices, students’ emotions during the course and students’ peer interactions were the major factors affecting the maintenance and change of students' science learning motivation profiles.

References

Ellwood, R., & Abrams, E. (2018). Student’s social interaction in inquiry-based science education: How experiences of flow can increase motivation and achievement. *Cultural Studies of Science Education, 13*, 395-427.

Fang, S.-C., Hsu, Y.-S., Chang, H.-Y., Chang, W.-H., Wu, H.-K., & Chen, C.-M. (2016). Investigating the effects of structured and guided inquiry on students’ development of conceptual knowledge and inquiry abilities: a case study in Taiwan. *International Journal of Science Education, 38*(12), 1945-1971.

Glynn, S. M., Taasobshirazi, G., & Brickman, P. (2007). Nonscience majors learning science: A theoretical model of motivation. *Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching, 44*(8), 1088-1107.

Jocz, J. A., Zhai, J., & Tan, A. L. (2014). Inquiry learning in the Singaporean context: Factors affecting student interest in school science. *International Journal of Science Education, 36*(15), 2596-2618.

Membuela, P., Acosta, K., Yebra, M. A., & González, A. (2023). Motivation to learn science, emotions in science classes, and engagement towards science studies in Chilean and Spanish compulsory secondary education students. *Science education, 107*(4), 939-963.

Tuan, H. L., Chin, C. C., & Shieh, S. H. (2005). The development of a questionnaire to measure students' motivation towards science learning. *International Journal of Science Education, 27*(6), 639-654. <https://doi.org/10.1080/0950069042000323737>

ASSOCIATION BETWEEN PHYSICAL ACTIVITIES AND ACADEMIC ACHIEVEMENTS AMONG VIETNAMESE 12TH GRADERS

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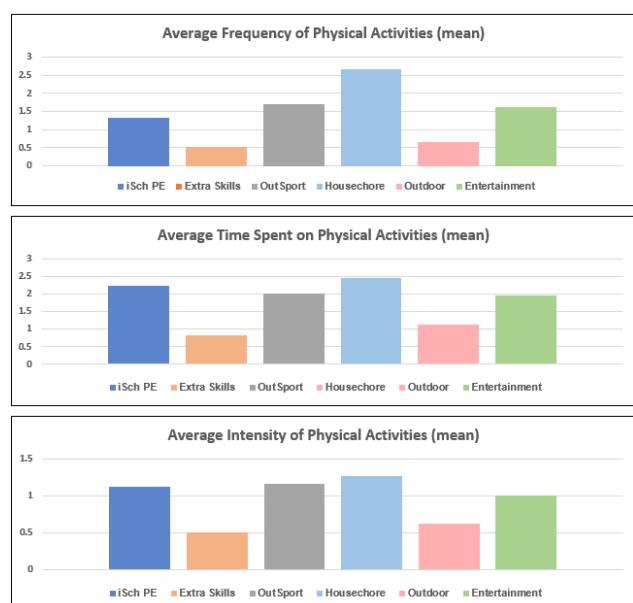
Background and Purposes

It has been shown widely in many research that physical activities play a substantial role in our physical and mental health (Watson, A. et al., 2017). Physical activities have also been proven in some research to be positively effective in helping children and adolescents improve their cognitive function and academic performance (Jiménez, J., 2023, Mullender-Wijnsma et al., 2015, So, W., 2012). In Vietnam, physical activities are integrated in the Ministry of Education and Training's general education program at all schools (MOET, 2018). However, there is a fact that for the group of 12th graders, the intense pressure from the high school graduation examination shifts their focus on enhancing academic achievements through a variety of extra-classes, rather than on doing physical activities. Not only for physical education classes, chances for the youngsters to participate in many kinds of physical activities are also reduced/not prioritized (Tuoi Tre, 2018). Concerning that fact, my study aims to (1) statistically look for evidence surrounding *the current status* of physical activities among Vietnamese adolescents, particularly a group of high-school students in Vietnam; (2) determine *the association between physical activities and academic achievements* among this group of students, thereby (3) offer some *recommendations* to improve their academic achievements through physical activities.

Materials and Methods

The study was conducted through a *questionnaire survey*. 220 random 12th-graders from 12 high schools in different cities/provinces of Vietnam were assigned to complete the questionnaire (n=220), in which 85 responses were directly collected in a high school in Hanoi and 135 feedbacks were obtained online. After a process of data filtering, 212 valid answers (52.83% of females and 47.17% of males) were selected for analysis, using (1) *descriptive statistics* for frequency, time and intensity of 06 main types of physical activities, including in-school physical education classes (iSch PE), extra-curricular activities (Extra skills), out-of-school sports (OutSport), house chores (Housechore), outdoor activities (Outdoor) and other forms of physical activities for amusement (Entertainment); (2) *Pearson correlation* between the above-mentioned physical variables and the students' academic achievements, measured by total GPA in all subjects (Avg GPA Total), GPA in Mathematics (Avg GPA Math), GPA in Vietnamese Literature (Avg GPA Liter) and GPA in English (Avg GPA Eng).

Results and Discussion



As can be seen from the dataset's *descriptive statistics*, Housechore, OutSport and Entertainment are the most frequent activities (4-5 times/week for Housechore and 2-3 times/week for OutSport and Entertainment). Housechore, OutSport and iSch PE are activities that the students decide to spend the most time with (~30 mins/time). Meanwhile, the most intense activities are Housechore, OutSport và iSch PE (~low-medium level).

As in Figure 1, doing housework, attending PE classes and playing sports after school are three most outstanding structured activities, in which Housechore shows the highest mean scores in frequency, time and intensity, suggesting the students' self-discipline and supportive attitude towards their parents. In-school PE and out-of-school sports are also popular activities, therein PE is a compulsory subject in the students' general education program, while sports are an optional activity that their parents may provide for their further development.

Entertainment is also a quite noticeable activity compared to others, implying that the Vietnamese youngsters may enjoy it during their stressful period of study. The other two activities - outdoor and extra-curricular – have pretty much lower mean scores related to frequency, time and intensity, showing that they are not popular forms of physical activities that are prioritized among the group of Vietnamese 12th-graders.

Secondly, the *Pearson correlation's* heatmap (Figure 2 below) demonstrates that Time/iSch PE and Intensity/iSch PE have the most prominent positive correlation with the students' study results. Particularly, the correlational values between Time/iSch PE and average GPAs are from 0.18 to 0.25. There is also a positive correlation between Intensity/iSch PE and GPA in Mathematics ($r=0.22$). Although the coefficients are not significant, this shows that the duration and intensity created during PE classes may somehow be beneficial to the learning outcomes of the youngsters.

Frequency of doing house chores demonstrates a positive correlation with GPA in Literature as well ($r=0.16$). This can be explained that by frequently doing the housework, the teenagers can be more meticulous and patient – traits that are useful when learning Literature – a difficult subject in Vietnam.

In contrast, a weak negative correlation between frequency of extra-curricular, time for sports, intensity of house chores and GPAs is displayed. It can be interpreted that the ways these activities are conducted may distract the students, waste their time for study or make them exhausted, causing a slight decrease in their GPAs. The other activities also show (positive or negative) correlation with the GPAs, but at a very-low level, meaning they have a minimal impact or do not affect the students' academic results at all.

After the correlation among variables is revealed, the association between Gender and Time/Intensity/iSch PE & Intensity/Housechore is considered to be made. Results from *Chi-square test* indicate that there is a significant association between Gender (male and female) and GPAs (Avg GPA Total and Avg GPA Liter), specifically, girls seem to join the physical activities more actively/harder than boys, which is probably a factor that leads to their higher study achievements.

Conclusion and Suggestions

To conclude, there is an association between physical activities and academic achievements among 12th-graders in Vietnam, even though the correlation is not seen as significant. Some structured activities like physical education classes or house chores can somehow be beneficial for the students' study achievements, while some other less-structured activities like out-of-school sports or extra-curricular activities may negatively affect their academic results. The association is especially shown more substantially in female than in male students. *As for the suggestions*, (1) schools may adjust their physical education program (by reasonably increasing time and intensity for PE classes), encourage more participation from the students, especially the male youngsters; (2) parents and teenagers may balance the study with the level of physical activities, so as to ensure the students are strong enough, less stressful, but not distracted from their study, especially during this important stage.

References

- Watson, A., Timperio, A., Brown, H., Best, K., Hesketh, K. (2017). Effect of classroom-based physical activity interventions on academic and physical activity outcomes: a systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*. Retrieved from <https://doi.org/10.1186/s12966-017-0569-9>
- García-Jiménez, J. (2023). Physical activity and academic performance in students from same primary education school. Retrieved from Doi: [10.15561/26649837.2023.0504](https://doi.org/10.15561/26649837.2023.0504)
- Mullender-Wijnsma, M. Hartman, E., de Greeff, J., Bosker, R. Doolaard, S., Visscher, C. (2015). Improving Academic Performance of School-age Children by Physical Activity in the Classroom: 1-year Program Evaluation. Retrieved from <https://doi.org/10.1111/josh.12259>
- So, W. Y. (2012). Association between physical activity and academic performance in Korean adolescent students. *BMC Public Health* 12, 258. Retrieved from <https://doi.org/10.1186/1471-2458-12-258>
- General Education Program within Vietnam's General Educational System. (2018). MOET. Retrieved from <https://moet.gov.vn/content/tintuc/lists/news/Attachments/8421/chuong-trinh-tong-the-ctgdpt-2018.pdf>
- Pressure from too much study and too little physical activities among school-age students (translated from Vietnamese article). (2018). Tuoi Tre Newspaper. Retrieved from <https://tuoitre.vn/loi-kho-hoc-nhieu-van-dong-it-cua-hoc-sinh-viet-20181110080640952.htm>

Pearson's Correlation between Physical Activities and Academic Achievements

Fqc/iSch PE	0.048	0.059	0.062	0.1
Fqc/Extra skills	-0.11	-0.11	-0.14	-0.0082
Fqc/OutSport	-0.041	0.038	-0.024	-0.071
Fqc/Housechore	-0.011	0.02	0.16	0.032
Fqc/Outdoor	0.034	0.083	-0.065	0.0053
Fqc/Entertain	0.051	0.11	-0.048	-0.011
Time/iSchPE	0.25	0.24	0.18	0.23
Time/Extra skills	-0.073	-0.086	-0.11	0.019
Time/OutSport	-0.081	-0.042	-0.044	-0.14
Time/Housechore	-0.068	-0.029	0.059	-0.039
Time/Outdoor	0.014	0.012	-0.033	-0.0081
Time/Entertain	0.038	0.11	-0.037	0.025
Intensity/iSch PE	0.17	0.22	0.16	0.15
Intensity/Extra skills	-0.045	-0.043	-0.053	-0.012
Intensity/OutSport	-0.015	0.022	0.0038	-0.11
Intensity/Housechore	-0.033	-0.0027	0.00061	-0.14
Intensity/Outdoor	0.032	0.021	-0.013	-0.034
Intensity/Entertain	0.05	0.1	0.0016	0.0029
	Avg GPA (Total)	Avg GPA (Math)	Avg GPA (Liter)	Avg GPA (Eng)

COMPARISON OF DETAILED LAND COVER MAPPING BASED ON SNI CLASSIFICATION SCHEME USING CONVENTIONAL AND RANDOM FOREST MULTISPECTRAL CLASSIFICATION

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Purpose and Background

Accurate land cover maps play an important role in various studies, such as environmental and natural resource management, regional development, climate studies, and food security (Cihlar, 2000). Remote sensing have been utilized as main data source for most of land cover mapping ever since the launch of the first Landsat satellite. Land cover mapping is a continually growing field that receives increasing attention. A significant issue in contemporary studies of land cover mapping is the challenge of deriving accurate and detailed land cover maps. Many factors influence the accuracy of land cover, one of which is the classification scheme used to create the map (Danoedoro, 2019). The SNI (*Standar Nasional Indonesia*) 7645-1:2014 classification scheme is a standardized system used in Indonesia. This classification scheme represents a harmonized approach to producing land cover maps that are applicable across various sectors. It is specifically designed for visual interpretation to effectively represent the complexity of land cover in Indonesia (Danoedoro et al., 2020). Several studies have utilized this scheme for detail land cover mapping, notably works by Danoedoro et al (2020) and Putri et al (2019). Due to its design for visual interpretation, the use of the SNI 7645-1:2014 classification scheme in digital image processing remains an interesting subject. The purpose of this work is to evaluate two digital image processing algorithms for detailed land cover mapping using SNI 7645-1:2014 classification scheme. We used both conventional and parametric classification approach and asses which one that resulted in higher thematic accuracy.

Materials and Methods

This study is conducted in some part of southern Garut Regency, West Jawa Province, Indonesia. This location is choosen because the complexity of land cover present in the location. Landsat 8 OLI/TIRS multispectral imagery, with a spatial resolution of 30 meters, serves as the primary data source for creating land cover maps at a scale of 1:250,000 using the SNI classification scheme. Two classification algorithms were employed in this study: Maximum Likelihood (ML) and Random Forest (RF), representing parametric and non-parametric approaches, respectively. The land cover map produce by this algorithm is evaluated by using error matrix and kappa coefficient. Before creating the training data for supervised classification, spectral based land cover is produce by using ISODATA clustering. Fieldwork will be conducted to gain insight of the land cover condition and its relation with spectral based land cover. The field data and spectral based land cover data will be used to create interpretation key in order to produce the training data.

Results and Discussion

Based on tentative land cover map and fieldwork processes, we identified 18 land cover classes present in the study location. The interpretation key of the training data produce 521 polygon that consist of 29 classes and include 14639 pixels. Some land cover class have different spectral properties that needed to be seperated during classification process, therefore the training data have more classes than the identified land cover. This separation will reduce the possibility of miss classification in final the land cover map. After the initial result of classification is produce, simplification of land cover classes is conducted using class merging tools in imagery processing software.

In order to create the validation data, Landsat 8 imagery is pansharp into 15 m spatial resolution using the Gram Schimdt (GS) Pan-Sharpening methods. This method is recomended by several studies because it maintain the spectral properties of the imagery. The validation data is create seperately with the training data, therefore maintain the validity of the data. The validation data consist of 336 polygons incorporating 23539 pixels. This validation data will be used to asses the thematic accuracy of each land cover map in this study.

Figure 1 shows the land cover map produce by ML (left) and RF (right) algorithm. Visually, both land cover shows promising result eventhough several miss classification can be observed. The miss classification happen between several classes, notable river and rice field, settlement and agricultural land, and finally aquaculture and river. Many local resident grow rice close to the river, therefore when the rice is still in the growing phase, the resulting spectral pattern is similiar with the river itself. Same thing can be said about build-

up settlement and agricultural land. Many agricultural land grows near settlement, when the land has been harvested, the spectral pattern are similiar to build up settlement.

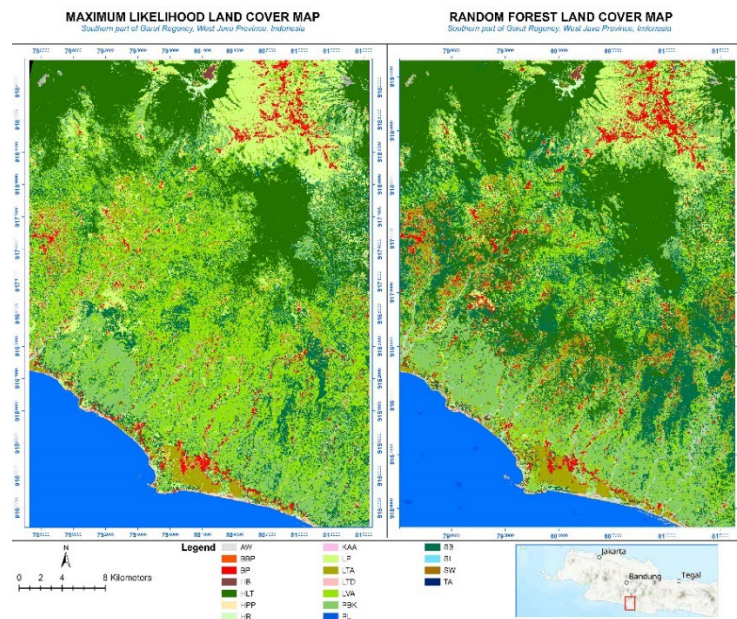


Figure 1 Final land cover map using ML (left) and RF (right) algorithm.

Table 1 Accuracy assesment report of both land cover map

Overall Accuracy		Kappa Coefficient	
ML		RF	
79.17%	0.7638	82.92%	0.8051

Error matrix is generated by using the validation data explained before. Two main indicator of the error matrix is used to asses the thematic accuracy of the land cover map. These indicator are Overall Accuracy (OA) and Kappa Coefficient. RF land cover map shows higher OA and Kappa value, compared to ML land cover map. Currently, there is no universally accepted accuracy score for assessing land cover maps, eventhough USGS have stated that land cover map can be accepted when the OA value is above 85%. Considering the complexity of land cover present in the study location and the limitation of the pixel based approach, the OA value for RF can be consider adequite. Improvement of the training data and other ancillary data can be used to improved the classification result. Kappa coefficient of shows the strength of the agreement between the validation data and land cover map. Both land cover map shows a substantial and strong agreement, therefore the quality of the error matrix is consider adequate.

REFERENCES

- Cihlar, J. (2000). *Land cover mapping of large areas from satellites: Status and research priorities*. International Journal of Remote Sensing, 21(6–7), 1093–1114. <https://doi.org/10.1080/014311600210092>
- Danoedoro, P. (2019). *Multidimensional land-use information for local planning and land resources assessment in Indonesia: Classification scheme for information extraction from high-spatial resolution imagery*. Indonesian Journal of Geography, 51(2), 131–146. <https://doi.org/10.22146/ijg.32781>
- Danoedoro, P., Ananda, I. N., Kartika, C. S. D., Umela, A. F., & Indayani, A. B. (2020). *Testing a detailed classification scheme for land-cover/ land-use mapping of typical Indonesian landscapes: case study of Sarolangun, Jambi and Salatiga, Central Java*. Indonesian Journal of Geography, 52(3), 327. <https://doi.org/10.22146/ijg.50080>
- Putri, E. A. W. A., Danoedoro, P., & Farda, N. M. M. (2019). Comparing land-cover maps accuracies generated from multispectral classification of Landsat-8 OLI dan Pleiades images using two different classification schemes. In S. B. Wibowo, A. B. Rimba, A. A. Aziz, S. Phinn, J. T. Sri Sumantyo, H. Widyasamratri, & S. Arjasakusuma (Eds.), *Sixth Geoinformation Science Symposium (Issue August 2020, p. 31)*. SPIE. <https://doi.org/10.1117/12.2548888>

A Study on the Application of ChatGPT in Collaborative and Autonomous Learning Outcomes for High School Students

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Purpose and Background:

With the implementation of Taiwan's 108 Curriculum Guidelines, the learning portfolio has become a crucial element for high school students applying to universities. This initiative aims to move beyond the traditional reliance on standardized test scores in the admissions process, providing a more comprehensive showcase of students' learning experiences, personalities, and achievements. Consequently, university admissions can evaluate students' potential and suitability from a broader perspective (Ministry of Education, 2022). With the rapid advancement of technology, Artificial Intelligence (AI) has also been flourishing in the field of education, offering new possibilities for the creation, updating, and evaluation of learning portfolios. AI tools like Chat GPT can analyze students' learning portfolios, provide personalized learning recommendations, and generate learning reports. In the classroom, these tools can serve as aids for innovative curriculum development and teaching optimization, helping students learn more effectively and providing teachers with new instructional perspectives. With AI reading extensive data and offering guidance and substantive suggestions, it can indeed alleviate teachers' stress. AI-assisted learning portfolios can help students reduce the burden of writing, while also enhancing their willingness to engage in independent thinking and writing. When AI acts as a learning partner for students, it can enrich the content of learning portfolios, making them more diverse and well-structured.

There have been numerous studies on learning portfolios and the integration of generative AI into education. However, research specifically focused on generative AI assisting students in writing learning portfolios has yet to emerge. Therefore, this study aims to explore the application of generative AI in high school students' creation of learning portfolios under the framework of the 108 Curriculum Guidelines.

1. **Investigate the current status of high school teachers and students in producing course learning outcomes:**
 - What are the existing practices and challenges faced by high school teachers and students in creating learning portfolios?
 - How do teachers and students perceive the importance and utility of learning portfolios in the context of the 108 Curriculum Guidelines?
2. **Examine how generative AI can assist high school teachers and students in producing course learning outcomes:**
 - What specific AI tools and technologies are available for aiding in the creation of learning portfolios?
 - How can AI tools like Chat GPT be integrated into the process of writing and refining learning portfolios?
 - What are the potential benefits and limitations of using generative AI in this context?
3. **Assess the effectiveness of high school teachers and students using generative AI to collaborate on course learning outcomes:**
 - How does the use of generative AI impact the quality and depth of learning portfolios created by students?
 - In what ways does AI support collaborative efforts between teachers and students in documenting and reflecting on learning experiences?
 - What measurable improvements can be observed in students' engagement, writing skills, and overall learning outcomes when using AI-assisted tools?

By addressing these questions, the study aims to provide a comprehensive understanding of the role and impact of generative AI in enhancing the creation and utilization of learning portfolios in high school education.

Materials and Methods:

This study adopts action research as the methodology, employing a mixed-methods approach. Data collection methods include document analysis, semi-structured interviews, and questionnaires. The research will be conducted at Taipei Municipal Yongchun Senior High School, focusing on humanities teachers and their students (grades 10 and 11), targeting 1 to 3 classes. Based on the Ministry of Education's learning portfolio review project, the "Collaborative Learning Portfolio: Suggestions for Presenting Course Learning Outcomes" handbook outlines six major guidelines and specific suggestions for "course learning outcomes." These guidelines will be practically applied in the educational setting to guide students in creating their portfolios. The strategies will be integrated with generative AI functionalities to broaden and deepen the practical application of these guidelines.

Results and Discussion:

This breakdown highlights both the potential benefits and challenges associated with using ChatGPT in an educational setting. While it introduces new ways of thinking and can improve certain aspects of student work, there are still hurdles to overcome in terms of motivation, workload reduction, and technological adaptation. Teachers' roles evolve but remain essential, with an added focus on ethical use and content internalization.

1. Benefits of ChatGPT Assistance

- Addressing Current System Limitations:
 - The current education system often lacks dedicated teachers to provide individual guidance.
 - ChatGPT can serve as a solution to this gap, helping students overcome learning difficulties.
- Promoting Self-Exploration and Learning Motivation:
 - ChatGPT encourages students to engage in self-directed exploration.
 - It boosts students' motivation to learn, aligning with the trends of competency-based education and self-directed learning.

2. Importance of Learning Reflection

- Critical Role of Individual Student Thought:
 - Despite the assistance from ChatGPT, individual student thinking remains crucial.
 - Students must continuously refine their questions based on the responses they receive.
- Internalizing Knowledge:
 - Through the process of questioning and answering, students can gradually internalize the information.
 - This ongoing refinement and reflection help students transform received information into their own knowledge.

REFERENCES:

- Gan, Z. R. (2023, March 31). Why is the most discussed AI today? Reasons for the popularity of ChatGPT and three major controversies. *Scientific Monthly*. <https://www.scimonth.com.tw/archives/6370>
- Lin, J. D., Yan, J. F., & Chen, M. H. (2005). Qualitative research methods: Analysis of interview models and implementation steps. *Quarterly Journal of Disability Studies*, 3(2), 122-125.
- Wu, Q. (2024, January 10). Multimodal integration of generative AI into the educational ecosystem from the perspective of frontline education. *Flip Education*. <https://flipedu.parenting.com.tw/article/008926>
- Wu, D., Yang, Z. K., Wang, J., & Chen, X. (2023). Analysis of the impact of ChatGPT/generative AI on education and response strategies. *Journal of East China Normal University Educational Sciences*, 7.

Latent Profile Analysis of Scientific Inquiry Skills Among Taiwanese High School Students

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Purpose and Background

Scientific inquiry skills are crucial indicators of scientific literacy and represent a key component of 21st-century cognitive abilities. Recently, Taiwan introduced a national curriculum for natural sciences that specifically highlights the importance of students' independent and thorough demonstration of "inquiry skills." This focus emphasizes the importance of developing these skills in current educational reforms (National Research Council, 2000; Tytler, 2007).

Through the animation-based activity (ABA), we involved students in a scientific inquiry centered on the atmospheric chemistry of climate change. During this inquiry, students performed tasks that included data analytics (DA), control of variables (COV), and scientific reasoning (SR) – three essential skills recognized as crucial for promoting students' active engagement in the learning process (Sui et al., 2023; Bao & Koenig, 2019; Bao et al., 2022).

This study aimed to examine the inquiry skills of Taiwanese high school students using latent profile analysis (LPA) as the methodological approach. LPA, a recognized statistical technique, was chosen for its ability to classify students based on varying probabilities, offering a nuanced understanding of the diverse profiles within the population (Spurk et al., 2020).

Materials and Methods

Data was collected from 667 high school students, aged 15-16, over two consecutive years from a nationally representative high school in central Taiwan. These students specialized in both natural and social sciences. For the technological assessments, CCR was chosen as the platform for the ABA, which included Animation Experiment 1 (Fig.1), Animation Experiment 2 (Fig.2), and five additional tasks. We used the coding methods developed by Sui et al. (2023) to evaluate students' inquiry skill performance. To characterize the students' inquiry profiles, LPA was applied to the dataset (n = 667), aiming to identify potential subgroups based on students' inquiry skills.

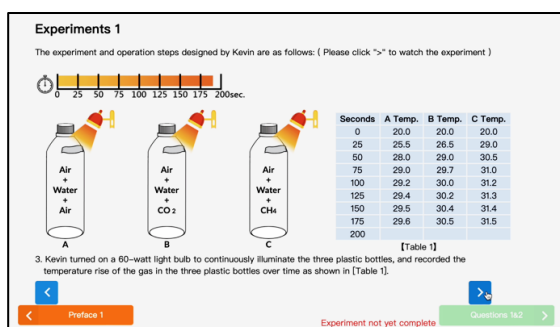


Figure 1. Animation Experiment 1 (exposed to the light heat the bottles)

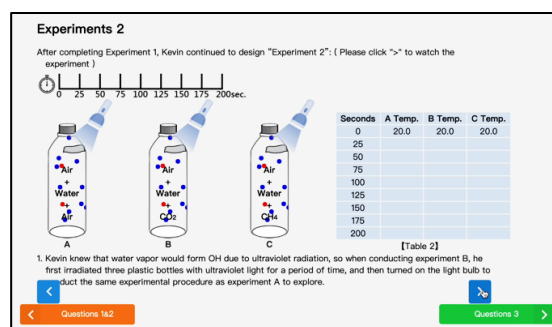


Figure 2. Animation Experiment 2 (exposed to ultraviolet, water vapor & hydroxyl radical molecules are visible)

Results and Discussion

Our analysis identified three distinct subgroups of inquiry skill profiles: “Sophisticated,” “Experimental,” and “Basic,” each defined by their proficiency in DA, COV, and SR (**Fig. 3**). The Sophisticated subgroup showed strong performance across all three skills, the Experimental subgroup excelled mainly in DA, and the Basic subgroup exhibited deficiencies in all three areas. These results are consistent with a previous study that examined inquiry skill profiles among Chinese high school students. Overall, this study utilized LPA to provide generalized and transferable insights into students' inquiry profiles during ABA learning. By validating this generalization model, the findings become more robust and applicable across different countries. In the future, this model could be applied to research in non-Chinese cultural contexts, offering effective strategies for enhancing students' inquiry skills and promoting the development of various scientific inquiry tools.

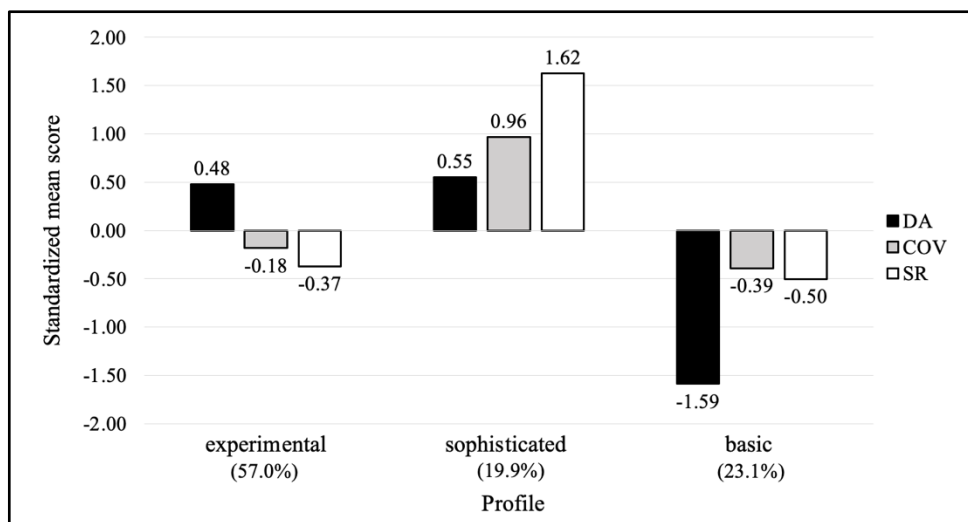


Figure 3. The LPA results for the inquiry profiles of Taiwanese high school students

REFERENCES

- Bao, L., & Koenig, K. (2019). Physics education research for 21st century learning. *Disciplinary and Interdisciplinary Science Education Research*, 1(1), 2. <https://doi.org/10.1186/s43031-019-0007-8>
- Bao, L., Koenig, K., Xiao, Y., Fritchman, J., Zhou, S., & Chen, C. (2022). Theoretical model and quantitative assessment of scientific thinking and reasoning. *Physical Review Physics Education Research*, 18(1), 010115. <https://doi.org/10.1103/PhysRevPhysEducRes.18.010115>
- National Research Council. (2000). *Inquiry and the national science education standards: A guide for teaching and learning*. Washington, DC: National Academies Press.
- Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and “how to” guide of its application within vocational behavior research. *Journal of Vocational Behavior*, 120, 103445. <https://doi.org/10.1016/j.jvb.2020.103445>
- Sui, C. J., Hsiao, S. Y., Yeh, S. C., Zhao, P., Chang, C. Y., & Lin, J. (2024). Do they have inquiry skill profiles? Exploring high school students' scientific inquiry in an animation-based activity. *Science Education*, 108(2), 467-494.
- Tytler, R. (2007). Re-imagining science education: Engaging students in science for Australia's future. *Teaching Science*, 53(4), 14-17.

SDGs Workshop

Purpose of the SDGs workshop

Sustainable Development Goals (SDGs) 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 the direction to solve those issues, especially since their causes are diverse even in the local areas. 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 that the workshop attendants will discuss with students from other countries, and make friends with each other. Human network is essential to solving global issues, and this is the opportunity to start building the network.

SDGs Workshop

Room G4-21 (Jun NOMURA, Chiba University)

Group A		Name	University / School	Country
1	Facilitator	Ahmet Melik Bas	Chiba University	Turkey
2	Learner	AGIL AKBAR FAHREZI	Universitas Gadjah Mada	Indonesia
3	Learner	CHENG, HSIANG-CHING	National Taiwan Normal University	Taiwan
4	Learner	ODA Sarita	Chiba Municipal Chiba High School	Japan
5	Learner	FUKUMOTO Yuma	Chiba Prefectural Funabashi High School	Japan
6	Learner	KUROSAKI Mao	Chiba University	Japan
7	Learner	SUZUTA Akito	Chiba University	Japan
8	Learner	KIKUCHI Syouri	Chiba University	Japan

Group B		Name	University / School	Country
1	Facilitator	Cristina Roselle Mitra	Chiba University	Philippines
2	Learner	SHOFIA KARIMA	Bandung Institute of Technology	Indonesia
3	Learner	ZHANG JIAN, YUN-YI	National Taiwan Normal University	China
4	Learner	MIYAZAKI Yusuke	Chiba Municipal Chiba High School	Japan
5	Learner	TAKUSHI Kou	Chiba University	Japan
6	Learner	MATSUMOTO Momoko	Chiba University	Japan
7	Learner	ISHIHARA Yura	Chiba University	Japan

Group C		Name	University / School	Country
1	Facilitator	Rizvon Suleimanov	Chiba University	Tajikistan
2	Learner	HUANG, YOU-JIA	National Taiwan Normal University	China
3	Learner	ISHII Yoshiumi	Chiba Municipal Chiba High School	Japan
4	Learner	MATSUOKA Uina	Tokyo Metropolitan Koishikawa Secondary School	Japan
5	Learner	ISHIDA Youta	Chiba University	Japan
6	Learner	YOKOGAWA Manami	Chiba University	Japan
7	Learner	MARUYAMA Kairi	Chiba University	Japan

Room G4-22 (Tetsuya KATO, Chiba University)

Group D		Name	University / School	Country
1	Facilitator	Afsana Begum	Chiba University	Bangladesh
2	Learner	LI SILIN	Mahidol University	China
3	Learner	LIN, EN-QIAN	National Taiwan Normal University	Taiwan
4	Learner	OKUNO Haruto	Chiba Municipal Chiba High School	Japan
5	Learner	NUNOKAWA Ai	Showa Gakuin Shuei Senior High School	Japan
6	Learner	UEHARA Akira	Chiba University	Japan
7	Learner	KIMINARITA Hiyori	Chiba University	Japan
8	Learner	SHIMURA Daiki	Chiba University	Japan

Group E		Name	University / School	Country
1	Facilitator	Julia Brottman	Chiba University	Sweden
2	Learner	PARINYA MUTCHA	Kasetsart University	Thailand
3	Learner	LIU, SHU-CHEN	National Taiwan Normal University	Taiwan
4	Learner	KAWASHIMA Gaku	Chiba Municipal Chiba High School	Japan
5	Learner	TSUCHIYA Tomoki	Chiba University	Japan
6	Learner	KOBAYASHI Kai	Chiba University	Japan
7	Learner	TADA Konoka	Chiba University	Japan

Group F		Name	University / School	Country
1	Facilitator	Kiagus Afa Ibrahim	Chiba University	Indonesia
2	Learner	ORRANAN CHUACHART	Chulalongkorn University	Thailand
3	Learner	SHIH, YI-HSUAN	National Taiwan Normal University	Taiwan
4	Learner	TERASHITA Keishu	Chiba Municipal Chiba High School	Japan
5	Learner	OSONE Riku	Chiba University	Japan
6	Learner	OMORI Maya	Chiba University	Japan
7	Learner	SASAKI Yu	Chiba University	Japan

SDGs Workshop

Room G4-23 (Koji TSUJI, Chiba University)

Group G		Name	University / School	Country
1	Facilitator	Fajriah Sulaiman	Chiba University	Indonesia
2	Learner	WASSANA LEKKLA	King Mongkut's University of Technology Thonburi (KMUTT)	Thai
3	Learner	LI, LING-CHEN	National Taiwan Normal University	China
4	Learner	YONEMOTO Daisuke	Chiba Municipal Chiba High School	Japan
5	Learner	SATO Miki	Chiba University	Japan
6	Learner	NISHIOKA Sayana	Chiba University	Japan
7	Learner	HIRAIWA Miki	Chiba University	Japan

Group H		Name	University / School	Country
1	Facilitator	Loraine Bainto	Chiba University	Philippines
2	Learner	NABILLA HADISTIA	Indonesia University of Education	Indonesia
3	Learner	WU, WEN-YEN	National Taiwan Normal University	Taiwan
4	Learner	KIMURA Hiroto	Chiba Municipal Chiba High School	Japan
5	Learner	HIRAI Mika	Chiba University	Japan
6	Learner	MATSUNAGA Miharu	Chiba University	Japan
7	Learner	KAWASHIMA Toko	Chiba University	Japan

Group I		Name	University / School	Country
1	Facilitator	Marvin Gilberto Escobar Leiva	Chiba University	El Salvador
2	Learner	CHAYANAN KITTITEERATHAMRONG	Mahidol University	Thailand
3	Learner	HUNG, PEI-HSUAN	National Taiwan Normal University	Taiwan
4	Learner	HAMANAKA Leo	Chiba Municipal Chiba High School	Japan
5	Learner	SUGIBAYASHI Katsuhiko	Chiba University	Japan
6	Learner	HIRATA Kohana	Chiba University	Japan
7	Learner	KOMAI Hiromi	Chiba University	Japan

Room G4-32 (Shuji SHIMONAGATA, Chiba University)

Group J		Name	University / School	Country
1	Facilitator	Nasuha Bunyameen	Chiba University	Thailand
2	Learner	NGUYEN VU THU AN	University of Education, Vietnam National University	Vietnam
3	Learner	CHEN, YU-CHUN	National Taiwan Normal University	Taiwan
4	Learner	NAGANO Sae	Chiba Municipal Chiba High School	Japan
5	Learner	MIZUKOSHI Sotaro	Chiba University	Japan
6	Learner	SASAKI Nana	Chiba University	Japan
7	Learner	HARA Ryusei	Chiba University	Japan

Group K		Name	University / School	Country
1	Facilitator	Patrick Onyelukachukwu Nwaokocha	Chiba University	Nigeria
2	Learner	SADILLA MUHRENI KASTRO	Universitas Pendidikan Indonesia	Indonesia
3	Learner	YU, YUN-SHUO	National Taiwan Normal University	China
4	Learner	NOJIRI Kotaro	Chiba Municipal Chiba High School	Japan
5	Learner	UCHIYAMA Yuto	Chiba University	Japan
6	Learner	AKABANE Toki	Chiba University	Japan
7	Learner	IGARASHI Yuri	Chiba University	Japan

Group L		Name	University / School	Country
1	Facilitator	Qahramani Kousar	Chiba University	Iran
2	Learner	TANAPAT CHATCHAWATWIMOL	Chulalongkorn University	Thailand
3	Learner	SUGIMOTO Chiaki	Chiba Municipal Chiba High School	Japan
4	Learner	KIKUCHI Kei	Chiba University	Japan
5	Learner	KITADA Aya	Chiba University	Japan
6	Learner	XU FANGZHOU	Chiba University	China
7	Learner	SUGAWARA Nanoha	Chiba University	Japan

SDGs Workshop

Room G4-33 (Wang Qian & Hina MORISHIGE, Chiba University)

Group M		Name	University / School	Country
1	Facilitator	Iago Carvalho Silva	Chiba University	Brazil
2	Facilitator	Victor Ibrahim Mbeya	Chiba University	Kenya
3	Learner	KOMED NACHAENG	Kasetsart University	Thailand
4	Learner	HAYASHI Waka	Chiba Municipal Chiba High School	Japan
5	Learner	YACHI Ryoya	Chiba University	Japan
6	Learner	OWADA Mai	Chiba University	Japan
7	Learner	NEGORO Ayaka	Chiba University	Japan
8	Learner	XU YIFEI	Chiba University	China

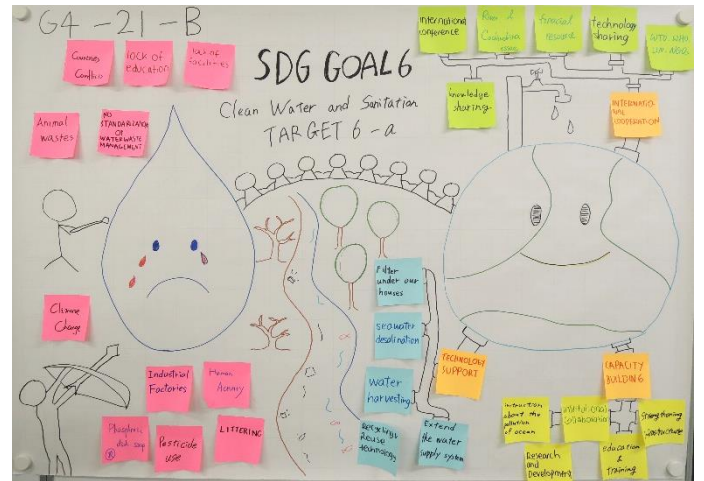
Group N		Name	University / School	Country
1	Facilitator	Savira Aristi	Chiba University	Indonesia
2	Learner	YEH LIU, YU-HSUAN	National Taiwan Normal University	China
3	Learner	TAKAHASHI Hironobu	Chiba Prefectural Funabashi High School	Japan
4	Learner	FUKUDA Kotaro	Chiba Prefectural Sakura High School	Japan
5	Learner	SATO Yurika	Chiba University	Japan
6	Learner	UNOZAWA Masamitsu	Chiba University	Japan
7	Learner	MATSUDA Kotone	Chiba University	Japan

Group O		Name	University / School	Country
1	Facilitator	Yu-Lim Chen	National Taiwan Normal University	Taiwan
2	Learner	LI JIA XIN	Mahidol University	China
3	Learner	NGUYEN NGOC HOA	University of Education, Vietnam National University	Vietnam
4	Learner	UMEZONO Sara	Chiba Prefectural Funabashi High School	Japan
5	Learner	TANAKA Yushin	Chiba University	Japan
6	Learner	KAKUI Mio	Chiba University	Japan
7	Learner	KATO Atsuya	Chiba University	Japan

Poster



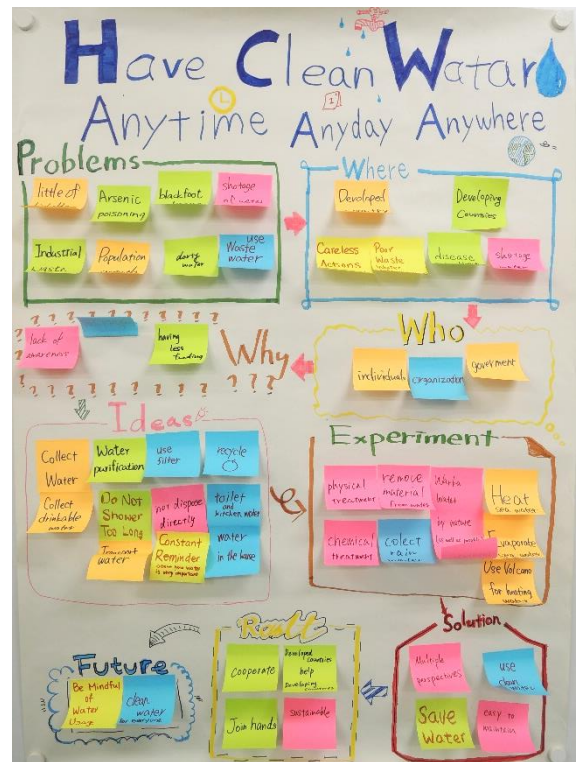
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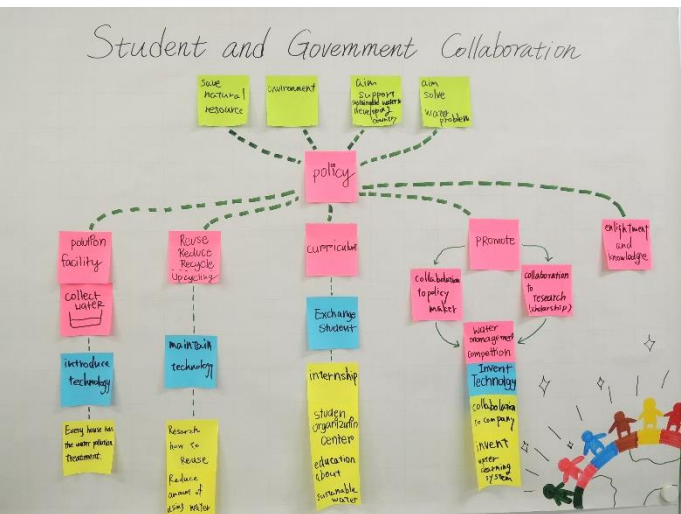
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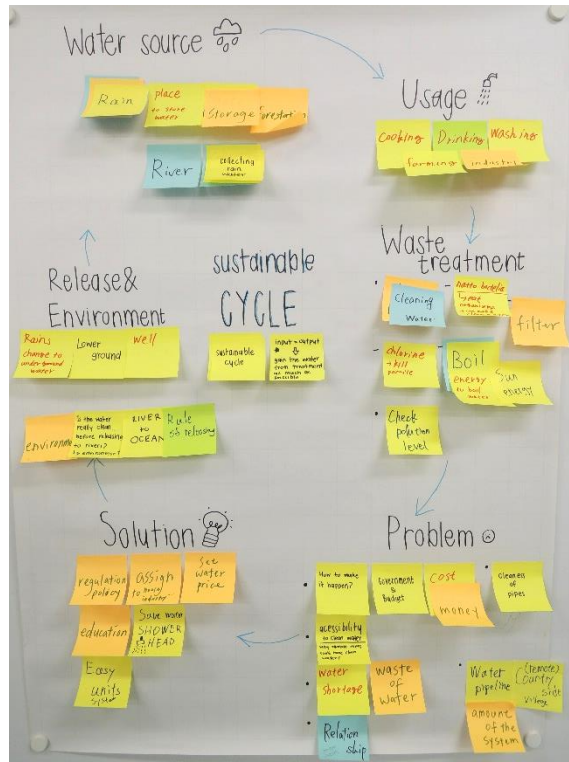
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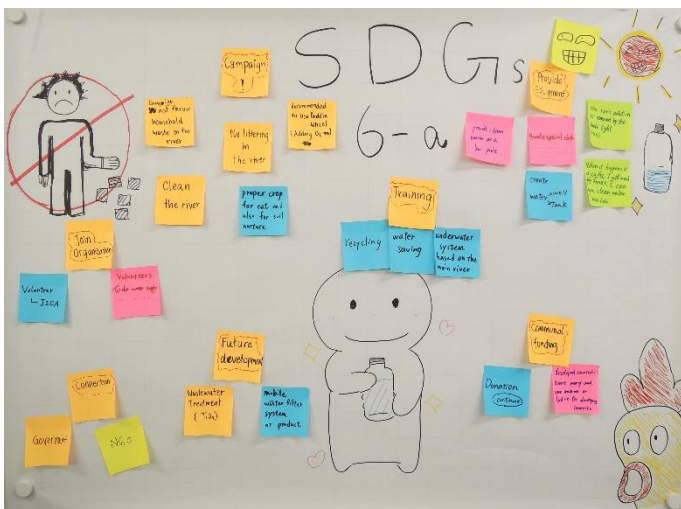
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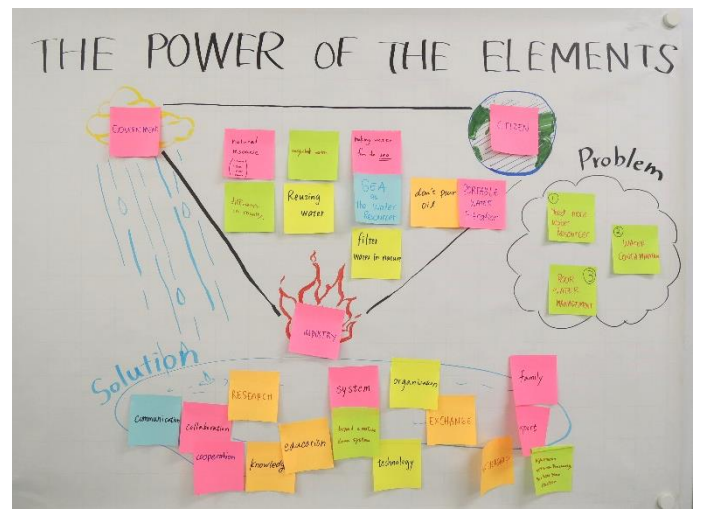
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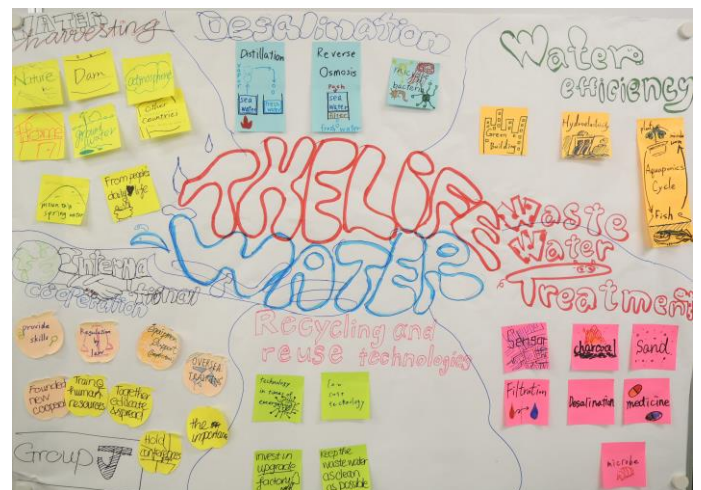
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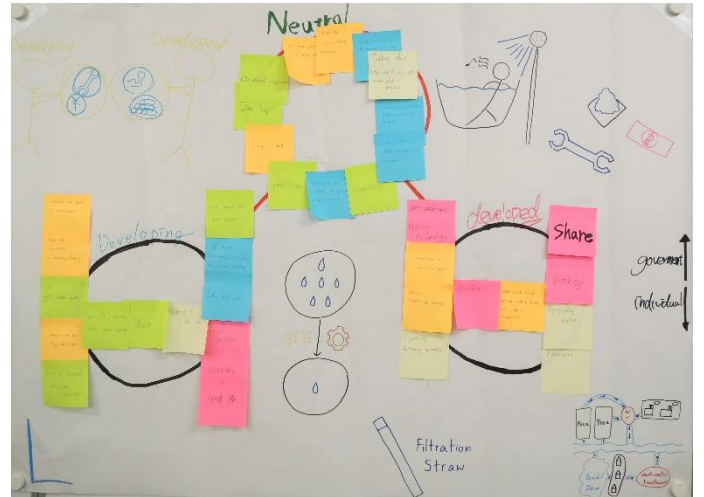
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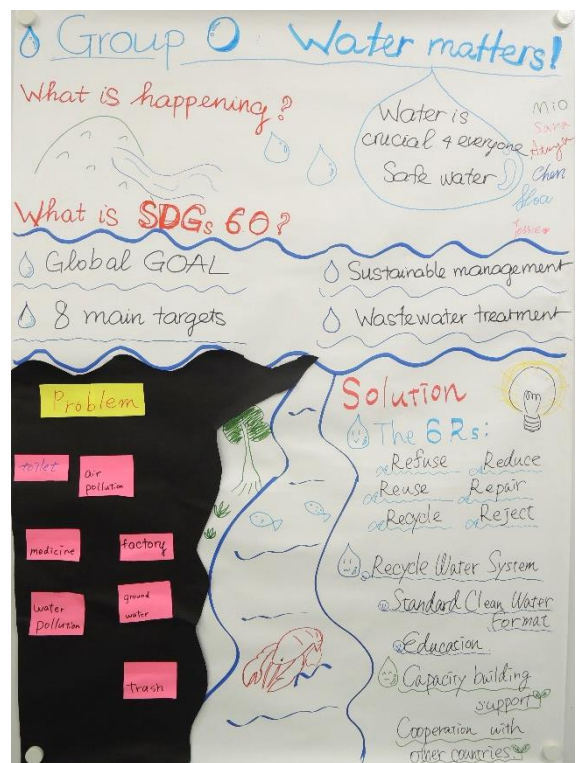
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<Group L>



<Group M>



<Group N>



<Group O>

Name & Room List

■ ASEAN Faculty Member

Name	University	Research Session		Workshop	
Yu-Lim CHEN	National Taiwan Normal University	G3-12	Panelist	G4-33-O	Facilitator

■ ASEAN Students

Name	University	Research Session		Workshop	
AGIL AKBAR FAHREZI	Universitas Gadjah Mada	G4-34	Presenter	G4-21-A	Learner
CHAYANAN KITTITEERATHAMRONG	Mahidol university	G4-34	Presenter	G4-23-I	Learner
CHEN, YU-CHUN	National Taiwan Normal University	G4-34	Presenter	G4-32-J	Learner
CHENG, HSIANG-CHING	National Taiwan Normal University	G4-34	Presenter	G4-21-A	Learner
HUANG, YOU-JIA	National Taiwan Normal University	G4-24	Presenter	G4-21-C	Learner
HUNG, PEI-HSUAN	National Taiwan Normal University	G3-11	Presenter	G4-23-I	Learner
KOMED NACHAENG	Kasetsart University	G3-11	Presenter	G4-33-M	Learner
LI JIA XIN	Mahidol University	G3-11	Presenter	G4-33-O	Learner
LI SILIN	Mahidol University	G4-24	Presenter	G4-22-D	Learner
LI, LING-CHEN	National Taiwan Normal University	G3-11	Presenter	G4-23-G	Learner
LIN, EN-QIAN	National Taiwan Normal University	G3-11	Presenter	G4-22-D	Learner
LIU, SHU-CHEN	National Taiwan Normal University	G3-12	Presenter	G4-22-E	Learner
NABILLA HADISTIA	Universitas Pendidikan Indonesia	G3-11	Presenter	G4-23-H	Learner
NGUYEN NGOC HOA	University of Education, Vietnam National University	G4-34	Presenter	G4-33-O	Learner
NGUYEN VU THU AN	University of Education, Vietnam National University	G4-24	Presenter	G4-32-J	Learner
ORRANAN CHUACHART	Chulalongkorn University	G3-12	Presenter	G4-22-F	Learner
PARINYA MUTCHA	Kasetsart University	G3-12	Presenter	G4-22-E	Learner
SADILLA MUHRENI KASTRO	Universitas Pendidikan Indonesia	G3-12	Presenter	G4-32-K	Learner
SHIH, YI-HSUAN	National Taiwan Normal University	G4-34	Presenter	G4-22-F	Learner
SHOFIA KARIMA	Bandung Institute of Technology	G4-24	Presenter	G4-21-B	Learner
TANAPAT CHATCHAWATWIMOL	Chulalongkorn University	G4-24	Presenter	G4-32-L	Learner
WASSANA LEKKLA	King Mongkut's University of Technology Thonburi	G4-24	Presenter	G4-23-G	Learner
WU, WEN-YEN	National Taiwan Normal University	G3-12	Presenter	G4-23-H	Learner
YEH LIU, YU-HSUAN	National Taiwan Normal University	G3-12	Presenter	G4-33-N	Learner
YU, YUN-SHUO	National Taiwan Normal University	G4-24	Presenter	G4-32-K	Learner
ZHANG JIAN, YUN-YI	National Taiwan Normal University	G4-24	Presenter	G4-21-B	Learner

■ High School Students

Name	University/School	Research Session		Workshop	
FUKUMOTO Yuma	Chiba Prefectural Funabashi High School	-	-	G4-21-A	Learner
HAMANAKA Leo	Chiba Municipal Chiba High School	-	-	G4-23-I	Learner
HAYASHI Waka	Chiba Municipal Chiba High School	-	-	G4-33-M	Learner
ISHII Yoshiumi	Chiba Municipal Chiba High School	-	-	G4-21-C	Learner
KAWASHIMA Gaku	Chiba Municipal Chiba High School	-	-	G4-22-E	Learner
KIMURA Hiroto	Chiba Municipal Chiba High School	-	-	G4-23-H	Learner
MIYAZAKI Yusuke	Chiba Municipal Chiba High School	-	-	G4-21-B	Learner
NAGANO Sae	Chiba Municipal Chiba High School	-	-	G4-32-J	Learner
NAKAJIMA Joe	Showa Gakuin Shuei Senior High School	G4-34	Presenter	-	-
NOJIRI Kotaro	Chiba Municipal Chiba High School	-	-	G4-32-K	Learner
ODA Saria	Chiba Municipal Chiba High School	-	-	G4-21-A	Learner
OKUNO Haruto	Chiba Municipal Chiba High School	-	-	G4-22-D	Learner
SUGIMOTO Chiaki	Chiba Municipal Chiba High School	-	-	G4-32-L	Learner
TAKAHASHI Hironobu	Chiba Prefectural Funabashi High School	-	-	G4-33-N	Learner
TERASHITA Keishu	Chiba Municipal Chiba High School	-	-	G4-22-F	Learner
UMEZONO Sara	Chiba Prefectural Funabashi High School	-	-	G4-33-O	Learner
YONEMOTO Daisuke	Chiba Municipal Chiba High School	-	-	G4-23-G	Learner

■ASCENT Students

Name	University/School	Research Session		Workshop	
FUKUDA Kotaro	Chiba Prefectural Sakura High School	G3-11	Presenter	G4-33-N	Learner
MATSUOKA Uina	Tokyo Metropolitan Koishikawa Secondary School	G4-34	Presenter	G4-21-C	Learner
NARITA Momoka	Chiba Prefectural Funabashi High School	G3-12	Presenter	-	-
NUNOKAWA Ai	Showa Gakuin Shuei Senior High School	G3-11	Presenter	G4-22-D	Learner
UCHIYAMA Yuki	Friends Girls Senior High School	G3-12	Presenter	-	-

■TWINCLE Students

Name	University	Research Session		Workshop	
AKABANE Toki	Chiba University	G3-11	Audience	G4-32-K	Learner
HARA Ryusei	Chiba University	G4-34	Audience	G4-32-J	Learner
HIRAI Mika	Chiba University	G3-12	Timekeeper	G4-23-H	Learner
HIRAIWA Miki	Chiba University	G3-11	Audience	G4-23-G	Learner
HIRATA Kohana	Chiba University	G3-12	Audience	G4-23-I	Learner
IGARASHI Yuri	Chiba University	G4-24	Audience	G4-32-K	Learner
ISHIDA Youta	Chiba University	G3-11	Audience	G4-21-C	Learner
ISHIHARA Yura	Chiba University	G4-34	Audience	G4-21-B	Learner
KAKUI Mio	Chiba University	G3-11	Audience	G4-33-O	Learner
KATO Atsuya	Chiba University	G4-34	PC Assistant	G4-33-O	Learner
KAWASHIMA Toko	Chiba University	G3-12	Audience	G4-23-H	Learner
KIKUCHI Kei	Chiba University	G4-24	PC Assistant	G4-32-L	Learner
KIKUCHI Syouri	Chiba University	G4-24	Audience	G4-21-A	Learner
KIMINARITA Hiyori	Chiba University	G4-34	Timekeeper	G4-22-D	Learner
KITADA Aya	Chiba University	G4-24	Audience	G4-32-L	Learner
KOBAYASHI Kai	Chiba University	G3-12	PC Assistant	G4-22-E	Learner
KOMAI Hiromi	Chiba University	G4-34	Timekeeper	G4-23-I	Learner
KUROSAKI Mao	Chiba University	G4-34	Audience	G4-21-A	Learner
MARUYAMA Kairi	Chiba University	G4-34	PC Assistant	G4-21-C	Learner
MATSUDA Kotone	Chiba University	G3-11	Audience	G4-33-N	Learner
MATSUMOTO Momoko	Chiba University	G3-12	Audience	G4-21-B	Learner
MATSUNAGA Miharuru	Chiba University	G4-24	Audience	G4-23-H	Learner
MIZUKOSHI Sotaro	Chiba University	G4-34	Audience	G4-32-J	Learner
NEGORO Ayaka	Chiba University	G3-12	Audience	G4-33-M	Learner
NISHIOKA Sayana	Chiba University	G3-11	Audience	G4-23-G	Learner
OMORI Maya	Chiba University	G4-24	Timekeeper	G4-22-F	Learner
OSONE Riku	Chiba University	G4-24	Audience	G4-22-F	Learner
OWADA Mai	Chiba University	G3-12	Audience	G4-33-M	Learner
SASAKI Nana	Chiba University	G4-24	Audience	G4-32-J	Learner
SASAKI Yu	Chiba University	G4-24	Audience	G4-22-F	Learner
SATO Miki	Chiba University	G3-11	Timekeeper	G4-23-G	Learner
SATO Yurika	Chiba University	G4-24	Timekeeper	G4-33-N	Learner
SHIMURA Daiki	Chiba University	G3-12	Audience	G4-22-D	Learner
SUGAWARA Nanoha	Chiba University	G4-34	Audience	G4-32-L	Learner
SUGIBAYASHI Katsuhiko	Chiba University	G4-34	Audience	G4-23-I	Learner
SUZUTA Akito	Chiba University	G3-11	Audience	G4-21-A	Learner
TADA Konoka	Chiba University	G3-11	Audience	G4-22-E	Learner
TAKUSHI Kou	Chiba University	G3-12	Audience	G4-21-B	Learner
TANAKA Yushin	Chiba University	G4-34	Audience	G4-33-O	Learner
TSUCHIYA Tomoki	Chiba University	G3-11	PC Assistant	G4-22-E	Learner
UCHIYAMA Yuto	Chiba University	G4-24	PC Assistant	G4-32-K	Learner
UEHARA Akira	Chiba University	G3-11	PC Assistant	G4-22-D	Learner
UNOZAWA Masamitsu	Chiba University	G3-12	Audience	G4-33-N	Learner
XU FANGZHOU	Chiba University	G3-12	Timekeeper	G4-32-L	Learner
XU YIFEI	Chiba University	G3-11	Timekeeper	G4-33-M	Learner
YACHI Ryoya	Chiba University	G3-12	PC Assistant	G4-33-M	Learner
YOKOGAWA Manami	Chiba University	G4-24	Audience	G4-21-C	Learner

■Chiba University (International Students)

Name	Faculty	Research Session		Workshop	
Afsana Begum	Graduate School of Humanities and Studies on Public Affairs	G4-34	Panelist	G4-22-D	Facilitator
Ahmet Melik Bas	Graduate School of Humanities and Studies on Public Affairs	G4-34	Panelist	G4-21-A	Facilitator
Cristina Roselle Mitra	Graduate School of Horticulture	G3-11	Panelist	G4-21-B	Facilitator
Fajriah Sulaiman	Faculty of Education	G4-24	Panelist	G4-23-G	Facilitator
Iago Carvalho Silva	Graduate School of Science and Engineering	G3-11	Panelist	G4-33-M	Facilitator
Julia Brottman	Faculty of Education	G3-12	Panelist	G4-22-E	Facilitator
Kiagus Aufa Ibrahim	Graduate School of Engineering	G4-24	Panelist	G4-22-F	Facilitator
Loraine Bainto	Graduate School of Horticulture	G3-12	Panelist	G4-23-H	Facilitator
Marvin Gilberto Escobar Leiva	Faculty of Education	G3-11	Panelist	G4-23-I	Facilitator
Nasuha Bunyameen	Graduate School of Horticulture	G3-11	Panelist	G4-32-J	Facilitator
Patrick Onyelukachukwu Nwaokocha	Faculty of Education	G3-12	Panelist	G4-32-K	Facilitator
Qahramani Kousar	Faculty of Law, Politics and Economics	G4-24	Panelist	G4-32-L	Facilitator
Rizvon Suleimanov	Graduate School of Humanities and Studies on Public Affairs	G4-34	Panelist	G4-21-C	Facilitator
Savira Aristi	Graduate School of Science and Engineering	G4-34	Panelist	G4-33-N	Facilitator
Victor Ibrahim Mbeya	Faculty of Education	G3-11	Panelist	G4-33-M	Facilitator

■Chiba University

Name	Faculty	Research Session		Workshop	
KATO Tetsuya	Faculty of Education	G3-12	Chair Person	G4-22	-
MANABE Yoshitsugu	Head of Next-generation Outstanding Learning Office	-	-	-	-
MORISHIGE Hina	Tokyo Gakugei University	-	-	G4-33	-
NOMURA Jun	Faculty of Education	G3-11	Chair Person	G4-21	-
SHIMONAGATA Shuji	Faculty of Education	G4-34	Chair Person	G4-32	-
TSUJI Koji	Faculty of Education	G4-24	Chair Person	G4-23	-
Wang Qian	School of Horticulture	-	-	G4-33	-

