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

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Spring Institute of
Asia & ASEAN Center for Educational Research

2025.02.09
International Research Session & SDGs Workshop

Place	Time	Detail
Faculty of Education Building 2	09:00-09:15 (15 min)	Reception
	09:30-09:45 (15 min)	Opening Ceremony
	10:00-12:00 (120 min)	Oral Presentation
	12:30-13:30 (60 min)	Lunch *We will hold a discussion session for teachers during lunch.
	13:30-16:00 (150 min)	SDGs Workshop ・ Poster Presentation
	16:30-17:00 (30 min)	Closing Ceremony

Greeting

Koutaro YOKOTE, M.D., Ph.D.

President of Chiba University

Chiba University, established in 1949 as one of Japan's newly restructured national universities, proudly traces its origins back approximately 150 years. Building on our rich history and tradition of excellence in education and research, we have taken a significant step forward this year by establishing a new Faculty of Informatics and Graduate School of Informatics. These initiatives are designed to advance education and research in information and data science, integrating and expanding upon existing programs from the Faculty of Engineering and related graduate disciplines. Through these efforts, we aim to cultivate talent equipped to thrive in the digital age.

In addition, we are actively working to strengthen our research capabilities and facilitate the social implementation of academic achievements. Chiba University has been intensifying its research in critical areas such as immunology, vaccine science, and preventive medicine, striving to translate these advancements into tangible societal benefits. Our commitment to research excellence has been further recognized through our selection for the Program for Forming Japan's Peak Research Universities (J-PEAKS), which underscores our role as a regional and international research hub.

In the realm of education, we are also fostering global initiatives to nurture the next generation of leaders. Supported by the Japan Science and Technology Agency's STELLA program, we have launched ASCENT-6E, a new program dedicated to identifying and developing talented individuals.
This initiative, carried out in collaboration with domestic and international universities as well as education and research institutions, offers diverse opportunities for young scholars to grow.
In the near future, these individuals will emerge as the next generation of researchers, poised to tackle global challenges.

Chiba University remains steadfast in its mission to contribute to a better society. We deeply appreciate your continued support and collaboration in these endeavors.

Greeting

Daisuke FUJIKAWA

Dean, Faculty of Education,
Chiba University

To the esteemed faculty and researchers from our partner universities in Asia and the ASEAN region, thank you very much for taking the time to participate in this annual assembly. On behalf of the Faculty of Education at Chiba University, I extend my heartfelt gratitude to all of you.

At the Faculty of Education, Chiba University, we aim to contribute to the realization of a sustainable society by enhancing the quality of education and fostering the creation of new knowledge. In pursuing this goal, international collaboration and the sharing of knowledge beyond borders are indispensable. In this context, our partnerships with universities in Asia and the ASEAN region play a crucial role by enriching our learning and research through diverse cultural and social perspectives.

Through our past collaborative efforts, we have shared numerous achievements. However, as global challenges become increasingly complex, it is essential that we further strengthen our cooperation and advance to the next stage of collaboration.

I am confident that your expertise and passion will greatly enhance the strength of our collaboration. I sincerely hope that this assembly will serve as a platform for generating new ideas and forging lasting friendships.

In closing, I wish you all continued success and look forward to the fruitful outcomes of our future joint endeavors.

Thank you very much.

Greeting

Yoshitsugu MANABE, Doctor of Engineering

Professor, Graduate School of Informatics, Vice Dean,
Head of Next-Generation Outstanding Learning Support Office, Chiba University

Chiba University is committed to enhance further its ability to foster excellence in the field of scientific research through the ASCENT-6E beginning in FY2024, following the ASCENT program launched in FY2020.

Education and research activities beginning as early as high school are essential to cultivate outstanding individuals in science and technology, not just university-level efforts. Inquiry-based education at the high school level helps to develop the ability to ask questions and solve problems independently. Projects that involve forming hypotheses, conducting experiments using scientific methodologies, analyzing data, and drawing conclusions help students enhance their problem-solving skills and creativity. Furthermore, inquiry-based education draws out students' interests and passions, deepening their engagement with their areas of interest. This, in turn, fosters heightened motivation for learning and encourages self-driven study. Such educational activities enable the development of individuals who can propose innovative ideas and solutions in the field of science and technology.

Leveraging its extensive network of international scientific and technological research and education, Chiba University supports high school research activities through ASCENT-6E. This initiative aims to nurture young talents who can lead the creation of a new world envisioned by Society 5.0 and become outstanding global researchers.

We sincerely thank you for your support over the past four years of the ASCENT Program and kindly ask for your continued support as we embark on the ASCENT-6E initiative.

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

Dear Distinguished Guests,

It is my great pleasure to welcome you to the annual meeting of the Asia and ASEAN Center for Educational Research at Chiba University. As the director of this center, I am deeply honored to have so many esteemed guests join us from across the globe to share their insights, knowledge, and experiences.

The Asia and ASEAN regions are at the forefront of innovation, cultural diversity, and economic growth, making them vital contributors to global progress. At Chiba University, we are committed to fostering collaboration and advancing education and research that address the challenges and opportunities of this dynamic region. Through partnerships and shared endeavors, we aim to create impactful solutions and nurture future leaders who can contribute to sustainable development and mutual understanding.

This annual meeting provides an invaluable platform for us to exchange ideas, build connections, and explore new possibilities for collaboration. I am confident that the discussions and insights shared during this event will lead to meaningful advancements in our shared goals.

I would like to express my heartfelt gratitude to all of you for traveling from afar to participate in this gathering. Your presence here today is a testament to the strength of our international network and the shared commitment to advancing education and research.

On behalf of Chiba University, I extend my warmest welcome and wish you a fruitful and inspiring meeting. Let us work together to build a brighter future for the Asia and ASEAN regions and beyond.

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 2108 (Biosensors, Biology, Electromedical, Education)		
Chairperson	TITI CANDRA SUNARTI	IPB University
Panelist	CHITTABOUBPHA SOUPHAPHAK	National University of Laos
Panelist	Amornrat Boobpachote	Chulalongkorn University Demonstration Secondary School
Panelist	Victor Ibrahim Mbeya	Chiba University
Presenter 1	SHOFIYA WARDAH MAULANA Universitas Indonesia **Exploration of Flexible Carbon Electrodes: Preliminary Research on Material and Fabrication Methods**	
Presenter 2	MATSUMOTO Kotaro Hyogo Prefectural Kakogawa Higashi High School **The native plant species of the Kakogawa River by family**	
Presenter 3	APRILIA SARAH KRISTINA Universitas Indonesia **Experimental Study: Innovation The Development of Electrostimulation Technology to Stabilize Excess Glucose Levels in Diabetes Suffers**	
Presenter 4	HATAKEYAMA Yuku, MATSUMURA Takeshi, MURANUSHI Moeka,OHKOHCHI Shunpei, SUZUKI Yuzu Chiba Prefectural Kisarazu High School **Make Delicious Amazake with Kisarazu's Local Product**	
Presenter 5	DONG JIEJUN Mahidol University **AI and Personalized Learning: Opportunities and Challenges**	
Presenter 6	SUZUKI Anri Tokyo Metropolitan High School of Science and Technology **The relationship between basil glandular hairs and the growing environment**	
Presenter 7	STELLA MARISKA HANAKO Bandung Institute of Technology (ITB) **Land Suitability for Arabica Coffee (Coffea arabica) Agroforestry and Land Cover Analysis in Geulis Mountain, Sumedang Regency**	
Presenter 8	ANNA FELICYA Bandung Institute of Technology (ITB) **Coastal Vegetation in Citepus Sukabumi**	
Presenter 9	WAKUNO Uta Tokyo Metropolitan High School of Science and Technology **Photosynthesis by Chloroplasts Outside the Cell**	
Presenter 10	PENG LITING Mahidol University **AI Competence and Impact on the Cross-Cultural Adaptation of International Students**	

International Research Session

Room 2109 (Education, Biology, Health, Information)		
Chairperson	DODI SUDIANA	Universitas Indonesia
Panelist	CHATREE FAIKHAMTA	Kasetsart University
Panelist	Patchara Nualpan	KU Laboratory School
Panelist	Julia Brottman	Chiba University
Presenter 1	SHI JINGJING Mahidol University **Analysis of Shanghai's education system**	
Presenter 2	KHANSA NITISARA RAMADHANI Universitas Indonesia **HeartTip: Remote Heart Monitoring System for Pediatric Congenital Heart Disease Patients**	
Presenter 3	ODA Salia Chiba Municipal Chiba High School **Deodorizing effect of Houttuynia cordata**	
Presenter 4	LI XUAN Mahidol University **Analysis of Kunming's Education System**	
Presenter 5	NOJIRI Kotaro, HAMANAKA Leo, MIYAJIMA Takeru Chiba Municipal Chiba High School **PROPOSAL of NEW ECO-FRIENDLY WAYS to CONTROL PESTS ～In SMART FARMING～**	
Presenter 6	SALSABILA ZAHRANI PUTRI Bandung Institute of Technology (ITB) **Identification of Coral Reef Types and Conditions in Tunda Island, Indonesia, Using the Coral Watch Coral Health Chart**	
Presenter 7	MATSUOKA Uina Tokyo Metropolitan Koishikawa Secondary School **Exploring Correlations between Human Emotions, Society, and the Evolution of Music in Modern Japan**	
Presenter 8	ALICIA ZALFAA JATNIKA Bandung Institute of Technology (ITB) **UTILIZING CITARUM RIVER'S WATER HYACINTH FOR CRAFT PRODUCTION: A SUSTAINABLE APPROACH TO ENVIRONMENTAL RESTORATION AND LOCAL EMPOWERMENT**	

International Research Session

Room 2111 (Microbiology Food Safety , Biology, Climatology, Sports Science, Earth Sciences, Marine Pollution)		
Chairperson	UDOMLUK KOOLSRIROJ	Kasetsart University
Panelist	THITI YANPRECHASET	Silpakorn University
Panelist	Charuwan Pupanead	Watraikhing Wittaya School
Panelist	Iago Carvalho Silva	Chiba University
Presenter 1	ASEP FIRMAN NUGRAHA IPB University **Systematic Review: The Prevalence of Pathogenic Bacterial Contamination in Beef**	
Presenter 2	NARITA Momoka Chiba Prefectural Funabashi High School **Comparison of lipid production capacities of algae in indoor aquariums**	
Presenter 3	RIYADI ZAKIA SYAHRULLOH Bandung Institute of Technology (ITB) **Correlation Analysis of ONI and DMI for Rainfall in the Cirata Reservoir Area in 2010 – 2023**	
Presenter 4	FUKUDA Kotaro Chiba Prefectural Sakura High School **Study on the Deodorization Method of Cricket Powder ～Attempts to Use Insects Food～**	
Presenter 5	TARNPIAM PARAVEE Mahidol University **INTER-LIMB ASYMMETRY IN MUAY THAI FIGHTERS DURING A PRE-COMPETITION PHASE**	
Presenter 6	RAFLI YUDHA ASDANA Bandung Institute of Technology (ITB) **Coastal Vulnerability Analysis of Southern Yogyakarta Against Abrasion Threats**	
Presenter 7	SASE Kaisei, HIRONAKA Aya, MAEDA Taichi, KONNO Wataru Chiba Prefectural Kisarazu High School **The Development of Jasmine rice koji**	
Presenter 8	ALIF SHIDQIE AL BANI Bandung Institute of Technology (ITB) **FOURIER TRANSFORM INFRARED (FTIR) SPECTROSCOPY FOR PLASTIC POLYMER TYPE ANALYSIS**	
Presenter 9	KAMONTHIP JINDAWONG Silpakorn University **Exercise Behaviors of Sports Science Students at Silpakorn University, Sanam Chandra Palace Campus**	

International Research Session

Room 2112 (Earth Sciences, Chemistry, Agriculture, Life Science)		
Chairperson	PUTU AYU ASTY SENJA PRATIWI	Udayana University
Panelist	SURAPONG RATTANAKUL	King Mongkut's University of Technology Thonburi
Panelist	YUSLI WARDIATNO	IPB University
Panelist	Lin Chunhao	Taipei First Girls High School
Panelist	Patrick Onyelukachukwu Nwaokocha	Chiba University
Presenter 1	MUHAMMAD ADRIAN LUBIS Bandung Institute of Technology (ITB) **ANALYSIS OF STEEP FACTORS ON THE IMPACT OF SEA LEVEL RISE AND LAND SUBSIDENCE IN THE COASTAL REGION OF INDONESIA**	
Presenter 2	MATSUZAKI Sakurako Chiba Municipal Chiba High School **Hair Damage Repair Effect By Kelp Extract**	
Presenter 3	PANDE MADE GIOPANY Udayana University **Capacity Building for Farmer Group Through Integrated Pest Management (IPM) Field School**	
Presenter 4	YAMAZAKI Taro, SHIMAZAKI Riku, MINE Rintaro Chiba Prefectural Chiba Higashi High School **About luminol reaction**	
Presenter 5	NITTIYA ORNWARN King Mongkut's University of Technology Thonburi (KMUTT) **Development of Thermo/Magnetic responsive Hydrogel for Drug Delivery Application**	
Presenter 6	KATO Yuna Chiba Municipal Chiba High School **About Caramelization Reaction**	
Presenter 7	DEWINA NUR HUMAIRA IPB University **LIBIDO AND SCROTAL CIRCUMFERENCE OF GARUT SHEEP SUPPLEMENTED WITH DIFFERENT UNSATURATED FATTY ACID SOURCES AND ANTIOXIDANTS**	
Presenter 8	SHIBAYAMA Himari Tokyo Metropolitan High School of Science and Technology **Preparation of Water Absorbent Paper Mixed with Used Tea Leaves**	
Presenter 9	NAILA FARIDAH HUDA WASILAH Bandung Institute of Technology (ITB) **INVESTIGATING THE 2022 BANGKA SUBMARINE CABLE DAMAGE: BATHYMETRIC AND TIDAL ASSESSMENT IN BANGKA WATERS**	

International Research Session

Room 2201 (Physics, Chemistry, Remote Sensing Application, Geoscience and Environmental Management)		
Chairperson	TOCH PHEAKDEY	Royal University of Phnom Penh
Panelist	PANCHIT LONGPRADIT	Mahidol University
Panelist	HARRIS BUDILAKSONO	IPB University
Panelist	Kittaporn Puakanokhirun	Chiang Mai University Demonstration School
Panelist	Savira Aristi	Chiba University
Presenter 1	CHEN, JIE-TONG National Taiwan Normal University **Lorentz Transformations and Basic Kinematic Results of Special Relativity**	
Presenter 2	AKABA Kento, NAGATSUBO Taiyo, NAKAMURA Nico, MINAMI Hiroto Tokyo Gakugei University International Secondary School **On the Extraction of Monosodium Glutamate by Acid Hydrolysis of Wheat Gluten -Seeking the Production of an Amino Acid Fertilizer-**	
Presenter 3	ATHAR ABDURRAHMAN BAYANUDDIN Universitas Gadjah Mada **Assessing the Impact of Savanna Fires on Sentinel-1 C-Band Backscatter Time Series in the Bromo Tengger Semeru National Park**	
Presenter 4	EGAMI Yuma Chiba Municipal Chiba High School **Plasma jet commodity**	
Presenter 5	KHUAT THI THANH HUYEN University of Education, Vietnam National University, Hanoi **USING EXPERIMENTS IN TEACHING PHYSICS ACCORDING TO THE 2018 GENERAL EDUCATION CURRICULUM IN VIETNAM**	
Presenter 6	FUNAKOSHI Tsukasa Chiba Prefectural Makuhari Sogo High School **Research on red cabbage pigment**	
Presenter 7	TSAO, SHUO-CHENG National Taiwan Normal University **Millikan's oil drop expriment**	
Presenter 8	OKUNO Haruto, YONEMOTO Daisuke, KAWASHIMA Gaku Chiba Municipal Chiba High School **A Study on How to Stack Cards Infinitely Using the Center of Gravity**	
Presenter 9	DINIYARTI Universitas Gadjah Mada **Mapping the Distribution of Potential Acid Sulfate Soils Using Remote Sensing Based on Coastal Landscape Characteristics**	

International Research Session

Room 2202 (Education, Math, Physics)		
Chairperson	ACHMAD SAMSUDIN	Universitas Pendidikan Indonesia
Panelist	LE THAI HUNG	University of Education, Vietnam National University, Hanoi
Panelist	SAMIPHAK, SARA	Chulalongkorn University
Panelist	TANAWAN SAWATDIPHAP	Mahidol University
Panelist	Andrew Dy	USC-Senior High School
Presenter 1	SUMIATI Universitas Pendidikan Indonesia **Improving Students' Critical Thinking Skills Through Technology-Based Learning Media on Climate Change Material**	
Presenter 2	HIRA Shoji Chiba Prefectural Chosei High School **Optimal strategy of memory game**	
Presenter 3	XIONG YANGXIANGJUN Mahidol University **Improving and Enhancing Education of Dali Yunnan**	
Presenter 4	FUKUMOTO Yuma Chiba Prefectural Funabashi High School **The relationship between the coefficient of friction and abrasion on aluminum surface**	
Presenter 5	SUWANNAKET CHUTIPON Chulalongkorn University **Enhancing Scientific Imagination of Thai Secondary School Students through Collaborative Thought Experiments**	
Presenter 6	CHAN,YU-CHENG National Taiwan Normal University **The Sound Produced by The Corrugated Pipes**	
Presenter 7	TERASHITA Keisyu Chiba Municipal Chiba High School **GRATING that Improves Drainage Performance Affected by Fallen Leaves**	
Presenter 8	SUN NIKA Royal University of Phnom Penh **Solar Charger**	
Presenter 9	TAKAHASHI Hironobu Chiba Prefectural Funabashi High School **The relationship between the distance of the exit to the jamming of the spheres**	
Presenter 10	PANRUI TAN Mahidol University **Research on the Importance of Online Education Platforms for Educational Leaders**	

International Research Session

Room 2203 (Ocean Dynamic, Chemistry, Environment , Experimental Research, Education)		
Chairperson	IVONNE MILICHRISTI RADJAWANE	Institut Teknologi Bandung
Panelist	ARISARA LEKSANSERN	Mahidol University
Panelist	Sari Narulita	SMA Negeri 1 Bandung
Panelist	KAMELIA FIKRIAH	Kornita Senior High School
Panelist	Rizvon Suleimanov	Chiba University
Presenter 1	PARIKESIT NURIL AZMI Bandung Institute of Technology (ITB) **Charting Merine Plastic Pollution: Modeling Macroplastic Trajectory with OpenDrift**	
Presenter 2	TAKANASHI Hiro, TSUBOUCHI Amane, MIYAMOTO Haruta Chiba Municipal Chiba High School **Comparison of Antioxidant Effects of Potato Peels in Korea and Japan**	
Presenter 3	TIPARADEE VARINTORN King Mongkut's University of Technology Thonburi (KMUTT) **TREATABILITY STUDY FOR DYE-MANUFACTURING WASTEWATER: ADVANCING SUSTAINABLE DEVELOPMENT GOALS (SDGs)**	
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International Research Session

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Chairperson	POSCHANAN NIRAMITCHAINONT	MahidolUniversity
Panelist	WANDEE KASEMSUKPIPAT	Kasetsart University
Panelist	NUR MUHAMMAD FARDA	Universitas Gadjah Mada
Panelist	LELY ERSASTRI ZAINUDDIN	SMAN 9 Depok
Panelist	Fajriah Sulaiman	Chiba University
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International Research Session

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Chairperson	SOVARITTHON CHANSAENGSEE	MahidolUniversity
Panelist	TZU-SHAN CHENG	National Taiwan Normal University
Panelist	Aang Suhendar	SMA Alfa Centauri
Panelist	Charmaine Gugulethu Lunga	Chiba University
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International Research Session

Room 2207 (Education, Humanities, Social Science)		
Chairperson	ROLANDO VELARDE OBIEDO	University of San Carlos
Panelist	SARMIENTO VENUS MAY HORTALEZA	Pangasinan State University
Panelist	Santos, Cherry Cathleen Topinio	Regents Secondary School
Panelist	Marvin Gilberto Escobar Leiva	Chiba University
Presenter 1	PIYANUCH KIEWARAM Kasetsart University **Development of a Creative Thinking and Innovation Course Focusing on Design Thinking Process and the Bio-Circular-Green (BCG) Economy Model for Upper Secondary School Students in Science Schools**	
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Presenter 3	CHEN, FANG-CHI National Taiwan Normal University **"Brilliant as a Child, Not Necessarily Outstanding as an Adult?"— An Exploration of Self-Identity in Gifted Adults**	
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Presenter 5	GUO ZHIWEI Mahidol University **Improving and Enhancing Education in Shandong**	
Presenter 6	ONOZAWA Miyu, SARUTA Mako, MITSUOKA Chinatsu, WATANABE Rua Chiba Prefectural Sakura High School **Traditional Japanese Games for Communication**	
Presenter 7	MAEDA Yuya Chiba Prefectural Chosei High School **The future of Alphabet**	
Presenter 8	CHARY LYN D. DE GUZMAN Pangasinan State University **Associating Science Teaching Approaches to Students' Motivation: An Analysis**	
Presenter 9	SAITO Hiyori Chiba Prefectural Chosei High School **The mystery of the end of mascot boom～mascot's not adorable story～**	
Presenter 10	FENG XIN Mahidol University **Improving and Enhancing Education of Yuxi City**	

International Research Session

Room 2208 (Humanities, Social Science, Education, Psychology)		
Chairperson	JANEJIRA ARSARKIJ	Chiang Mai University
Panelist	CHAKVONSA DOKPHOUT	National University of Laos
Panelist	MONCHAI CHOTTIDAO	Mahidol University
Panelist	Akhmad Fatoni Markum	High School 6, Yogyakarta (SMA Negeri 6 Yogyakarta)
Presenter 1	RAFIE AMANDIO FAUZAN Universitas Indonesia **DiversID: AI-Powered E-KYC for the Visually Impaired**	
Presenter 2	SAGIUCHI Mei Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School **Role of Body Language in Communication with Cultural Context**	
Presenter 3	MEEMAE TANYARAT Mahidol University **Role of Modern Educational Leadership: A Case Study on a Refugee School in Thailand**	
Presenter 4	ANDO Yusuke Shibaura Institute of Technology Kashiwa High School **Current status and future prospects of forensic scientists**	
Presenter 5	ALOUNPHET KEOVONGSY National University of Laos **Counselling Room in Faculty of Education for Student at National University of Laos**	
Presenter 6	KHUAT HA THU VNU University of Education **Research on Gender Issues Arising from Media and SDGs**	
Presenter 7	NAKANO Kaede Shibaura Institute of Technology Kashiwa High School **The relationship between the number of hours of online English lessons and the number of English words spoken**	
Presenter 8	THERESIA ROSELINDA PERMATA DEWI IPB University **Implementing Open Innovation to Address SMEs Challenges**	
Presenter 9	KUTSUMIZU Rion Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School **The Silent Struggle of Public Speaking in Japan**	
Presenter 10	LIU WANYUE Mahidol University **Improving and Enhancing Education of the Beibei District**	

Proceedings
（High School Students）

Make Delicious Amazake with Kisarazu's local product

Hatakeyama Yuku, Matsumura Takeshi, Muranushi Moeka,
Ohkohchi Shunpei, Suzuki Yuzu

Chiba Prefectural Kisarazu High school, Japan

Purpose and Background

Our research's goal is to make fruit amazake, a fermented food originating from Kisarazu that makes use of Kisarazu's special products. Amazake is the Japanese traditional fermented drinks. But, recently, Amazake is becoming less and less popular. Subsequently, we contemplated the question, "How can we make the popularity of Amazake and imbue it with greater originality?" and came up with an idea of adding fruits. We thought that adding fruit would change the taste of Amazake and make it easier to drink.

Materials and Method

We utilized the method proposed by Ohyama (2022) to make our Amazake after making our Koji. In order to make Koji, first, 0.83 grams of Aspergillus mold was added to 1 cup of jasmine rice and fermented in an incubator at 30℃ for 24 hours. After that, 400 grams of water, rice malt made in step 1, and 1 cup of jasmine rice. were mixed and fermented in a yogurt maker for 9 hours to make Amazake (Ohyama 2022).

Amazake was completed and we added blueberries to the amazake we made.

How to evaluate flavors

Seven teachers sampled the Amazake that we made. Four distinct flavors were assessed by them. The Amazake was rated the taste on a scale from 1 to 7, with 4 representing the highest quality of flavor. The closer the average rating is to 4, the better the taste becomes.

Results and Discussion

	sweet	bitter	salty	acidity
Amazake we made	2.43	3.57	3.00	2.71
with blueberry	2.71	3.43	3.43	**4.00**

Table1, First experiment's result

	sweet	bitter	salty	acidity
Amazake	3.00	**4.00**	2.86	3.29
blueberry	2.86	**4.00**	3.71	4.14

Table2, Second experiment's result

	sweet	bitter	salty	acidity
Amazake	3.86	**4.00**	3.43	4.57

Table3, Third experiment's result

In the first experiment's result (*Table 1*). The Amazake we made with blueberry had perfect acidity point. But the Amazake we made was solid. To make the Amazake closer, we decided to add more water because Amazake is originally in a liquid state. Second, we added 2 times the amount of water as in the first experiment. The experimental method was the same as the first experiment. The second experiment's result (*Table 2*). Amazake we made and Amazake we made with blueberry had It's not a liquid state. Third, we Increased the step 1's fermentation time of Jasmine rice because the teacher advised for us that the insufficient fermentation time of the Aspergillus mold in Step 1. We fermented it for 48 hours. The experimental method was the same as the first experiment. The third experiment's result (*Table 3*). Among all the Amazake we have made to date, we have been able to create the one that is closest to a liquid form and the sweetest.

Conclusion

As the fermentation time increased, the flavor became sweeter, sour and more liquid. Additionally, adding blueberry resulted in higher points especially acidity.

Prospects

The Amazake we made is not sweet enough, so we need to think of ways to make Amazake sweeter. So, we would like try and use sweet blueberry jam because blueberry make Amazake delicious but more acidly than other one. We would also like to explore other options in the future.

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The relationship between basil glandular hairs and the growing environment

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Purpose and Background

Glandular hair makes and accumulates essential oils. When the accumulations burst due to stimulation, they emit a smell unique to the plant. In recent years, Japan's basil production has faced challenges such as the supply of imported basil and a decrease in quality control, and it is required to strengthen its competitiveness. In this study, we investigated the impact of the growth environment on glandular hair. Based on the knowledge gained, we aim to propose new basil cultivation guides and cultivation systems for Japanese basil farmers.

Materials and Methods

Basil was grown at room temperature 21℃, 12 hours of light irradiation time, and photo quantum flux density of 189.3μmol/(㎡•s) until the leaf age of 8. At the age of 8, basil was divided into two environments, "15℃-20℃" and "25℃-30℃". In addition, it was cultivated for 17 days in each environment, divided into "groups with 25 ml of 0.1% saline water" and "groups with 25 ml of pure water"(Table 1).The number of glandular hairs on each leaf was counted.[1)]

Table 1 Cultivation conditions

Temperature(℃)	Water given at the beginning of cultivation
15-20	0.1 % Saline solution
15-20	Water
25-30	0.1 % Saline solution
25-30	Water

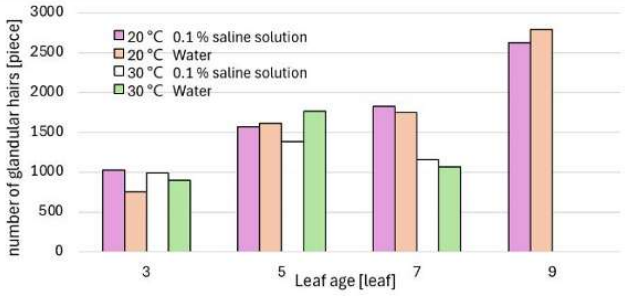

Fig.1 The number of glandular hairs by number of leaves

Fig.2 Basil immediately after environmental treatment

Fig.3 Basil 17 days after environmental treatment

Results and Discussion

17 days after the start of environmental treatment, the basil leaves grown at 15℃-20℃ became rounded and yellow. Basil leaves grown at 25℃-30℃ became dark green (Fig.2, Fig.3). Basil grown at 15℃-20℃ also increased the number of glandular hairs as the leaf age increased. However, the number of glandular hairs of basil grown at 25℃-30℃ decreased as the leaf age increased from 7 (Fig.1). From this, it is possible that basil increases the number of glandular hairs when it feels stressed by the low temperature.

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Photosynthesis by chloroplasts outside the cell

Wakuno Uta

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Purpose and Background

Urbanization in many countries has reduced the number of suitable places for plant growth, thereby making global warming a worldwide problem. I hypothesized that efficient photosynthesis could be achieved by applying extracted chloroplasts to the roofs and walls of buildings. (Sonoike,2012) The objective of this study was to investigate whether the extracted chloroplasts can photosynthesize in air and saline solution, and what the differences are between the two.

Materials and Methods

Chloroplasts were extracted from spinach and 4% sucrose solution, and were extracted by grinding with a mixer, filtration, and centrifugation. The extracted chloroplasts A: precipitate, B: filtered residue, and C: filtrate were each placed in a flask containing 3 ml of carbon dioxide and measured in an oximeter for 4 days. The spinach filtrate was placed in a 30 ml Visking tube and soaked in saline solution; after 10 days, the presence of sugar was determined using liquid chromatography.

Results and Discussion

A	B	C
42,500	27,000	32,000

Fig.1: Measured oxygen concentration in air (ppm)

Fig.2: Covered chloroplasts

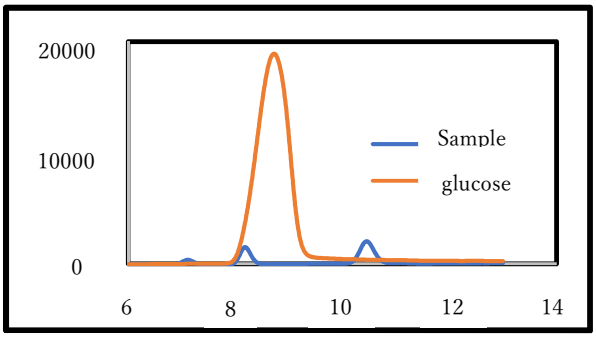

Fig.3 Results of glucose measurement in saline solution

area	concentration	compound name
22526	0.02%	glucose

Fig.4 Results of sugar measurement

The oxygen concentration in the chloroplast sediments was measured at 42,500 ppm(Fig.1). This corresponds to one-fifth of the oxygen concentration in air. After the experiment, the samples were examined under a microscope. In residue after filtration chloroplasts were found to be covered with a thin film. This is presumably due to the absorption of the annihilated chloroplasts into the vacuole(Fig.2). The chloroplasts in the air were moldy after 5 days. After 10 days, liquid chromatography of the saline solution showed that a small amount of sugar was produced(Fig.3,4). No mold was found on the chloroplasts in the tubes. The extracted chloroplasts were found to be able to photosynthesize both in air and in saline solution. We also considered that they are less likely to mold in saline solution because they are not in contact with mold in the air.

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Deodorizing effect of Houttuynia cordata

Salia Oda

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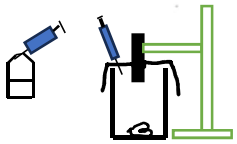
Purpose and Background

When I visited my grandparents house, I found the *Houttuynia cordata* leaf in the restroom. I was very surprised and I asked my grandmother why? Then she said " It has a deodorizing effect." Therefore ,I became interested in it and I started this research to find out if it was true.
In this research, I focused on ammonia and I investigated the deodorizing effect of *Houttuynia cordata* leaf on it. Because the restroom is related to ammonia. https://www.kumamoto-u.ac.jp/ (2024/9/3)

Materials and Methods

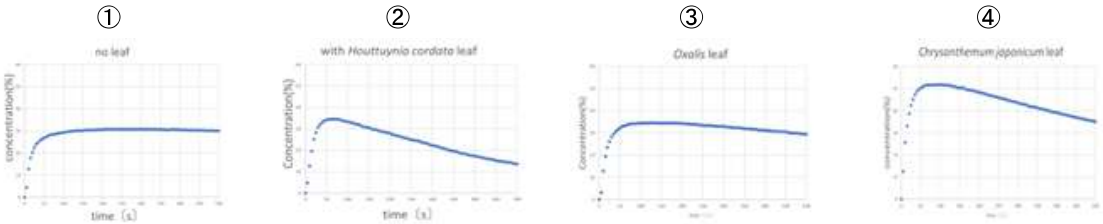
(Tools)
▪syringe ▪stand ▪bottle containing ammonia water (concentration8%)
▪500mL beaker ▪ammonia concentration measuring instrument
▪plastic film ▪time▪ *Houttuynia cordata* leaf ▪*Oxalis* leaf▪*Chrysanthemum japonicum* leaf

(Method)
1,setting the tools like this figure.



2,remove 8mL of ammonia gas from the bottle with a syringe.
3,put gas into a beaker .
4,measure ammonia concentration with a measuring instrument every five seconds.
5,conduct four experiments (①with no leaf ②with *Houttuynia cordata* leaf ③④other kinds of leaves to compare)

Results and Discussion



Deodorizing effect of Houttuynia cordata on ammonia concentration is recognized. Also,other plants may have a deodorizing effect.Their plants have chemicals.
Houttuynia cordata leaf – decanoyl acetaldehyde *Oxalis* leaf – oxalis aci*Chrysanthemum japonicum* leaf– monoterp
I want you to live by using weeds instead of throwing them.

REFERENCES

https://www.kumamoto-u.ac.jp/ (2024/9/3)

PROPOSAL of NEW ECO-FRIENDLY WAYS to CONTROL PESTS ～In SMART FARMING～

Kotaro Nojiri, Leo Hamanaka, Takeru Miyajima

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Purpose and Background

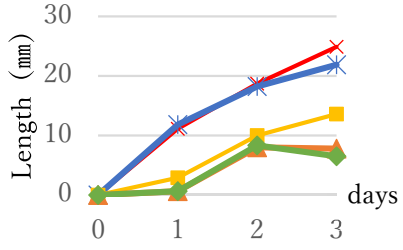
The aging and decrease of Japan's agricultural population are serious issues.[1] To address this, smart farming technologies are being used. However, the slow development of pest control technologies remains a major challenge.[2] Our goal is to find eco-friendly pest control methods. Currently, high temperature treatment is one of the ways to do this, but there is little research done on low temperature treatment, so we forced it in this research.[3]

Materials and Methods

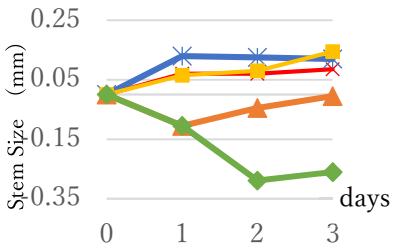
plant	Radish (Raphanus sativus var. sativus)	Freezing temperature	-35℃
Growth conditions	Temperature 23.5℃　Humidity 75%	Freezing time	0, 30, 60, 120 and 180sec.
Soil	GREEN TECH's soil	Freezing timing	7 days after germination

2 radish seeds were planted in each pod with 130g of soil, and these radishes were grown in a plant growth chamber, then frozen in a deep freezer. Radish length, stem size, and leaf area were measured using a ruler, vernier micrometer, and an app called ImageJ respectively.

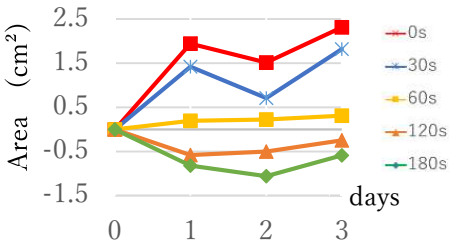
Result and Discussion



the Radish Growth Graph



the Stem Size Graph



the Leaf Area Graph

Overall, we found little difference between the results for the 0- and 30-seconds groups, meaning that freezing at -35°C for 30 seconds doesn't significantly affect plants growth. As freezing time increased, growth decreased, with a large difference between the results of the 30- and 60-seconds groups. Therefore, we concluded that Radishes seem to endure freezing at -35°C for 30 to 60 seconds. We infer that growth slows down as freezing times increase because freezing slows metabolism and damages cell walls.

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Exploring Correlations between Human Emotions, Society, and the Evolution of Music in Modern Japan

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Purpose and Background

Despite the increasing interest in music psychology studies, research integrating music, human emotions, and social backgrounds remains limited. The objective of this research is to analyze the psychological influence of music on human emotions, and how other musical components have evolved throughout modern history, hoping to extract how social events have affected J-Pop music.

Materials and Methods

Examination 1: Correlation Between Music and Social Backgrounds, 1988-2023

This study analyzed the evolution of music by selecting five popular songs per year and quantifying four musical elements—BPM, key, sound pressure, and chord progression—using Mirtoolbox in MATLAB. The extracted trends were then examined in relation to Japan's social background.

Examination 2: Correlation Between Music and Human Emotions

To investigate the relationship between musical chords and human emotions, a survey was conducted in which participants rated their emotional responses to five distinct melodies, each incorporating one of the five major chord types commonly used in J-Pop. The survey results were visualized using MATLAB. To minimize bias from prior familiarity, the melodies were generated using the AI-based music generation tool CREEVO.

Results and Discussion

Examination 1:

BPM: Rose slightly over time, showing a strong correlation with economic trends (See Fig. 1).
Key: More key signatures per song, likely to have enhanced musical complexity
Sound Pressure: Song structures evolved. Some years might have been influenced by social events.
Chord Progressions: Gradual shift from the I–IV–V–I (1451) progression to other patterns.

Discussion→We need to analyze social events other than economy, from objective point of view.

Examination 2: See Fig. 2 for the correlation between chord progressions and emotions.

Discussion→Emotional factors should be reconsidered due to strong correlations among emotions. While CREEVO reduced bias, its melodies were too similar, raising doubts about the statistical significance of chord progression differences.

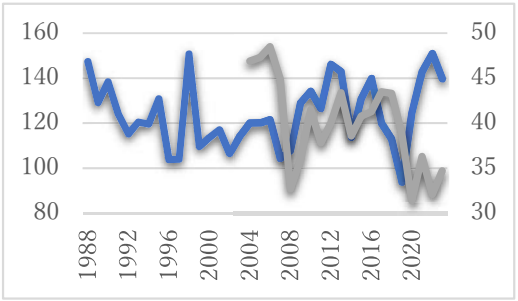

Fig. 1 BPM and Economic Situation

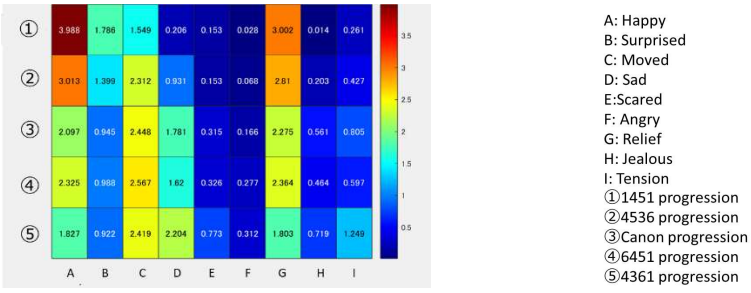

Fig. 2 Correlation between Chord Progressions and Emotions

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COMPARISON OF LIPID PRODUCTION CAPACITIES OF ALGAE IN INDOOR AQUARIUMS

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Purpose and Background

When we raise killifish or goldfish in indoor aquariums, brown moss appears. Brown moss is a freshwater diatom, and diatoms have been thought to be something that should be removed. However, I think that is a waste, so I focused on diatoms living in indoor aquariums and decided to research their possibility as biofuels. In recent years, there has been a movement to shift energy production from fossil fuels to renewable energy in order to solve environmental problems. Freshwater green algae and marine diatoms have been discovered to have value as algae biomass, but no such possibility has been found for freshwater diatoms. In 2021, Keishirou Yoshida and Taisuke Ohtsuka identified diatoms appearing in indoor killifish breeding tanks. However, the ability of diatoms in indoor aquariums to produce lipids was not investigated. In this study, I conducted a study to search for species of freshwater diatoms living in indoor aquariums that can be used as algae biomass.

Materials and Methods

The first experiment was the isolation and culture of algae from indoor aquariums. Samples were collected from four aquariums: aquarium A with water plants, aquarium B with water plants or one killifish, aquarium C with one killifish, aquarium D without water plants and killifish. After that, culture medium was added and diluted to four concentrations, and the samples were isolated in 96-well microplates. The isolated algae were transferred to 24-well microplates with silica gel and cultured at 25℃.

The second experiment was lipid droplet staining with Oil red O. Among the algae successfully isolated and cultured in the first experiment, two diatoms and three green algae were stained to check whether these algae actually had lipid droplets.

Results and Discussion

In the first experiment, green algae and diatoms were found in the four aquarium environments. The following algae were isolated and cultured: one diatom and two green algae from aquarium A, one diatom and one green alga from aquarium B, one diatom from aquarium C, and one green alga from aquarium D. In total, four green algae and two diatoms were successfully isolated and cultured (Fig.1). The same diatom was also isolated and cultured from aquariums B and C. Two diatoms and two green algae were stained by Oil red O (Fig.2), so they were shown to have lipid droplets.

In conclusion, I found the possibility of producing lipids in those algae.

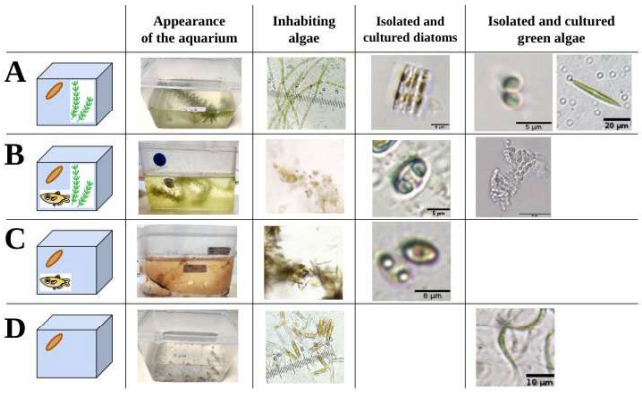

Fig.1 Algae in indoor aquariums under different environments and successfully isolated and cultured

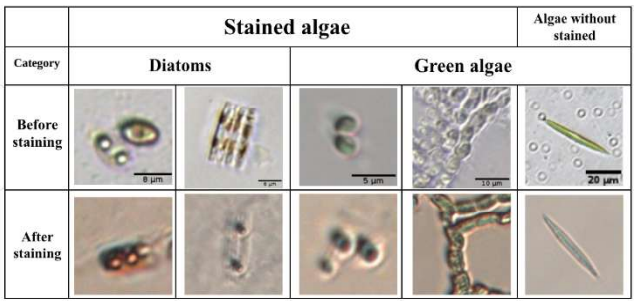

Fig.2 The result of Oil red O staining of five algae successfully isolated and cultured

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Study on the Deodorization Method of Cricket Powder
～ Attempts to Use Insects Food ～

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Purpose and Background:

In the near future, the world population is expected to exceed 10 billion. As a result, the demand for protein will increase, and the supply of protein will likely become insufficient. One way to add less this shortage is through the use of high-protein, low-cost entomophagous diets [1][2]. There are several issues that need to be addressed in order to increase the popularity of insect diets, but the appearance of insects can be improved by making them into powder. However, insects have a distinctive odor [3]. This study focused on the odor of cricket powder to see how such an odor could be eliminated.

Materials and Methods:

1. Grind the dried cricket into powder.
2. Soak 4g of dried cricket powder in the reaction solution for either 1 minute or 1 hour.

2-1 Reaction conditions

①Non-chemical treatment	22℃		
② pure water	22℃	40mL	
③ sodium bicarbonate	22℃	2.4×10^{-2}	mol/40mL
④ acetic acid	22℃	3.3×10^{-2}	mol/40mL
⑤citric acid	22℃	9.5×10^{-3}	mol/40mL
⑥pure water	97℃	40mL	

3. Pour solutions ② to ⑥into a funnel, filter them, and then add 50 mL pure water.
4. Dry at 60℃ overnight.
5. Sensory test: The odor was sniffed and the intensity of the odor was rated from 7 to 1.

Results and Discussion

As shown in Table 1, when the immersion time was 1 minute, the powder immersed in acetic acid and citric acid exhibited a weaker odor than that of pure water and baking soda. On the other hand, when the immersion time was one hour, the odor of the powder immersed in pure water and 97°C pure water was weaker than that of citric acid and acetic acid. In addition, the powder soaked in citric acid emitted an odor resembling oil clay, while the powder soaked in pure water for 1 hour exhibited a slightly burnt chocolate-like aroma, suggesting that the powder is more versatile for cooking. One limitation is that the odor evaluation was conducted by a single individual, so future studies should involve multiple evaluators Furthermore, the immersion durations were restricted to 1 minute and 1 hour; therefore, extending the soaking time to intermediate durations such as 10 minutes and 30 minutes may provide additional insights into the odor modification process.

Table 1. Odor Intensity Rating Rating scale: 1(faint) ⟺ 7(very strong)

Treatment	Odor intensity (1 min treatment)	Description of odor	Odor intensity (1 hour treatment)	Description of odor
① Non chemical treatment	5	Steamy, chocolate-like, burnt	5	Strong burning, steamy
② pure water	7	Steamy odor (stronger than ③)	3	Slight odor of dust
③ **sodium bicarbonate**	6	Steamy odor	4	Strong steamy odor
④ **acetic acid**	2	Slightly burnt chocolate-like odor	7	Strong acidic odor
⑤ **citric acid**	3	Slightly burnt chocolate-like odor	6	Oily odor
⑥ **pure water(97°C)**	4	Odor like burning	2	Slightly earthy odor
⑦ empty case	1	Odorless	1	Odorless

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The development of Jasmine rice koji

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Chiba Prefectural Kisarazu High school, Japan

Purpose and Background

Our goal is to make original fermented food from Kisarazu High School. We focused on Jasmin rice and Japanese koji. Japanese koji is a kind of Aspergillus oryzae. Among them, Japanese Aspergillus oryzae is called “koji mold,” and unlike the “Rhizopus” found in China, Taiwan, and the Korean Peninsula, it has been recognized as Japan's “national fungus” (Koizumi Takeo, 2019). And Jasmine rice is mainly imported from Thailand. So, we think of making original fermented food with Japanese koji and Jasmin rice and making Jasmin rice by using Japanese koji more popular has special meaning for Japan and Thailand.

Materials and Method

We conducted three experiments. In the first experiment, we cook Japanese rice(300g) and Jasmine rice(300g) and used Japanese koji to ferment them. We covered it with cloth and placed it in a 35 degrees incubator. The next day, we prepared rice in the same way. Then we took fermented Japanese rice and fermented Jasimine rice out of the incubator, and had our teachers evaluate the differences in flavor and texture. We repeated the first experiment and made sushi as the second experiment and sembei as the third experiment with the same procedure. Our teachers evaluated the taste of all the products.

Results and Discussion

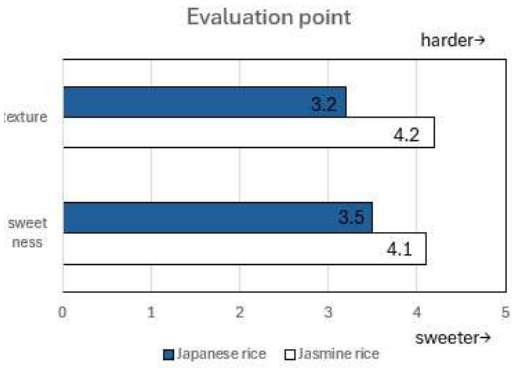

Figure 1. Average of evaluation about the first experiment (Out of 5)

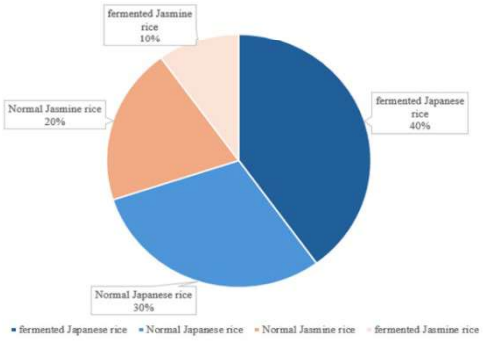

Figure2. Popularity ranking of Sembei

In the first experiment, as shown in Figure1, fermented Jasmine rice is sweeter and harder than Japanese rice. In the second experiment, Sushi using Japanese rice was tastier and the reason is because using Jasmine rice wasn’t fit. Jasmin rice and fermented it are too sweet and hard to use for sushi. In the third experiment, Sembei using the fermented Japanese rice was the most popular and in total, Sembei using Japanese rice was more popular than kind of Jasmine rice. Jasmine rice’s flavor and texture is sweeter and harder and may be not more popular than Japanese rice’s ones even if they are fermented and cooked for Japanese.

Conclusion and Prospective

As the results of these experiments, Jasmine rice’s flavor and texture was not more popular than Japanese rice’s ones. So, we need to take more account of how to utilize Jasmine rice’s flavor and texture as it is unique effectively.

Prospects

We would like to explore more ways to make use of jasmine rice’s flavor and texture more effectively, such as improving crackers made from fermented Jasmine rice and making other food products that match fermented jasmine rice’s flavor and texture and create new food products like it.

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Hair Damage Repair Effect By Kelp Extract

Matsuzaki Sakurako

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Purpose and Background:

Since shampoo and treatment containing seaweed ingredientsare sold, I thought that seaweed ingredients repair and strengthen hair damage. Investigate if seaweed ingredients have the effect of repairing and strengthening hair damage. Hair damage is repaired and strengthened by applying an extract of kelp containing a lot of alginic acid having a moisturizing effect. (N.Tanaka, A.Gyouhu (1999))

Materials and Methods:

1〈Effect of kelp extract on hair〉

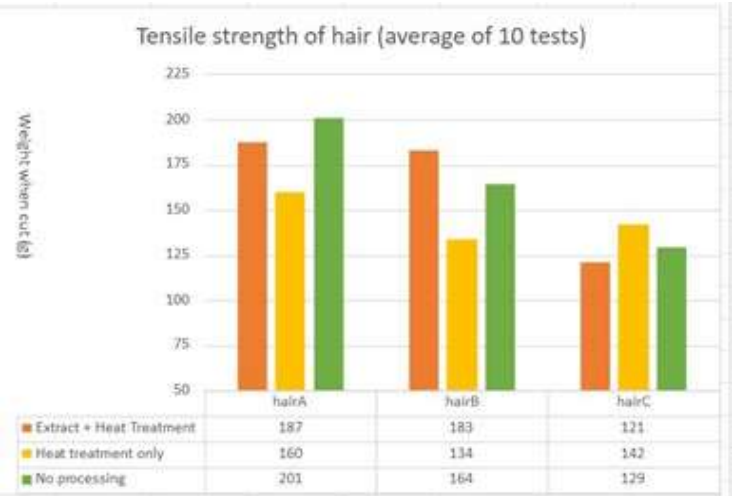
Extracted kelp extract containing alginic acid. Measured the strength of untreated hair and kelp extract applied.

2〈Effect of kelp extract due to heat damage to hair〉

Prepared heat damaged hair. Prepared three types of hair and changed the conditions
Hair A: Untreated hair　Hair B: Dyed Hair　Hair C: Dyed and Bleached Hair

Experimental method
1　Tensile Strengs
2　Surface observation using a microscope

Results and Discussion:



From the graph, hair A is less likely to be cut off when the kelp extract is applied, but the difference from the value when the kelp extract is not applied is reduced. The results of hair B and C are obtained that it is easier to cut when kelp extract is applied.

In addition, when the kelp extract is applied to the heat-treated hair A, B, the result is obtained that it is difficult to cut compared to the heat-treated hair A, B. Hair B has a large difference in value depending on the presence or absence of kelp extract, and hair C has a result that it is harder to cut when only heat treatment is applied, and it is easier to cut when kelp extract is applied.

In the case of hair A, it was considered that the effect of kelp extract on healthy hair was small because the difference in strength value depending on whether or not kelp extract was applied was small. In the case of hair B, C, when the kelp extract is applied, the strength of the hair is weakened to make it easy to cut. Accordingly, the kelp extract is considered to have no effect of repairing the hair subjected to chemical treatment. Hair A and B could be stronger when applying kelp extract after thermal damage. From this, it was considered that kelp extract has an effect of repairing heat damage to hair in the case of hair A and B conditions.

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About luminol reaction

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Purpose and Background

I studied a reaction called the luminol reaction, which produces a bluish-white glow when hydrogen peroxide and a catalyst are mixed with a substance called luminol. If you change the order of adding luminol, hydrogen peroxide, and catalyst, the illumination intensity and the length of time it glows will change. A green precipitate appeared after the reaction, no matter what order they were added (Figure 1).
We investigated the reason for this. The catalyst used in this experiment was tetraamminecopper ion. The result looked like Table 1. I looked into why the left and center of Table 1 didn't react much.

Figure 1: A green precipitate.

Table 1:What is above is the last chemical added.

	①H_2O_2	②Luminol	③$[Cu(NH_3)_4]^{2+}$
Illuminance(lx)	1	0	1.3
Time(s)	0	0	1.3

Order of adding.
① Luminol+Catarist+H_2O_2
② H_2O_2+Catarist+ Luminol
③ Luminol+ H_2O_2+ Catarist

Materials and methods

The concentrations of each solution

Luminol 5.0×10^{-3}mol/L, H_2O_2 2.9×10^{-2}mol/L, $[Cu(NH_3)_4]^{2+}$ 0.2mol/L

Experiment1: Make reactions with just luminol and a catalyst.
Experiment2(1): Make reactions with just hydrogen peroxide and a catalyst.
(2): A gas was generated, so bring a lit incense stick closer to it.

Results and Discussion

Result1: A green precipitate appeared.
Result2: The incense stick burned violently,
so hydrogen peroxide decomposed and oxygen generated
From these things, the reason why it doesn't shine much is because a different reaction occurs, and substances which are used reaction decrease before the luminol reaction occurs.

Figure 2:
Burning incense stick.

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***New Stage New Chemistry Chart* (in Japanese).** Hamasima Shoten. 1/27, 2025

About Caramelization Reaction

Kato Yuna[1], Thanyarat Ruengteerasunti[2], Rawiapar Manusviyangoon[2]

1. Chiba Municipal Chiba High School, Japan
2. Chulalongkorn University Demonstration Secondary School, Bangkok, Thailand

Purpose and Background

Caramelization happens when sugar is heated, but the process is not well understood. This study looks at how Glucose(Glc), a kind of sugar, changes when heated, whether it loses water (dehydration), and if the new substances still have reducing properties. Thin-layer chromatography (TLC) is used to study these changes. Caramelization affects the taste, color, and texture of food. Understanding this reaction can help improve food production and other industries. By studying these changes, we hope to make caramelization more useful for better food quality. (Miu, F. Chihiro, F. Mai, T. Yusuke 2019)

Materials and Methods:

Glc was heated on a hot plate at 250°C, and samples were taken at different times from 1 to 160 minutes. We observed changes in mass and color. To check if the samples still had reducing properties, we mixed them with Fehling's solution and heated them, noting any color changes or precipitate formation. Thin-layer chromatography (TLC) was used to study molecular changes by comparing Rf values with different heating times.

Results and Discussion

After heating for 3–5 minutes, Glc reacted strongly and turned brown. By 20 minutes, it became dark brown, and its mass dropped to 90% of the original. Fehling's test showed that all samples still had reducing properties. TLC results indicated that samples heated for 14 minutes or less formed larger or more polar molecules, while after 20 minutes, smaller or less polar molecules appeared. These results suggest that Glc first forms polymers but later breaks down. Future studies will further examine these changes.

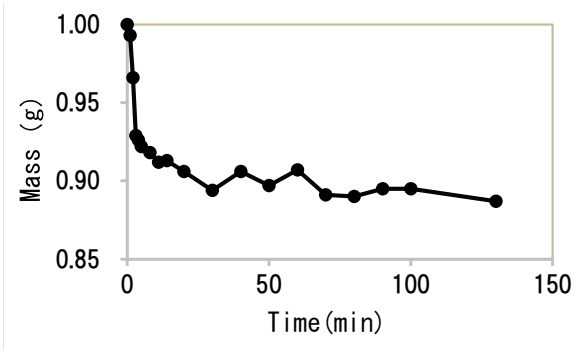


Figure1 Change in mass

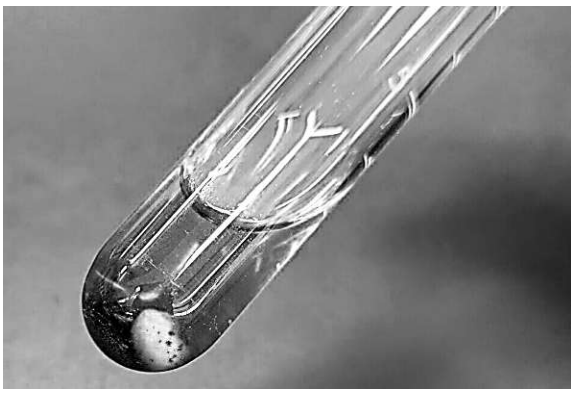
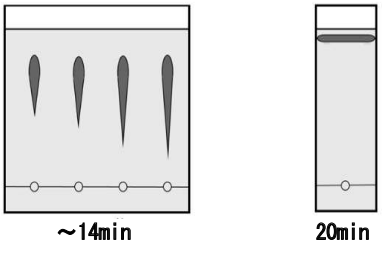
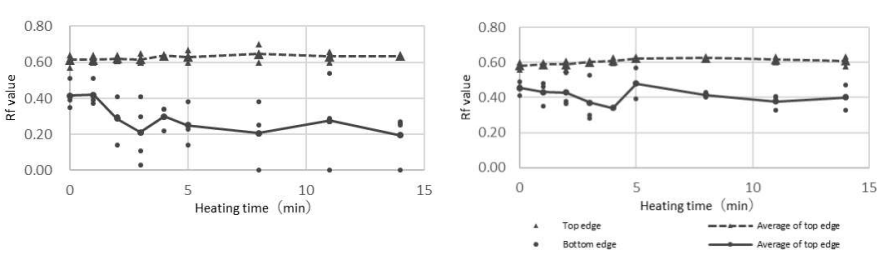


Figure2 Fehring's solution



Fighure3 Spot location



Fighre4 Rf value of KMnO4

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Preparation of Water Absorbent Paper Mixed with Used Tea Leaves

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Purpose and Background

In recent years, the production of soft drinks has increased, of which the annual production of Japanese green tea beverages is about 3 million kL. As a result, used tea leaves produced about 57,000 tons of used tea leaves at ITO EN Co., LTD [1]. However, because used tea leaves contain a lot of water, it is difficult to reuse them efficiently. The purpose of this study is to prepare water absorbent paper using used tea leaves that still contain water[2].

Materials and Methods

Experiment 1: The waste paper, tea leaves, and prototype absorbent paper were put in a tea strainer, and about 500 mL of hot water was poured over it. After leaving it for 10 minutes, the water absorption ratio was measured. The water absorption ratio was calculated using following formula.

$$\text{Water absorption ratio} = \frac{\text{(mass after absorbing water)} - \text{(mass before absorbing water)}}{\text{mass before absorbing water}}$$

Experiment 2: The 0.5 % of pulp slurry and used tea leaves slurry were prepared, and these solutions were mixed together so that the total mass was 500 g. The absorbent paper was made using our own papermaking tool (Figure 1). The prepared paper was dried, and each water absorption ratio was measured.

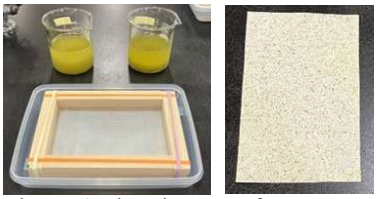

Figure 1 The pictures of our own papermaking tool and prepared absorbent paper

Results and Discussion

The water absorption ratio of tea leaves and absorbent paper were about 5 times, and paper was about 2.3 times (Figure 2). The reason for these results is thought to be that used tea leaves consist of plant tissue, while paper consist of cellulose fiber. The graph of water absorption ratio of water absorbent paper is shown in Figure 3. These results show that the higher the mixing ratio of used tea leaves, the higher the water absorption ratio of the absorbent paper.

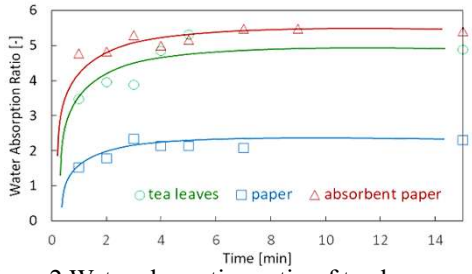

Figure2 Water absorption ratio of tea leaves, paper, and water absorbent paper

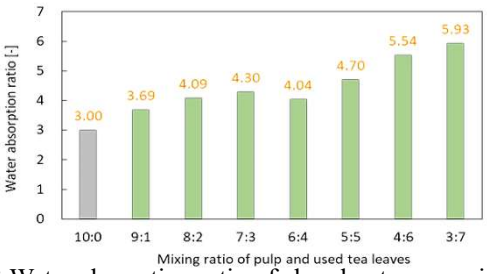

Figure3 Water absorption ratio of absorbent paper with different mixture ratios of pulp and used tea leaves

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Plasma jet commodity

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Purpose and Background

Plasma jet researches get up steam in 2000 and it becomes easily how to make plasma jet. However, it needs special knowledge, such as not knowing how to handle high voltages or what the procedure is.

Materials and Methods

A plasma jet is used as the mechanism, and a dielectric barrier method (DBD) is used for plasmaization. Plasma jet is a mechanism that injects plasma from a nozzle, and DBD is a plasma production method that uses an electrical discharge generated by covering an insulator with an electrode made of metal.

Material of the device

・Glass Tube – Insulator and nozzles(CTE33, Outsideφ6mm, Innerφ1.5mm, https://www.glass-kan.com/)
・Copper Tape – electrode ・Oxygen gas and Nitrogen gas – Plasma Materials

The current and voltage of the device were measured by the circuit shown in Figure 1 V1 is the voltage measured by dividing the resistor with R1 = 1 MΩ and R2 = 10 KΩ. V2 is the current obtained from the calculation of R3 = 100 Ω. The circuit refer to previous research, (H.Akamatu et al. 2012) and it is changed cheaper one that hard to buy the material.

It outputs 10V DC from the power supply and converts it to 300V AC at a high frequency by inputting it to a Power inverter. Then, an electric current is passed through the gas to generate plasma.

Results and Discussion

Since the light emission and sound at the time of plasma generation could not be confirmed, it is considered that it did not occur.

In cause, It is low voltage and mixed gas is more difficult to become plasma than rare gases. And the distance is not approvement that ground electrode between powered electrode.

So I shaved glass tube and insert multivibrator (Figure 2) to circuit. Frequency is calculated by C++ (584.51[Hz]).

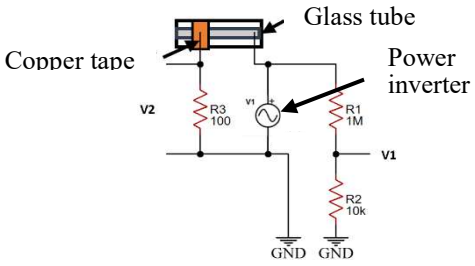

Figure1 Circuitry

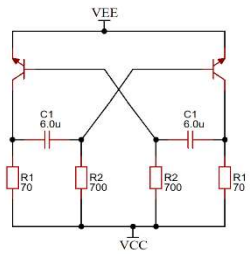

Figure2 Multivibrator

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Research on red cabbage pigment

Tsukasa Funakoshi

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Purpose and Background

Red cabbage contains a pigment called anthocyanin.[1] Interestingly, its color changes depending on the pH value (Fig1.).[2] However, when I started an experiment of anthocyanin from red cabbage, I found that its color was lost after 7days (Fig2.). The changes were especially remarkable at basics. To research the reason why such a phenomenon happens, I carried out an experiment.

Fig1. Pigment state changes depending on pH value

Materials and Methods

For This experiment, I used red cabbage. First, I cut it into small pieces. Second, I set the following 5 extraction process,

(0) Heated them in boiling water.
(1) Heated them in a solution of boiling glucose.
(2) Heated them in a solution of boiling sodium chloride.
(3) Rubbed with glucose powder.
(4) Rubbed with sodium chloride powder.

Fig2. Pigment state changes depending on pH value (After 7 days)

I changed the color of each of these for each pH and recorded how they looked after one week.

Results and Discussion

The heated ones (0),(1),(2) and the ones that added sodium chloride (2),(4) got impacted, and their anthocyanin states changed into the other ones. However, the one that added only glucose powder (3) could keep pigment state. According to these results, I suppose that heat and sodium chloride make anthocyanin pigment accelerate deterioration or decomposing. In contrast, I can also suppose that glucose supports pigment to maintain its state. Moreover, glucose may have been consumed when anthocyanin pigment shows reaction.

Table1. Result of Experiment about pigment state

C=change pigment state K=keep pigment state

pH		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Extraction process	(0)	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	(1)	K	K	C	C	C	C	C	C	C	C	C	C	C	C	C
	(2)	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
	(3)	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K
	(4)	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C

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Optimal strategy memory game

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Purpose and Background

In memory game, the player whose turn it is draws two cards. If the two cards are the same, the player draws two more cards. If they are different, the turn passes to the next player.When the number of cards left on the board reaches zero, the player with the highest number of cards wins. Although neurasthenia is generally thought of as a game of memory and luck, there is also a strategic component, which can be analyzed algebraically[1)2)].

Materials and Methods

At the time of their turn, a player may opt to draw a card from among the known cards if there is an identical card in the deck that pairs with the first card. If there is an identical card in the known cards that pairs with the first card, the player turns over that card. If not, the player's action is divided into two strategies: Strategy 1 and Strategy 2.In Strategy 1, the player chooses a card at random from among the unknown cards.In Strategy 2, the second card is chosen from among the known cards to avoid giving the opponent new information[3)].

To compare the two strategies, a stochastic process is constructed from which an incremental equation is derived. The mother function of the asymptotic equation is then obtained and the distribution of the number of cards won by the players and the win rate are analysed. This allows a mathematical assessment of which strategy is more advantageous.

Results and Discussion

This figure expresses the probability to win strategy 1(Fig.1). Players who draw when it is a match take strategy 1,and players who draw second take strategy 2.They can remember all of the cards.

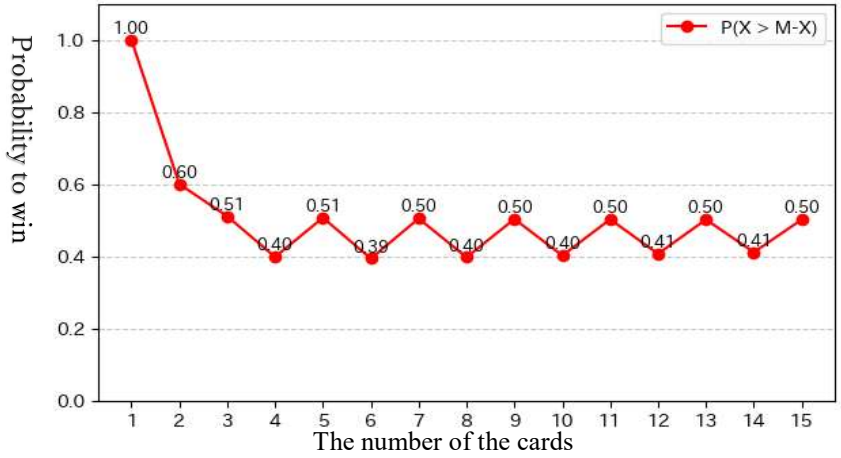

Fig.1 Probability to win strategy 1

Most people take strategy 1.However,you should take strategy 2 over strategy 1.When the number of cards is little, strategy 1 has an advantage.However, when the number of cards is increasing, strategy 2 has more of an advantage to win.

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The relationship between the coefficient of friction and abrasion on the aluminum surface

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Purpose and Background

The friction principle is not uncovered. There are two theories. The first theory is the adhesion theory, which states friction is the adhesive force and is proportional to the real contact area (RCA) (a part of apparent contact area). The other is the roughness theory, which states friction is caused by the roughness of the contact surface and is proportional to the surface gradient (Popov, 2023).

Previously, I did an experiment researching the paper would wear by sliding on the aluminum (Al) surface. I slid an object with paper on the Al slope 20 times. Then, the surfaces of the paper and Al slope were observed through an electronic microscope. Only the paper surface became smoother than before. The results of this experiment showed the paper surface wore, when I slid the object on the Al slope.

This time I decided to look at the relationship between the coefficient of friction and abrasion on the Al surface.

Materials and Methods

I conducted two experiments. I prepared an object with a piece of paper pasted underneath. The 1st experiment was on static friction (SF). The maximum SF between the object and an Al flat surface was measured to calculate the coefficient of SF (CSF). Then, I slid the object with paper on the Al slope 5 times in order for the paper surface to wear. These steps were repeated 5 times.

The 2nd experiment was on kinetic friction (KF). I slid the object with paper on the Al slope 10 times for the paper surface to wear. The coefficient of KF (CKF) was calculated on the sliding motion video analysis.

Results and Discussion

In the 1st experiment, the CSF increased and converged as the amount of sliding increased (Fig. 1). According to the adhesion theory and Greenwood-Wiliamson model (GW model) (a model of contact mechanics on rough surfaces), the CSF would increase as the paper became smoother. I found the adhesion theory and GW model can explain the CSF. Additionally, I compared the change in the CSF and the change in the wear volume (Popov, 2023). Calculation shows these values are roughly proportional. I conclude that SF is proportional to the RCA because the change in the wear volume is proportional to the RCA.

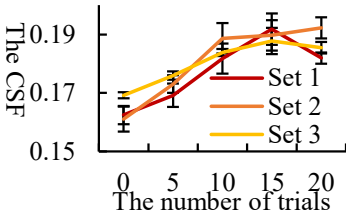

Fig. 1 The CSF

In the 2nd experiment, the CKF was independent of sliding (Fig. 2). Previous two theories cannot explain KF. However, the CSF increases with contact time (Popov, 2023). If KF is considered as SF with very short contact time, the adhesion theory may be able to explain KF.

In conclusion, we can see that the adhesion theory and GW model can explain the SF and might explain the KF, and that the change in the wear volume and in the CSF are roughly proportional.

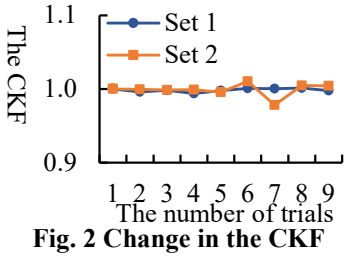

Fig. 2 Change in the CKF

RCA = real contact area, Al = aluminum, SF = static friction, CSF = coefficient of static friction, KF = kinetic friction, CKF = coefficient of kinetic friction, GW model = Greenwood-Wiliamson model

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GRATING that Improves Drainage Performance Affected by Fallen Leaves

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Purpose and Background

Grating is a cover for the street drains. They have a problem caused by fallen leaves and dirt reducing drainage performance. To solve this problem, I devised a method. Move the accumulated fallen leaves to a position away from where the water falls, allowing them to accumulate there. In this method, we can keep the grating hole that water wants to fall empty. To make this method work, I considered structural changes such as the shape, size, and spacing of the grating bars. (M.ISHIKAWA, H.GOTOH, & M.TAKEZAWA 2019) (T.KAWAGUCHI, T.SAEKI, Y.TAKETANI, & Y.KAWAHARA. 2016)

Materials and Methods

To evaluate the effectiveness of the method, I conducted experiments. First, I created grating models with a 3D-printer. Second, I created a drain model. Third, I placed fallen leaves on the model. Finally, I poured water from the top of the model. I recorded the length shown in A, B, and C (Figure. 1). I also recorded the amount of water. I made 3 types of structures. Experiment. 1 was the previous structure (Figure. 2). Experiment. 2 was changed bar spacing (Figure. 3). Experiment. 3 model has a dent in the center of the model (Figure. 4).

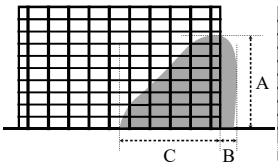


Figure. 1

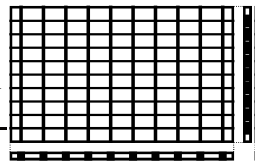


Figure. 2

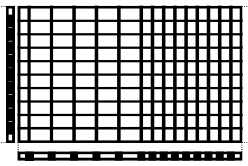


Figure. 3

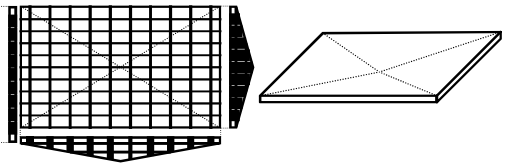


Figure. 4

Results and Discussion

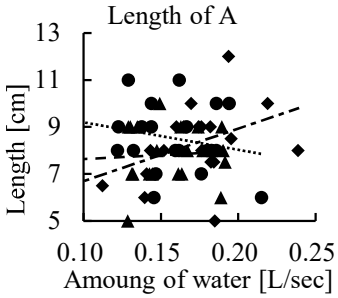


Figure. 5

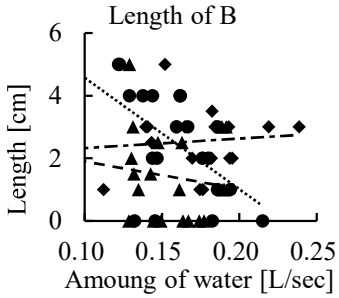


Figure. 6

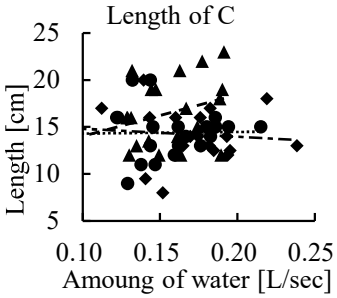
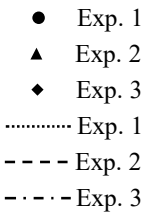


Figure. 7



The narrower the bar spacing, the more leaves accumulated on the edge of the grating, and the longer B. The accumulation condition had no effect. The lengths of A, B, and C were shorter than those of any other grating model. Thus, we can conclude that the Experiment 3 model improved drainage performance.

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The relationship between the distance of the exit to the jamming of the spheres

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Purpose and Background

Trains in Japan are known to be very crowded. Especially, during rush hour, I always go to school in the morning by train and find it difficult to transfer at my stops. So, I wanted to understand human movement in crowded trains to avoid missing train transfers. After reading references[1)] and conducting Simplified Experiments, I was interested in the phenomenon of the jamming of spheres and their internal structure. In previous experiments, I focused on the internal structure when they jammed. In this experiment, I varied the distance from the start point to the goal (indicated by the orange arrow in Fig.1), and counted how many times they jammed. In the future, I hope this data will be useful in designing public facilities, including trains.

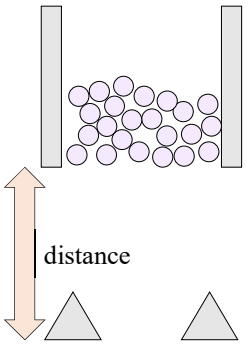

Fig.1 Simplified model of the experience

Materials and Methods

I had 50 spheres (6 mm) roll down the 6° slope. I checked if they jammed at the exit (18 mm). In experiment 1, I varied distance from the start point to goal, ranging from 5 cm to 20 cm in 1 cm increments, and conducted the experiment 20 times for each distance. Based on this experiment, I conducted a more detailed second experiment, varying distance ranging from 10.5 cm to 12.5 cm in 0.5 cm increments and conducted the experiment 40 times for each distance.

Results and Discussion

As shown in Fig.2, the number of jamming decreased and increased repeatedly. Overall, the number of jamming tended to decrease as the distance increased.

From Fig.3, the number of jamming increased from 11.0 cm to 11.5 cm. By statistical analysis, there was no significant difference, which is to say, the result did not change significantly.

I hypothesize that this result comes from the density and speed of the spheres when they reach the exit. When the spheres have a higher density, in other words, when they are crowded, they are more likely to jam. Additionally, if they are moving quickly, they are also more likely to jam, because they bounce off the edge of the exit, increasing their density.

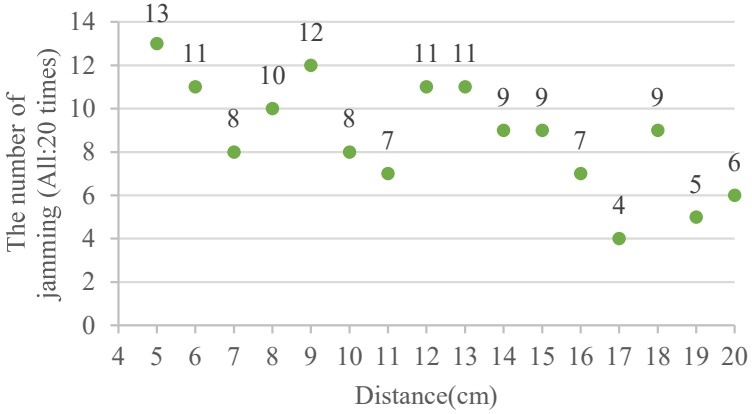

Fig.2 Distance and the number of jamming

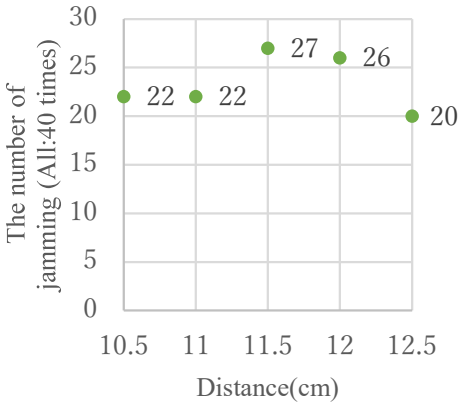

Fig.3 Distance and the number of jamming

Therefore, in the future, I would like to conduct for the research varying distance in more small increment to farther improve the quality of this data.

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Comparison of Antioxidant Effects of Potato Peels in Korea and Japan

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2. Ulsan Science High School, Korea

Purpose and Background

We knew that potatoes have Antioxidant effects. We thought there are differences between Japanese potatoes and Korean ones. Hypothesis is "Between Japanese and Korean potatoes have a difference of antioxidant effect."（K.Shibata, Y.Watanabe, Y.Negishi & Y.Yasuhara 2005）(T.Funayama 2015)

Materials and Methods

1. Peel the sweet potato
2. Soak the skin into the ethanol aqueous solution (0%, 35%, 70%, 99%)　(Extraction)
3. Place extract liquid in the dark room for 30 min.
4. Filter extract liquid
5. Vortex the filtered solution
6. Add DPPH (C18H12N5O6) and leave it alone for 30 min.
   (DPPH react antioxidant substances)
7. Measure absorbance with UV-Vis
8. Calculate antioxidant degree

Results and Discussion

Korean results		
Ethanol	**Absorbance Average**	**Antioxidation Degree**
0%	0.943	7.1%
35%	0.981	3.3%
70%	0.916	9.8%
99%	0.943	7.1%

Japanese results		
Ethanol	**Absorbance Average**	**Antioxidation Degree**
0%	0.544	75%
35%	0.351	83.3%
70%	0.320	85.3%
99%	0.366	83.1%

The date from the Japanese team showed the difference. But the other results were smaller than the Korean team's result.

→We think this happened because the skins of the sweet potatoes were rotten.

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The Research of New Water Purification Technology

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Purpose and Background

While water is essential for life for all people, not all of us have guaranteed access to hygienic water.[1)] To save the situation, the purpose of our research is to develop a technology that allows us to purify water more easily and affordably, and to produce high quality drinking water on our own.

Materials and Methods

We used Activated Carbon because it has a high capacity to absorb and remove harmful substances. To make the peanuts of the highest quality, we tried three types of treatment: grinding, washing with acid, and chemical treatment. We tried a combination of the processes and pursued a good result. In this experiment, the absorption capacity of activated carbon was evaluated by measuring the quantity of these items with Packtest[2)], which is commonly used in the activated carbon research.

Results and Discussion

The figures written in the table [(1)] below show the value of quantification of each adsorbate. Just to be sure, the lower the value, the higher absorption performance. As we had expected, chemical treatment increased the absorption capacity, but the results of grinding and washing were unexpected. Despite grinding, the surface of the pores area increased. However, there was a decrease of absorption performance with grinding, which may have been caused by peanuts having reticulated shells with mature outer tissue of the cotyledon. In this study, the absorption performance after washing with hydrochloric acid decreased against our expectations. The reason for this is mainly due to the peanut's pore size. Peanut is ordinarily porous and the pore size of peanuts activated carbon is larger than common materials. For this reason, chloride ions from the hydrochloric acid were absorbed into the pores and then blocked the absorption of what we want to remove from dirty water.[2)] Moreover, the drop in absorption performance does not occur when we wash with citric acid because of its chemical properties.

	Washing with HCl			Washing without HCl		
	$ZnCl_2$	H_3PO_4	$C_6H_8O_7$	$ZnCl_2$	H_3PO_4	$C_6H_8O_7$
COD	**OVER**	**OVER**	UNDER	**UNDER**	**UNDER**	UNDER
NO_3^-	**15**	**OVER**	UNDER	**UNDER**	**UNDER**	OVER
NH_4^+	1.7	1.7	UNDER	1	1.1	UNDER

Table 1. The value of quantification of each adsorbate

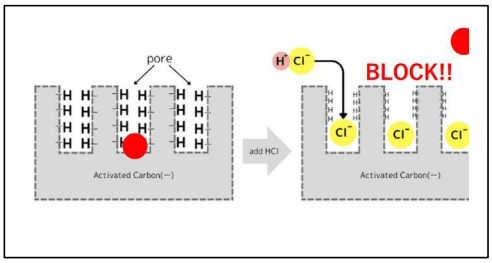

Figure 2. The structure of Activated Carbon

The feature of peanuts activated carbon has many differences from commonly used activated carbon. We finally found that peanut activated carbon, which is washed by pure water, and done with citric acid modification, without grinding, is the best in terms of cost and method. It is more efficient and cheaper than ordinary activated carbon. Also, peanut shells have many different properties compared to the materials used for ordinary ones. To achieve the first purpose, we need to make a more affordable and simpler model by reducing the number of chemicals and processes.

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Catch the Microplastic Suspended in the Air

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Background and Purpose

Microplastics are a current cause of marine pollution. However, microplastics are dispersed into the atmosphere by wind and wave splashes. Further impact on the environment and living creatures by it is a concern. Despite the seriousness of the problem, research on atmospheric microplastics is less extensive than that on microplastics in water and soil, and most people are unaware of the current situation. The purpose of this study is to investigate the current situation and to make many people aware of atmospheric microplastics.

Materials and Methods

Four main experiments were conducted in this study. In the first, air was collected using a homemade impinger (fig.1) to determine the status. Second, collected materials were stained using Nile Red to determine if it was plastic (Tanaka et al., 2022). Third, dyed materials were observed using a PlaWatch (fig.2) and a digital stereomicroscope to identify microplastics. Fourth, microplastics were identified using infrared microscopy. To determine the type of plastic.

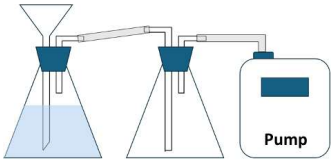

Fig.1 Homemade impinger

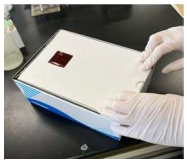

Fig.2 PlaWatch

Results and Discussion

From the results, that microplastics were collected and the type of plastics were found to be silicone and PET（Fig.3,4）.Experiment 1 showed that the amount collected on the 1st floor was greater than the amount collected on the 6th floor. This suggests that MPs fall from the sky to the ground due to their weight. Experiment 4 showed that characteristic silicon peak, which is the infrared absorption spectrum of silicone, was confirmed on both the 1st and 6th floors. This is thought to be due to the sealant used on the roof of the school peeling off due to deterioration（Fig.5）.

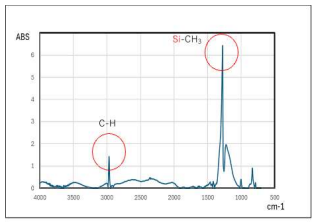

Fig.3 Spectrum of silicone MPs

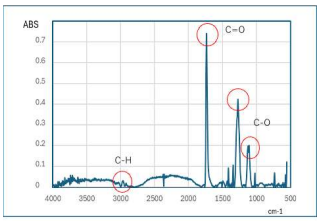

Fig.4 Spectrum of PET MPs

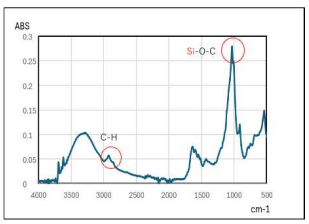

Fig.5 Spectrum of rooftop sealants

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The relationship between citizen's awareness and usage of public transportation ~example of Utsunomiya Light Rail Transit~

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Purpose and Background

Today, various public transportation systems are being planned to improve transportation issues in regional cities. However, their construction often takes several decades, requiring an extremely long period of time. Therefore, I hypothesized that differences in people's awareness and perception of public transportation lead to prolonged approval of public transportation[1)].

Materials and Methods

In this study, I aimed to verify this hypothesis and investigate whether increasing awareness could facilitate approval of public transportation. To do so, I conducted a survey targeting residents near the **Utsunomiya Light Rail**, which began operation in August 2023. The data was analyzed using multiple regression analysis and an ordered logit model to examine the relationships between awareness, usage rate, and public opinion[2)].

The survey included questions about the degree of awareness, possession of a driver's license, distance from home to the station, opinion on the project (support or opposition), and frequency of light rail usage. The first three factors were considered independent variables representing awareness, individual public transport usage, and geographical factors, while the last two served as dependent variables representing the outcomes. In the analysis, all variables were converted into dummy variables.

Results and Discussion

The results suggested that awareness had a significant impact on both usage rate and awareness compared to other factors(Table.1 and Table.2). Thus, it was implied that increasing awareness could indirectly reduce the time required for people to approve new public transportation.

Table.1 Results of multiple regression analysis

	Awareness	distance to station	driver's license	constant term
Coefficient	0.0926	-0.0130	0.0461	0.0356
T value	4.0040	-0.5604	1.5475	1.1582
P value (**1%,*5%)	0.0000**	0.5760	0.1236	0.2485

Table.2 Results of multiple logistic regression

	Awareness	distance to station	driver's license	constant term
Coefficient	1.1407	-0.4258	0.6403	-0.3324
T value	2.7900	-0.5810	1.3290	-0.7210
P value (**1%,*5%)	0.0050**	0.3950	0.1840	0.4710

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Improving the Design of Sinks to Decrease Scattering

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Purpose and Background

Scattered water such as toothpaste, hand soap, and others cause stains and unpleasant odors. Cleaning becomes more frequent, which can be laborious Therefore, by renewing the design of it, I think that I can reduce the needs of clean a sink and keep it clean.[1)]

Materials and Experiment

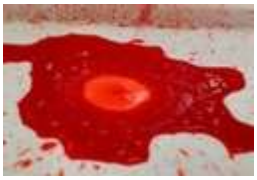
Pour colored water and observe when and how water scatters. Colored water was poured from a height of 30 cm above the bottom of the sink, and the scattering was observed. Based on the observations, I made a hypothesis. To verify this hypothesis, I used a physical modeling software, "Blender" [2)], for simulation.

Results and Discussion

As a result of analyzing the water flow, I found that it could be divided into three phases as follows. At 2nd Phase, Water forms small spheres and at 3rd Phase water splashes.

1st Phase

2nd Phase



3rd Phase

I hypothesized-by applying the structure of air hockey which has multiple hole ejecting air on the surface I can decrease the scattering. Then this is the results of modeling.

The hypothesis was that a sphere will be floating, however the water penetrated the air. This is because "Blender" could only handle smoke, and could not blow up the gas. As a future outlook, I have to conduct more research and better understand the structure of air hockey, and lead to simulation. [1)]

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Exploring Non-Verbal Communication: The Power of Gestures

Koharu TERADA

Ichihara Chuo High School, Japan

Propose and Background

This study investigates the question: Why can we communicate with gestures even if we do not speak English? The inspiration for this inquiry arose from an English TV program, "The Quest" (イッテQ in Japan), which featured a man who successfully communicated using gestures despite not speaking English, while an English-speaking woman, who did not use gestures, was less successful. This intriguing observation led to the formulation of my research question.

Materials and Methods

To explore this phenomenon, I hypothesized that communication is possible through gestures because visual cues effectively convey emotions and intentions. My research involved conducting an Instagram poll and reviewing existing literature on non-verbal communication.

Research Findings

Research 1: Public Perception of Gestural Communication

An Instagram poll revealed that 95% of respondents believe it is possible to communicate using gestures alone. Participants noted that gestures often facilitate smoother communication when language barriers exist. The 5% who disagreed were typically those without personal experience in using gestures. (1)

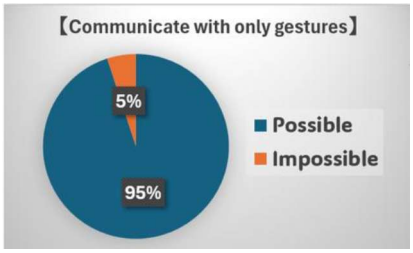

Figure1: Public Perception of Gestural Communication

Research 2: The Impact of Non-Verbal Cues

An examination of Mehrabian's rule provided insight into the significance of visual communication. According to this rule, linguistic information constitutes only 7% of communication, auditory information 38%, and visual information over 55%, highlighting the predominant role of visual cues. (2)(3)

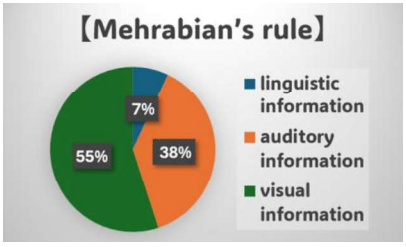

Figure2: The impact of Non-Verbal Cues

Research 3: Examples of Visual Influence

Building on Mehrabian's rule, I explored scenarios illustrating the dominance of visual cues. For instance, laughter during scolding often overrides the verbal message, while a dissatisfied expression during praise can negate the words. These examples underscore the powerful impact of visual information.

Results and Discussion

The research concludes that gestures can effectively facilitate communication when language barriers exist, as visual information is prioritized by many. However, words remain crucial for conveying specific details. This study has inspired me to improve my skills in both verbal and non-verbal communication, drawing inspiration from my teacher, Mr. Peter Hetzel, who excels in using English to connect with others. I aim to enhance my ability to communicate globally, bridging cultures through a balanced use of words and gestures.

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Exploring the Evolution of Beauty Standards

Seira DEDACHI

Ichihara Chuo High School, Japan

Process and Background

This study explores the question: How and why do beauty standards change across different periods and environments? The inquiry was sparked by a friend's remark, prompting me to examine the fluid nature of beauty standards. I hypothesized that as perspectives broaden over time, people may become more appreciative of traits different from their own.

Research Focus

The research sought to uncover the origins of beauty standards, exploring their foundational roots. It also examined how these standards have evolved over time and across various cultures. Additionally, the study investigated current beauty ideals, shaped by global influences and modern movements.

Figure1: Three questions for exploration

Findings

1. Root of Beauty Standards

In Asia, particularly Japan, Korea, and China, beauty often emphasizes white skin, small faces, and thin bodies. In contrast, Western standards often favor tanned skin, curvy bodies, and fuller lips. (1) (2) (3)

2. Evolution Over Time

Beauty standards are dynamic and vary by era and region. In Japan, the Heian period favored plump bodies and long hair, the Edo period preferred a slender form, while the Taisho period saw a shift towards Western appearances. The Showa period idealized dainty beauty, even in monochrome photography. (4)

3. Contemporary Standards

The internet has influenced global beauty perceptions, fostering diverse standards. The "body positivity" movement, primarily in the West, encourages embracing all body types and challenges traditional beauty norms.

Historical Insights

Researching historical figures, I found that grace and intelligence have consistently been valued. Princess Yang, often cited as a historical beauty, shared common traits with others admired over time: glossy hair, clean teeth, and intelligence. (5)

Results and Discussions

While beauty standards are influenced by time and place, certain foundational aspects remain constant. This research highlights the fascinating nature of human psychology and the evolving concept of beauty. In the future, I aim to engage with diverse cultures to deepen my understanding of this intriguing topic.

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Role of Body Language in Communication with Cultural Context

Mei Sagiuchi

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Purpose and Background

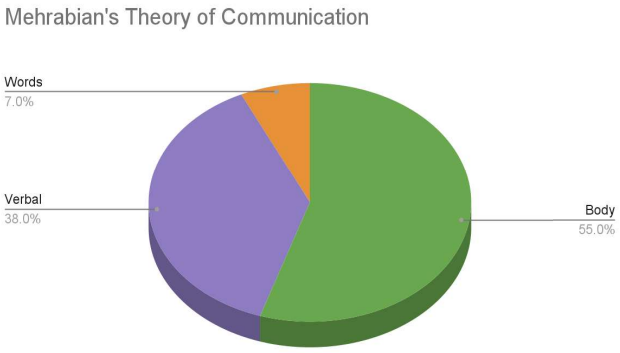
When the majority of people think of communication, they mainly consider verbal communication. However, isn't communication much more than what we just say? I was curious about the other types of communication therefore I decided to research body language in communication. I chose body language specifically due to my interests in animals and how they can communicate with us humans just through body language ie. wagging tails and bristled fur. Furthermore, when it comes to body language, cultural context is a big aspect of communication. With each region, country, and culture, there are differences in communication that I thought should be considered. Through this research I aspired to make communication easier and more effective for all.

Materials and Methods

I used mainly papers, research articles, and various people's experiences communicating with numerous people worldwide. I examined the different types of communication people and animals had with each other utilizing my time abroad in the USA as well as Japan.

Results and Discussion

As shown in Figure 1, body language is crucial, making up over 50% of all communication. There are 6 aspects of body language, each contributing to the entire perception of communication. One is haptics, also known as touch, showing feelings such as hugging for familiarity. Second, the postures: conscious and unconscious. Conscious postures are, as the name suggests, where the person intentionally aims to be pleasant to perception i.e. an open stance. Some other factors include talking and sitting manners. Unconscious postures are the exact opposite and illustrate the lack of engagement such as by slouching. Third are the gestures which are the most used form of body language. Fourth is the powerful gaze and eye contact, standing as the basis of authenticity. Afterall, it's the reason why the phrase "eyes are the window to the soul" exists! Fifth, facial expressions which are vital as gestures since they are applicable because the 7 main expressions (fear, disgust, anger, contempt, sadness, happiness, sadness) are universal, transcending any border (Segal, Smith, Robinson, Boose, 2024). These apply to cultural aspects in various ways such as low vs high context communication and difference in interpretation of the very same gestures (Meyers 2016).



(Figure 1. Pie chart demonstrating the percentages of each aspect of communication.)

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Proceedings

（Undergraduate Students / Postgraduate Students）

EXPLORATION OF FLEXIBLE CARBON ELECTRODES: PRELIMINARY RESEARCH ON MATERIAL AND FABRICATION METHODS

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Purpose and Background

The growth in biosensor technology presents significant opportunities to create flexible and economical detection devices made from easily accessed materials. Flexible carbon electrodes using graphite meet these criteria, providing the advantages of simple fabrications methods and the potential for efficient mass production. Graphite is used due to its exceptional electrical conductivity, chemical stability, mechanical stability, and cost-effectiveness.[1] Its layered structure allows efficient electron transfer, which is crucial for the sensitivity and reliability of biosensors.

Here we focus on the development of flexible carbon biosensors, formulated with graphite-infused carbon ink and substrates like polyethylene terephthalate (PET) or polyvinyl chloride (PVC) which are derived from recycled materials, such as plastic cups and mica sheets. Fabrication methods such as screen printing and inkjet printing play an important role in the production process. These methods, with their simplicity and practicality, provide a dependable and cost-efficient approach to production. Implementing these techniques allows for the creation of biosensors with consistent quality while simultaneously keeping up with large-scale production demands.

The objective of this research is to develop biosensors using easily accessible materials and cost-efficient production methods to create a reliable and economical biosensor with high conductivity, low resistance, and good stability as well as durability. It is also to help increase access to biosensors by allowing for low-cost and large-scale productions of electrochemical sensors.

Materials and Methods

This research utilises easily accessible and cost-efficient materials to develop electrode-based biosensors made of flexible carbon. Substrates used are PET and PVC from recycled materials, such as plastic cups and mica paper. For carbon ink, powdered graphite is used as a conductive agent. In order to formulate graphite into ink, a solvent and a stabilizer are used to make homogeneous ink and to prevent sedimentation. Ink formulation is designed to give high conductivity, low resistance, also mechanical and chemical stabilities. Flexible carbon electrode is produced using two methods of main fabrication, which are screen printing and inkjet printing:

1. **Screen Printing**: This process involves screen printing carbon ink on prepared substrates. PET and PVC substrates are cleaned and treated to enhance ink adhesiveness.[1] Then the carbon ink is printed in layers using stencils to form the desired electrode pattern.
2. **Inkjet Printing**: This method utilizes a special jet printer to print carbon ink on substrate. Before printing, the ink formulation is optimized to have sufficient viscosity and stability using specific printers. Inkjet printing is selected due to high precision and ability to print complex electrode patterns.[2]

Results and Discussion

Since this research is still in progress, the current objective is to identify the ideal combination of materials and fabrication methods to develop flexible carbon electrodes that are cost-effective, easily produced, and made from accessible materials. The goal is to achieve high-performance electrodes with excellent conductivity, low resistance, and robust stability. The findings of this research are expected to pave the way in developing economical and practical electrochemical biosensors for various applications.

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Experimental Study: Innovation The Development of Electrostimulation Technology to Stabilize Excess Glucose Levels in Diabetes Sufferers

Aprilia Sarah Kristina

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Purpose and Background

The development of people's lifestyles has undergone significant changes every year, starting from different lifestyles to consumption that has undergone changes with various processed foods without even paying attention to the content of the food. An undisciplined lifestyle and inappropriate consumption can cause someone to suffer from a disease, especially one that affects the sugar content in food or drinks. Consumption of food and drinks containing sugar will cause diseases that will even be difficult to cure and even cause death. The population of people with excessive sugar consumption continues to increase every year and is difficult to stop. This excessive consumption will have a bad impact on the body, one of which is Diabetes. Diabetes is generally only suffered by people over the age of 40, but the development of the era makes a different lifestyle from before and consumption factors that become irregular due to changes in people's lifestyle patterns. The potential for Diabetes disease no longer looks at age, young children if their consumption style is not regulated can suffer from Diabetes, genetic factors have the potential to dominate sufferers. The cause of Diabetes is high blood sugar content (exceeding normal limits) which can damage human internal organs if left untreated, sufferers can experience several symptoms such as weak conditions, excess weight, conditions of disorders in other organs of the body. This background is the basis for innovation in conducting research by utilizing micro-scale electric waves to stabilize blood sugar levels for people with Diabetes. This experimental method will continue to be studied until it produces a development of electrical innovation in the medical world.

Materials and Methods

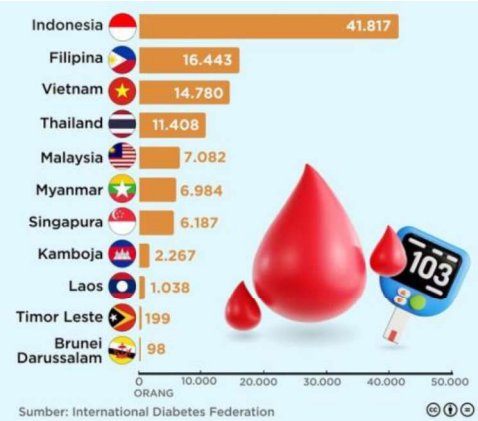

Figure 1. Data on diabetes sufferers in several countries (Source: International Diabetes Federation)

Data on diabetes sufferers in several countries has increased every year, this is due to lifestyle and genetic factors which cause an increase in the population of sufferers.
Treatments to overcome diabetes have been widely carried out, starting from treatments using natural products to other therapies, but this still has little effect on diabetes sufferers because the effects are not felt directly.

Age	Normal Blood Sugar	Fasting Blood Sugar	Blood Sugar after Meals and Before Bed
< 6 years	100 – 200 mg/dL	± 100 mg/dL	± 200 mg/dL
6 – 12 years	70 – 150 mg/dL	± 70 mg/dL	± 150 mg/dL
12 years >	<100 mg/dL	70 – 130 mg/dL	< 180 mg/dL (setelah makan) 100 – 140 mg/dL (sebelum tidur)

Figure 2. Blood Sugar Content Table According to Age

Age limit is an important parameter in predicting Diabetes, blood sugar content that exceeds the normal limit can be stated that the person is suffering from Diabetes but must be accompanied by further examination steps to detect the disease and the cause of the disease in as much detail as possible.

The research method used is an experimental study that will be carried out directly at Chiba University to obtain innovation updates, the results of the research developed. The initial method uses hypothesis analysis by taking several blood samples from people with Diabetes and then analyzing blood cells before being flowed with electric waves or what is called Electrostimulation, to analyzing blood samples when they have been given the effect of electrostimulation waves and analyzing the changes that occur.

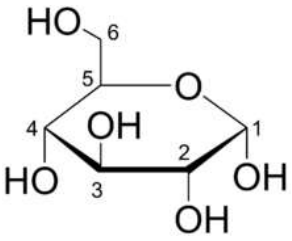

Figure 3. Atomic structure of glucose

Figure 4. Glucose Content in Blood Vessel Cells

The atomic structure of glucose, if the blood cells are filled with this structure, it will cause blood thickening so that oxygen circulation throughout the body will be inhibited, excess glucose will also cause damage to internal organs, causing decreased function due to direct complications with blood cells.

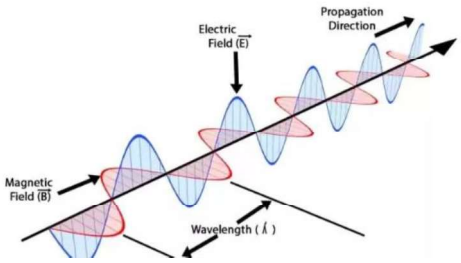

Figure 5. Electro Waves for Stimulation in Diabetes Patients

The results of the research using electro stimulation waves will be tested in stages to produce perfection in the research.

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AI and Personalized Learning: Opportunities and Challenges

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Purpose and Background

With the rapid development of information technology and the rise of AI, education is shifting from a teacher-centred to a learner-centred model, enabling broader access to quality resources and more personalised learning experiences (UNESCO). Ezzaim (2022) emphasises that AI-driven adaptive learning platforms aim to optimise learning by tailoring content to individual needs and styles.

By collecting and analyzing massive amounts of student learning data, AI can gain deeper insights into learners' needs and behaviors, thus developing personalized learning plans for different individuals. Many benefits of using AI in education can improve the student's learning, for example, a significant advantage is personalized education. AI can provide a more individualized learning experience and create lesson plans to teach each student effectively. In some regions of China, primary and secondary schools are gradually introducing intelligent learning platforms, adaptive learning systems, and online assessment tools, using AI algorithms to help students accurately identify and fill in gaps. This trend has also been encouraged to some extent by policies in the context of the "double reduction" policy. However, the accelerated iteration of technology has also triggered many educational and social issues, such as the widening digital divide, security risks to data privacy, and redefinition of the role of education subjects. How to fully utilize the advantages of AI technology while avoiding excessive dependence and potential ethical risks has become a common concern in the fields of education research and practice.

The purpose of this article is to investigate the opportunities and challenges that AI will face in personalized learning in education.

Materials and Methods

To further explore the opportunities and challenges that AI brings to personalized learning, this study mainly research by key words "AI Personalized" journal articles and through literature review this eight chosen articles to analyse.

The "Artificial Intelligence in Education: Challenges and Opportunities for Sustainable Development" published by UNESCO in 2019 systematically reviewed the latest developments and main application scenarios of AI technology in the field of education worldwide, and pointed out that personalized learning, intelligent evaluation, and adaptive teaching are one of the most promising directions The report emphasizes that if privacy and ethical issues in technology applications can be actively addressed, AI is expected to contribute to improving education equity and efficiency worldwide.

In recent years, there have been numerous studies on Learning Analytics and Adaptive Learning in databases such as IEEE, Elsevier, and Springer. Some scholars focus on how AI can provide feedback and personalized resource recommendations for teachers and students through processing of student learning behavior data; There are also studies exploring the biases and unfairness. These research findings have laid a theoretical foundation for future discussions on risk factors in AI education applications.

A typical case is the AI tutoring system developed by Stanford University. The system recommends targeted learning materials and exercises based on students' learning progress and comprehension ability, and provides feedback immediately after students complete exercises to help them correct errors and consolidate knowledge in a timely manner (de Baker, R. S. J., & Inventado, 2014). This real-time and personalized academic support deepens students' understanding and mastery of complex concepts.

Discussion

The positive impact of AI in personalized learning. Based on literature analysis the most valuable areas of AI in teaching are focused on precision teaching and self-directed learning. The adaptive learning system can quickly identify weak areas in students' knowledge mastery through real-time collection and analysis of massive behavioral data, and provide automated error correction and feedback mechanisms. But at the same time, it also faces some challenges. Data security and privacy protection are the first challenges, as personalized learning cannot be separated from the continuous collection of students' learning behavior and personal information. Once managed or used improperly, sensitive information may be leaked.

In addition, some teachers and students still have a "fear of difficulties" in the use of AI technology, and professional training and guidance are still insufficient. Finally, excessive use of technology may lead to a lack of offline interpersonal interaction and emotional communication between teachers and students. Most teachers emphasize that the core of education is still "cultivating people", and AI can only serve as an auxiliary tool within a limited scope.

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LAND SUITABILITY FOR ARABICA Coffee (*Coffea arabica*) AGROFORESTRY AND LAND COVER ANALYSIS IN GEULIS MOUNTAIN, SUMEDANG REGENCY

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Purpose and Background

Arabica coffee is a leading commodity that significantly contributes to Indonesia's economy, particularly in the plantation sector. West Java, including Geulis Mountain in Sumedang Regency, is known for producing high-quality Arabica coffee (Mulyana, n.d.). To ensure the success of Arabica coffee agroforestry in Geulis Mountain, a land suitability analysis is necessary, considering physical factors such as elevation, slope, rainfall, and soil type. Additionally, land cover analysis is crucial to understand the impact of land use on agroforestry implementation (Waskito, 2018).

The objectives of this study are to determine the land suitability for Arabica coffee (Coffea arabica) based on physical factors such as elevation, slope, rainfall, and soil type in Geulis Mountain, Sumedang Regency, and to generate spatial maps of land suitability and land cover using the Spectral Angle Mapping (SAM) method.

Methods

This study utilized Geographic Information System (GIS) tools to classify and analyze land suitability based on parameters such as elevation, slope, rainfall, and soil type. Supervised classification was conducted using the Spectral Angle Mapping (SAM) method in QGIS software, combined with field data validation to ensure accuracy. Field data were collected through ground navigation by marking points directly at the study site, Geulis Mountain, on the map using the Avenza Maps application.

Results and Discussion

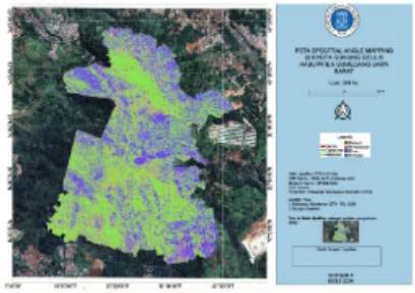

Figure 5. Land Cover Map

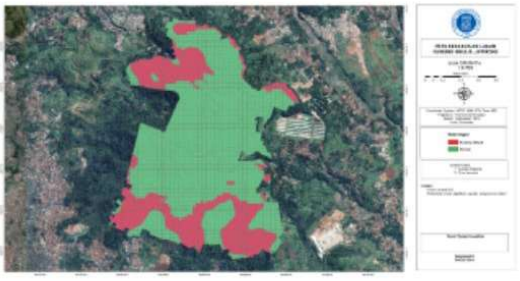

Figure 6. Land Suitability Map

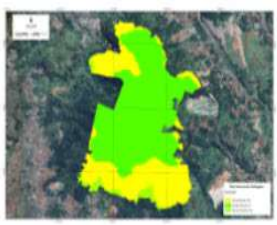

Figure 1. Elevation Classification Map

Figure 2. Soil Type Classification Map

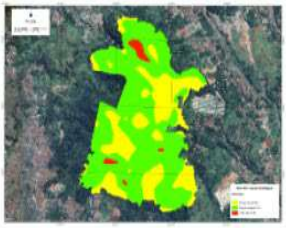

Figure 3. Slope Classification Map

Figure 4. Rainfall Classification Map

1. **Land Suitability Analysis:**
   - Slope: Areas categorized as marginally suitable (Green) spanned 226.809 hectares, primarily in steep regions (25-45% slope). (Fig 3.)
   - Elevation: The analysis identified 205.289 hectares as highly suitable (Green), within the 1,000-1,500 meters above sea level range. (Fig 1.)
   - Rainfall: Most of the area, covering 338.272 hectares, was categorized as moderately suitable (Yellow) with rainfall between 1,200-1,800 mm/year. (Fig 4.)
   - Soil Type: Latosol and alluvial soils, covering 300.360 and 37.908 hectares respectively, were highly suitable for Arabica coffee. (Fig 2.)
2. **Land Cover Analysis**:
   - Land cover maps revealed dominance by Calliandra species, indicating the presence of invasive plants (Petropoulos *et al.,* 2010). Other land covers included mixed forests, bamboo plantations, mahogany, and open land. (Fig 5.)
   - Classification accuracy was validated with a Kappa value of 0.79, signifying strong reliability.
3. **Spatial Map Results**:
   - A total of 242.255 hectares in Geulis Mountain was classified as suitable (Green) for Arabica coffee agroforestry, while 96.017 hectares were less suitable (Red). (Fig 6.)

Conclusion

The analysis concluded that Geulis Mountain is suitable for Arabica coffee agroforestry, with significant potential for sustainable plantation development. Spatial mapping highlighted key areas for optimization, balancing ecological and economic benefits. Effective land management practices, including invasive species control and soil conservation, are recommended to maximize productivity.

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COASTAL VEGETATION IN CITAPUS, SUKABUMI

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Purpose and Background

The coastal ecosystems of South West Java, especially along the coastline of Citepus, represent one of the most biologically rich and ecologically important regions in Indonesia. Situated along the southern coastline, which is highly influenced by harsh ocean waves and currents, this area is characterized by a diverse range of coastal vegetation that plays a pivotal role in maintaining environmental stability and supporting the livelihoods of local communities The interaction between land and sea, along with the region's tropical climate, creates an environment that fosters an abundance of plant species that are crucial for the biodiversity of both terrestrial and marine ecosystems. The utilization of coastal resources for activities such as fishing, agriculture, and tourism has long been a cornerstone of the region's economy. However, this delicate ecosystem is increasingly threatened by human activities such as coastal development, pollution, and overexploitation of natural resources.

This paper aims to explore the diverse types of coastal vegetation found in the South of West Java, focusing on the ecological functions they perform and their significance in the context of local environmental and socio-economic challenges by field survey at _____. To strengthen the analysis, the paper will examine the significance of physical oceanographic parameters, such as tidal, waves, and beach morphology. Through an in-depth analysis, this paper seeks to contribute to a deeper understanding of the role of coastal vegetation in Citepus Beach and highlight the need for sustainable management practices to safeguard these crucial environments for future generations.

Materials and Methods

The method used in this research is by field surveys , tools and equipment, data collection process, and data analysis. Field surveys utilized the transect method, where 10x10 meter plots were established along the coastline, marked with GPS coordinates for accuracy. Within these plots, vegetation species were identified using field guides, and their frequency, distribution, and trunk diameters were recorded to assess biomass and health. Tools such as GPS devices, measuring tapes, log sheets, and cameras were used to document data systematically. Transects were aligned parallel to the shoreline to include both high-tide and low-tide zones, with measurements of canopy coverage to evaluate erosion control and carbon sequestration functions. Photographic documentation supplemented species identification, and data analysis included calculating diversity indices, identifying dominant vegetation types, and correlating distribution patterns with ecological factors like soil type and tidal influences.

Figure 1 Map of Citepus Beach Sukabumi

Results and Discussion

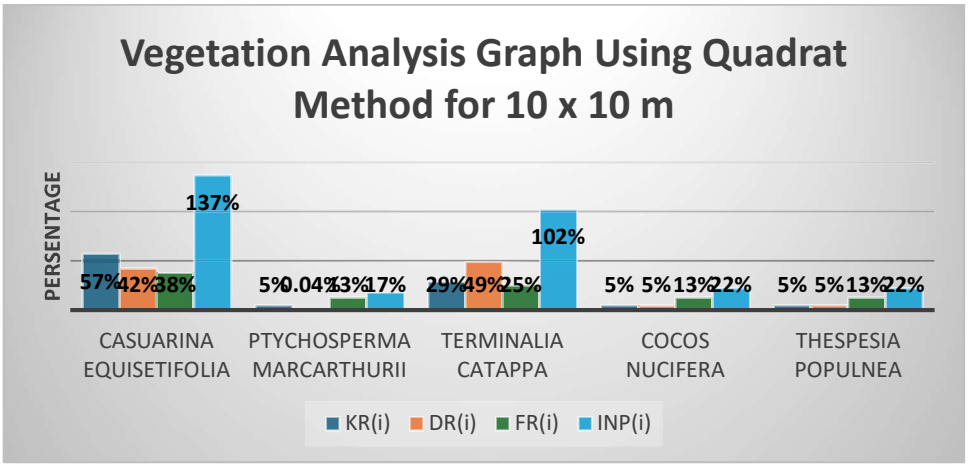

Figure 2 Vegetation Analysis Graph

Field studies conducted at Citepus, Sukabumi, revealed a rich diversity of coastal vegetation comprising key species such as *Casuarina equisetifolia* (cemara laut), *Cocos nucifera* (kelapa), *Terminalia catappa* (ketapang), *Thespesia populnea* (waru), and *Ptychosperma macarthurii* (palem). These plants contribute uniquely to ecosystem stability; *Casuarina equisetifolia* serves as a natural barrier against wave energy, reducing erosion and stabilizing sediments, while *Cocos nucifera* provides significant ecological and economic benefits through its fruit, fibers, and structural components. The vegetation is unevenly distributed, with denser populations of *Casuarina equisetifolia* observed near the shoreline and inland zones dominated by *Terminalia catappa*, which adapts to less saline conditions and stabilizes soil with its extensive root systems. The interwoven roots of *Casuarina equisetifolia* and *Thespesia populnea* are particularly effective in mitigating soil erosion during high tide events and storm surges. However, the ecosystem faces multiple challenges, including human-induced pressures such as waste disposal, urban development, and unregulated tourism, which degrade habitats and introduce pollutants, particularly plastics transported by rivers during the rainy season. Climate change exacerbates these threats with rising sea levels and increased storm activity, accelerating erosion and stressing vegetation health. Interviews with local residents revealed growing concerns about pollution, changes in vegetation density, and alterations in shoreline dynamics caused by sedimentation and erosion, highlighting the need for immediate and sustainable conservation efforts to preserve the critical ecological and socio-economic benefits provided by coastal vegetation in Citepus.

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AI Competence and Impact on the Cross-Cultural Adaptation of International Students

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Purpose and Background

This study investigates the relationship between AI competence levels and the cross-cultural adaptation of international students. As global student mobility continues to increase, challenges associated with cultural adaptation have become a critical area of focus. Grounded in the AI Literacy Framework and the Cross-Cultural Adaptation Model, alongside theoretical insights from UNESCO, this research seeks to elucidate how AI literacy influences the academic and social adaptation processes of international students.

AI serves as a double-edged tool, with its benefits or drawbacks contingent upon its application. For instance, irregular or unethical use has heightened concerns about academic integrity; however, AI undeniably plays a informativeness role in overcoming adaptation barriers for international students. Tools such as real-time translation applications enable seamless cross-linguistic communication, while 24/7 AI-powered student service systems offer accessible and empathetic support. The findings of this study hold substantial implications for designing AI-oriented support initiatives aimed at enhancing the cultural integration of international students.

Theoretical underpinnings of this research encompass concepts of AI literacy and cross-cultural competence. AI literacy is defined as the knowledge, skills, and attitudes required for effective engagement with AI technologies. According to UNESCO (2024), AI literacy comprises four dimensions: human-centered thinking, AI ethics, technology and application, and system design. These dimensions are measured across progressive levels—understanding, application, and creation—that reflect a spectrum from basic awareness to active co-creation of AI tools.

Table 1. AI competency framework for students

Competency aspects	Progression levels		
	Understand	Apply	Create
• Human-centred mindset	• Human agency	• Human accountability	• Citizenship in the era of AI
• Ethics of AI	• Embodied ethics	• Safe and responsible use	• Ethics by design
• AI techniques and applications	• AI foundations	• Application skills	• Creating AI tools
• AI system design	• Problem scoping	• Architecture design	• Iteration and feedback loops

Simultaneously, cultural adaptation is analyzed through frameworks such as Kim's Intercultural Adaptation Theory, which highlights personal, environmental, and interact factors shaping the adaptation process. Key determinants of adaptation include language barriers, cultural norms, dietary practices, and social support systems.

Research Methods

This study employs a mixed-methods approach to explore the relationship between AI competence levels and the cultural adaptation of international students in Bangkok, Thailand.

The quantitative component involves a survey of 32 international students, measuring AI literacy using UNESCO's AI Competency Framework and assessing cultural adaptation levels through the Sociocultural Adaptation Scale. The qualitative component complements the survey with in-depth interviews to capture personal narratives and uncover how AI tools address challenges in cultural adaptation.

Research Questions:

1. To what extent does AI competence influence the cultural adaptation of international students?
2. How do varying levels of AI competence differently impact academic adaptation and social adaptation?

Hypotheses:

H1: International students with higher levels of AI literacy exhibit stronger cultural adaptation.

H2: The influence of AI competence on academic adaptation is more pronounced than its influence on social adaptation.

Data Analysis and Discussion

Statistical analysis reveals a significant correlation between AI competence levels and indicators of cultural adaptation. Although the sample size is modest, the findings, reinforced by qualitative interview insights, indicate that students with higher AI competence levels exhibit enhanced cultural adaptation and report greater satisfaction with their study-abroad experiences. Notably, students with advanced AI skills demonstrate higher academic engagement and superior academic performance, which correlates positively with overall cultural adaptation. However, language proficiency emerges as a confounding variable in the study. Given that most international students rely on English for academic purposes and Thai for daily communication, varying proficiency levels in these languages significantly influence cultural adaptation outcomes. This limitation will be addressed in subsequent studies.

The results underscore the role of AI literacy in facilitating cultural adaptation and highlight the need for targeted development of AI competencies among international students. Moreover, the findings reveal that AI tools are particularly effective in addressing academic challenges, whereas social barriers remain less amenable to AI interventions.

Ethical considerations include the risk of over-reliance on AI tools, necessitating a balanced approach to their integration into adaptation strategies. The differential impacts of AI on academic and social adaptation provide valuable insights for designing tailored, AI-driven support programs. international program should integrate AI literacy training into orientation programs for international students, with a particular emphasis on academic integrity and ethical AI use. Additionally, institutions should provide AI tools aligned with regulatory frameworks to support students' academic and social adaptation processes effectively.

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Analysis of Shanghai's education system

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Purpose and Background

This article analyzes Shanghai's education system, as China's economic, financial, and trade center, Shanghai's education system is a cutting-edge model for China's educational reform and development, reflecting Shanghai's comprehensive national strength and modernization level(Yu Lihui, 2006). Shanghai has demonstrated a high level of innovation and internationalization in basic, higher and vocational education, especially in the Programme for International Student Assessment (PISA), where Shanghai students have been ranked first many times, showing that Shanghai students are at the world's leading level in mathematics, science, reading and other aspects. (Sellar & Lingard, 2013) This paper provides an overview of the strengths, problems, and challenges of Shanghai's education system, and proposes innovative policy recommendations for the current state of education in Shanghai.

Materials and Methods

This article provides an overview of Shanghai's education system, detailing teacher resources, basic, higher education, and vocational education, and citing multiple studies and data, such as the results of Shanghai students in PISA(Sellar & Lingard, 2013), schools and enterprises work closely together, and learn from the German "dual system" model to improve practical skills(Gehin & Mehaut, 1995), to support its analysis.

Results and Discussion

The research shows that Shanghai has a high level of internationalization of education, strict requirements for teacher recruitment, abundant educational resources, strong policy support, and attention is paid to educational equity and quality education(Tan, 2012). However, problems still exist, such as the pressure on teachers and students under the "double reduction" policy(Xue & Li, 2023), the uneven distribution of educational resources (Lu, Chen, & Wu, 2020), and the lack of attractiveness of vocational education (Li & Huang, 2024). Challenges include how to reduce teachers' workload while increasing after-school services, how to guide parents to change their attitudes about education, reduce excessive educational anxiety, and how to achieve greater equity in educational resources and improve the social acceptance of vocational education.In view of the problems and challenges identified in the analysis of the current situation of education in Shanghai, this paper puts forward a series of policy suggestions, Improve the quality and efficiency of education by investing in updating education technology infrastructure, such as smart classrooms and online learning platforms, and training teachers in digital literacy and online teaching capabilities(Law, 2007). It is recommended to formulate a smart education development strategy and cooperate with technology companies to introduce advanced technologies. Enhance the social status of vocational education through policy guidance, and establish a school-enterprise cooperation mechanism to enable students to acquire practical skills in the actual environment, so as to cultivate more skilled talents (Zengcai, Jingjing, & Yang, 2023).Tilt high-quality educational resources towards suburban and ordinary schools, attract high-quality teachers to work in these schools through policy incentives (such as providing housing subsidies and career development opportunities), and strengthen teacher

training to improve overall education standards and achieve educational equity(Zhang, Ding, & Xu, 2016).These recommendations aim to address current and future educational challenges and promote the continuous development and innovation of Shanghai's education system.

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HEARTTIP: REMOTE HEART MONITORING SYSTEM FOR PEDIATRIC CONGENITAL HEART DISEASE PATIENTS

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Purpose and Background

Indonesia faces significant challenges in managing pediatric heart diseases due to limited resources and geographical barriers. Currently, pediatric congenital heart disease affects approximately 43,200 births in Indonesia (Amelia, 2023). However, as an archipelagic country consisting of more than 17,000 islands, non-uniform distribution of human resources and logistic difficulties causes insufficient healthcare access, mostly in rural areas (Qanitha, 2022). Therefore, remote health monitoring emerges as a potential solution, enabling early detection and better management for pediatric patients with heart diseases.

This project aims to develop a pediatric heart monitoring device that can be used at home by patients, monitoring vital parameters, such as oxygen saturation, heart rate, respiratory rate, and blood pressure, display monitored results on a software, and share it to others. To ensure ease of use and minimum needs of training, the device is designed to be able monitor patients just through their fingertips. Therefore, we came up with the name, *HeartTip*; a heart monitoring device at the patient's fingertip.

Materials and Methods

The hardware and software components of the project were developed using a combination of specialized tools and methodologies. The MAX30102 sensor was utilized to measure oxygen saturation and heart rate via photoplethysmography, while an ESP32 microcontroller handled data processing and Bluetooth Low Energy (BLE) communication. For hardware design, Fusion 360 was utilized to create various prototypes of the casing, which were 3D-printed using a Bambu Lab 3D printer with polylactic acid (PLA) as the material.

The hardware fabrication process involved developing a program in Arduino IDE to manage the MAX30102 sensor and BLE communication on the ESP32. Multiple casing prototypes were designed in Fusion 360 and evaluated using a design matrix to select the optimal design, which was then fabricated using 3D printing. For the software, the user interface (UI) was first conceptualized using Figma before being implemented as a frontend application using Expo React Native. BLE communication functionality was then developed to integrate the software and the hardware so that monitoring results can be displayed in the software.

Results and Discussion

Hardware fabrication begins by assembling the circuit, which is to connect the MAX30102 sensor to the ESP32 microcontroller. The VCC and GND pins from MAX30102 are connected to the 3.3V power and ground pins from ESP32 for stable power supply. Then, its SDA and SCL pins are linked to GPIO21 and GPIO22 on the ESP32 for I2C communication. The MAX30105 library is used to measure infrared (IR) and red light to derive physiological parameters. Parameters such as heart rate and oxygen saturation are calculated using the maxim_heart_rate_and_oxygen_saturation function from the spo2_algorithm.h library. Respiratory rate calculation is derived from IR signal fluctuations. Peaks in the signal represent respiratory cycles and their count is converted to breaths per minute based on sampling frequency (Motin, 2020). Blood pressure is estimated based on the heart rate data; the faster the heart rate the higher the systolic and diastolic pressure (Tjitra, 2023). The BLE library is used to send measured parameters, which are configured with unique UUIDs, to software via BLE (bluetooth low energy).

Figure 1. a) design 1 consisting of a main unit and sensor belt, b) design 2, and c) design 3.

Design evaluation matrix as seen in Table 1 shows that design 3 receives a higher score in ease of production due to removal of ECG functions from design 1. Complexity in implementing ECG causes a lower ease of production score. Design 2 wins the aesthetics and practical aspects due to its size, but fails in ease of production and cost-efficiency due to the needs of customizing PCB for its smaller size. Even with the same accuracy, safety, and comfort score with design 2, design 3 wins the overall evaluation with a score of 5.54/6.00 due for its higher score in ease of production and cost-efficiency.

Aspect	Weight	Design 1		Design 2		Design 3	
		Score	Description	Score	Description	Score	Description
Potential Accuracy	30%	5.5	Sensors placed in different locations.	5	Only LED sensor placed on finger.	5	Only LED sensor placed on finger.
Comfort	15%	2	Requires sensor belt in different parts of the body.	6	Requires fingertip on the sensor.	6	Requires fingertip on the sensor.
Aesthetics	5%	5	Display unit shows the result directly.	5.75	Smaller size due to customized PCB.	5	Medium sized.
Safety	10%	5	No risk of cables.	5	No risk of cables.	5	No risk of cables.
Ease of production	35%	3	ECG increases complexity.	4.5	Needs PCB customization.	6	No ECG and custom PCB.
Cost-efficiency	5%	5.25	ECG increases cost.	5	Needs PCB customization.	5.75	No ECG and custom PCB.
Total		4.3		5.2		5.5	

Table 1. Design Evaluation Matrix

Software development begins with designing the UI on Figma. After that, the design is implemented into the frontend using Expo React Native, integrating libraries like Expo Print for generating PDFs, Expo Sharing for sharing data, React Native BLE-PLX for BLE connectivity, also Buffer and Expo Device for data processing and permissions. Functions were implemented for fetching and updating data, scanning and connecting BLE devices, and generating and sharing PDFs of monitored parameters results. Integration with hardware involved declaring UUIDs for BLE communication, real-time data streaming, and decoding base64-encoded sensor data into readable values. The final output, heart rate, blood pressure, oxygen saturation, and respiratory rate data, was displayed in the software.

HeartTip demonstrates a strong potential as an alternative to conventional monitoring tools. However, testing and calibration for the calculation formulas and ensuring robust data transmission under varying conditions should be focused in future research for improvement.

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Analysis of Kunming's Education System

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Purpose and Background

Yunnan Province is located in the southwest frontier of China. Despite its rich resources and diverse culture, there is a significant imbalance in economic development, leading to a notable disparity in the distribution of educational resources between urban and rural areas. Kunming, as the provincial capital, is an important engine for raising the overall educational level of the province. Kunming has certain advantages in terms of educational resource allocation, infrastructure construction, and policy support. However, due to long-standing urban-rural differences, its education system still faces issues such as uneven resource distribution, lagging teacher training, and a disconnect in vocational education. These problems directly affect educational equity and the progress of social development. Therefore, through an in-depth analysis of the current state of Kunming's education system, this article proposes policy recommendations tailored to local characteristics to support its educational reform and development.

Materials and Methods

This study is primarily based on relevant literature, policy documents, and statistical data on the current educational situation in Kunming, analyzing the distribution of educational resources between urban and rural areas, teacher training mechanisms, and the development of vocational education, with a focus on basic education, higher education, and vocational education fields. The research adopts a combination of quantitative analysis and qualitative research methods, comparing data on the allocation of urban and rural educational resources, college entrance examination results, and employment rates of vocational school graduates to reveal the gap between educational equity and quality. At the same time, case study methods are used to delve into teacher training and vocational education curriculum settings, and interview data is used to evaluate the effects of policy implementation and social feedback. In addition, through policy analysis, multiple suggestions are proposed, including urban-rural education linkage mechanisms, continuous teacher training programs, and vocational education reforms, with the aim of promoting balanced development in Kunming's education system.

Results and Discussion

The Kunming education system has made significant progress in policy support and resource allocation, especially in urban areas where educational infrastructure is well-developed, teacher quality is high, and there is a wealth of university resources. However, the imbalance in the distribution of educational resources between urban and rural areas remains a major obstacle. Schools in rural areas are relatively backward in terms of facilities, lacking necessary teaching resources such as libraries, laboratories, and multimedia equipment, and the teaching staff is also weak. There is a high turnover of teachers and a lack of teaching quality. This gap in resource allocation not only hinders the realization of educational equity but also limits the development opportunities for rural students.

At the same time, the lack of a teacher training mechanism has had a significant impact on the quality of education. Especially in rural areas, teachers lack continuous professional development support, there are fewer training opportunities, and teaching methods struggle to adapt to modern educational needs. In addition, vocational education is seriously disconnected from market demands, with curriculum settings not closely aligned with the needs of local economic development, and a low level of social recognition, further weakening the support role of vocational education for regional economic and talent development.

Conclusion

In summary, it is recommended that Kunming promote a linkage mechanism for urban and rural education, achieving resource sharing through policy support, especially using distance education technology to make up for educational deficiencies in remote areas. At the same time, strengthen teacher training and incentive mechanisms, especially providing more support for rural teachers to attract excellent teachers to serve the grassroots for the long term. In addition, deepen the reform of vocational education, optimize the school-enterprise cooperation model, and enhance social recognition of vocational education. Through these comprehensive reforms, the Kunming education system will be able to effectively narrow the urban-rural gap, improve overall education quality, and play a greater exemplary role in the provincial education reform.

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Identification of Coral Reef Types and Conditions in Tunda Island, Indonesia, Using the Coral Watch Coral Health Chart

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Purpose and Background

The existence of coral reefs is threatened by many things, such as climate change, plastic pollution, and unsustainable human activities. However, coral reefs play an important role as habitats for various marine species, protect coastlines from abrasion, and generate economic benefits through tourism and the fishing industry. One of the impacts that often occurs is the phenomenon of coral bleaching. This study analyzes the condition of coral reefs using the Coral Watch method that utilizes the Coral Health Chart. The table classifies coral colors into four classifications, namely green, red, brown, and brownish yellow, with a specific code for each color.

This research aims to classify coral reef types, know how to monitor coral reefs using the Coral Watch Coral Health Chart, and determine the level of coral bleaching and its causal factors. The research site chosen was Tunda Island, a small island located in Serang Regency, Banten Province, Indonesia, with an area of approximately 300 ha. The island is famous as a marine tourism destination because of its beautiful underwater nature. Most of the people on Tunda Island work as fishermen, farmers, and a small portion work as traders.

Materials and Methods

This research was conducted in November 2023. This research used tools, such as GPS, a thermometer, the Coral Watch Coral Health Chart, an underwater camera, and a logbook to record data. The data was obtained by determining the research location using GPS, measuring the temperature of the seawater at the research location using a thermometer, and matching the color of the coral reef with the Coral Health Chart through snorkeling. The data that has been obtained is then processed to calculate the average value of coral reef health based on the color scale on the Coral Watch Coral Health Chart, which is used to determine the health of coral reefs in the research location.

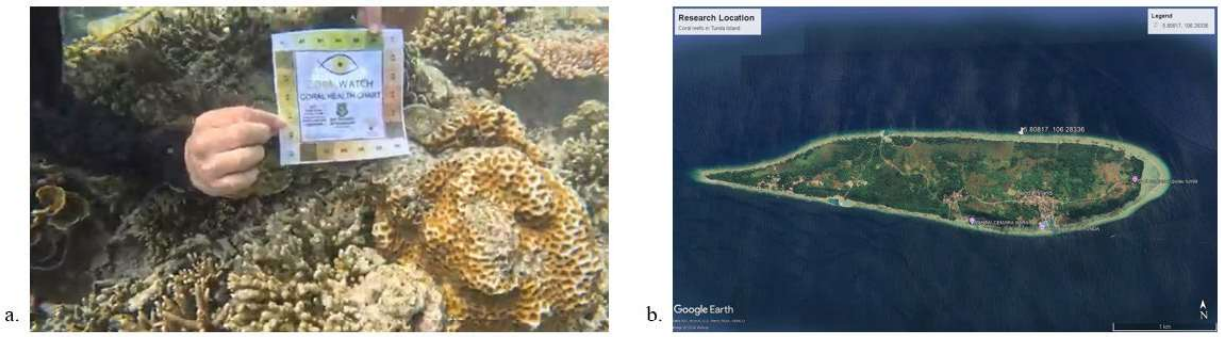


Figure 1. a. Data collection through snorkeling and b. Research location

Results and Discussion

a.

b.

Average color score per survey 3.88461538

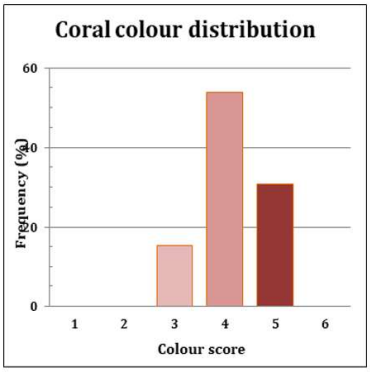
Number of corals surveyed 13

Coral number	Type of coral	Lightest color (letter)	Lightest color (number	Darkest color (letter)	Darkest color (number)	Average color score per coral
1	Boulder	B	3	B	6	4.5
2	Boulder	C	2	C	4	3
3	Branching	B	2	B	6	4
4	Branching	C	3	C	5	4
5	Branching	E	2	E	3	2.5
6	Branching	E	2	E	5	3.5
7	Plate	B	2	B	6	4
8	Branching	E	3	E	5	4
9	Boulder	E	4	E	5	4.5
10	Soft	E	4	E	5	4.5
11	Branching	E	2	E	6	4
12	Branching	E	3	E	6	4.5
13	Plate	E	2	E	5	3.5

Figure 2. a. Types of coral reefs in the study site and b. Calculation results based on coral reef classification

Based on the results obtained, there are 13 types of coral reefs with an average score of 3.88461538, which indicates that coral reefs on Tunda Island are in good condition. Based on the color distribution graph of coral reefs on Tunda Island, it was found that the value of 3 was 15%, the value of 4 was 54%, and the value of 5 was 31%, while for the distribution of coral reef shapes that have been analyzed on Tunda Island, it was found that 54% of coral reefs were branching type, 23% of coral reefs were boulder type, 15% of coral reefs were plate type, and 8% of coral reefs were soft type.

a.



b.

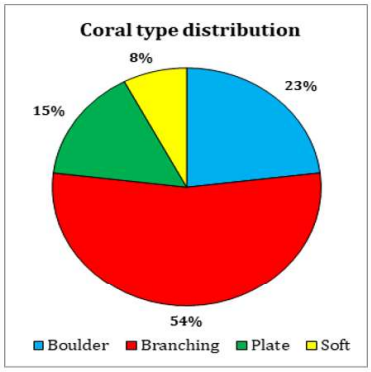


Figure 3. a. Distribution graph of coral reef color values against frequency and b. Distribution graph of coral reef types in Tunda Island

One of the main factors that support coral reefs on Tunda Island to be in good condition is the awareness of the local community in protecting the marine environment, including the use of environmentally friendly fishing methods, such as fishing so that there is no indication of coral bleaching (Zamani, 2015). However, coral reef ecosystems still face major threats, such as plastic pollution and rising sea surface temperatures due to climate change. Therefore, continuous education and strict supervision are needed to support environmental conservation and prevent destructive actions.

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UTILIZING CITARUM RIVER'S WATER HYACINTH FOR CRAFT PRODUCTION: A SUSTAINABLE APPROACH TO ENVIRONMENTAL RESTORATION AND LOCAL EMPOWERMENT

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Purpose and Background

Citarum River is the longest river in West Java, Indonesia with the river length of 297 km and a river basin area of 11.323 km^2. The Citarum River Basin flows through 13 districts/cities with a total population around the Citarum River Basin of ± 18 million people. The Citarum River is the main source of water for millions of people. However, more than 200,000 people throw their waste into the Citarum River. This makes the Citarum River very popular as the most polluted river in the world. This area has become a place for the disposal of large amounts of industrial and household waste, resulting in conditions that have the potential to have an impact on inhibiting sustainable ecosystem processes (Abdillah, et al., 2024).

At Citarum River KM 77 there is a foundation that addresses environmental damage in the Citarum River called the Bening Saguling Foundation. In the area of this foundation, abundant water hyacinth plants were found. Water hyacinth becomes a problem because it detains the flow of the river and traps waste floating in the river. Therefore, a step is needed to overcome the water hyacinth problem in the Citarum River so that the river flow continues to run smoothly. This research will explain how water hyacinth initially caused problems in the Citarum River and how Bening Saguling Foundation reduces these problems.

Materials and Methods

This research used a qualitative approach through a literature study to examine the utilization of water hyacinth from the Citarum River for crafting purposes. Materials were collected from the author's personal experience who went to Bening Saguling Foundation on 21st October 2024.

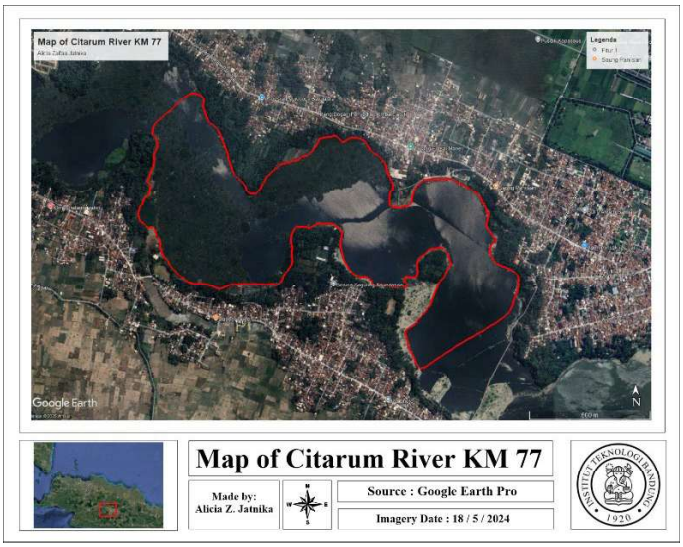

Figure 1 Map of Citarum River KM 77

Results and Discussion

Saguling Reservoir or Citarum River KM 77 produces one ton of water hyacinth every day so it will never run out of raw materials for crafting. Water hyacinth (*Eichhornia crassipes*) in the Saguling reservoir is very abundant because every day there are seven hundred kg to one ton of domestic waste in the area. Water hyacinth. In normal amounts, water hyacinth plays a role in capturing heavy metal

pollutants. However, if the rates are excessive, it will only become a weed that disrupts the balance of the ecosystem (Purnomo, 2024).

Making handicrafts from water hyacinth is very easy. Water hyacinth that has been transported from Saguling Reservoir is dried in the sun for a week. The stems are taken and pressed until flat so that mothers can weave manually. Handicraft products from water hyacinth include bracelets, bags, baskets, sandals, and tissue holders.

Figure 2 Handicraft products from water hyacinth (Source: MFCteam, 2023)

One of the Bening Saguling Foundation's strategies is building a positive correlation between the rivers and communities. To achieve that strategy, they make craft products out of water hyacinth. They employ empowered wives of scavengers as craftsmen. Processing water hyacinth into handicrafts can increase the economic value of the plant. Water hyacinth crafts are sold for IDR 80,000 to IDR 120,000. Therefore, it is not only cleaning the Saguling Reservoir from water hyacinth, but also empowering mothers so that they can earn income.

This program from Bening Saguling Foundation supports Sustainable Development Goals (SDGs) number one, eight, and fourteen. Goal number one is no poverty, by making water hyacinth crafts, women in Saguling rural can get additional sources of income that have the potential to help reduce poverty problems. This also supports goal number eight, which is decent work and economic growth. Lastly, another supported goal is goal number fourteen, which is underwater life. This is clear because water hyacinth itself is an aquatic plant, so utilizing this plant as a handicraft has made a positive impact on the aquatic ecosystem.

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SYSTEMATIC REVIEW: THE PREVALENCE OF PATHOGENIC BACTERIAL CONTAMINATION IN BEEF

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Purpose and Background

Foodborne diseases are one of the major global issues that directly affect to public health, economic stability, and social welfare. Each year, contaminated food causes foodborne illness to 600 million individuals, resulting in 420,000 fatalities, with the most significant impact affecting children under five-year-old (WHO, 2024). In Indonesia, increasing beef consumption (2.25 kg/capita/year) in the middle of domestic production deficit (Kominfo RI, 2024; BPS, 2024) raises worries over food safety due to pathogenic bacterial contamination such as *Salmonella sp., Escherichia coli*, *Listeria sp., Staphylococcus aureus, Clostridium perfringens* (BPOM RI, 2019).

This research systematically analyzed the prevalence of pathogenic bacterial contamination in beef based on the Scopus database in Indonesia and globally, employing a systematic review methodology. It also aims to support policymakers, industrial stakeholders, and consumers in enhancing food safety standards. This aligns with the Sustainable Development Goals, specifically SDG 3 (good health and wellbeing) and SDG 6 (clean water and sanitation) (United Nations, 2024). The outcomes of this research contribute to improving public health, enhancing food processing and security, increasing consumer confidence, and reducing the socio-economic burden of foodborne illnesses.

Materials and Methods

This research employs a systematic review method utilizing the Scopus database, Watase Uake application (Wahyudi, 2024), and Microsoft Excel. The study focuses on published journal articles (Q1-Q4) from 2014–2024. The process involves formulating research questions, defining inclusion and exclusion criteria, sourcing and selecting studies (illustrated by the PRISMA 2020 flowchart), and extracting and assessing data (Page et al., 2021).

Results and Discussion

The systematic review process, as depicted in the flowchart (Figure 1), highlights the methodology and outcomes of screening studies on the prevalence of pathogenic bacterial contamination in beef.

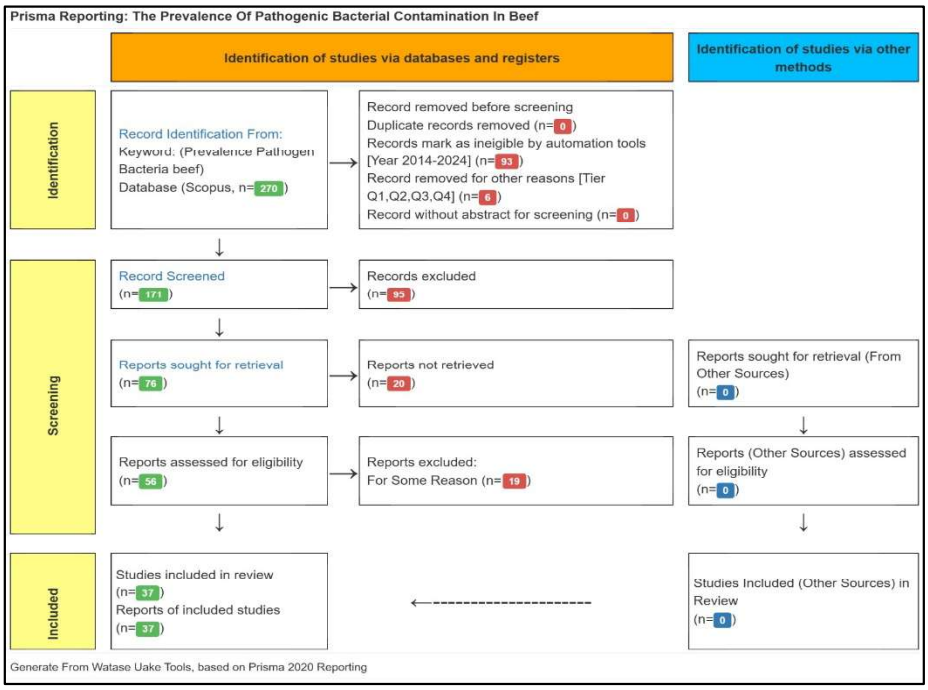

Figure 1. Flowchart of research stages result (Prisma Reporting)

A total of 270 articles were initially identified from the Scopus database using the keyword combination "Prevalence Pathogen Bacteria Beef.". After removing duplicates (n=8) and ineligible records (n=91), 171 records were reviewed, resulting in 78 reports for retrieval. Of these, 56 studies underwent rigorous evaluation, and 37 studies were extracted and included for synthesis as meeting the criteria (beef only), ensuring a high-quality basis for analysis and conclusions.

The data shows notable variations in the prevalence of different pathogens in beef. Among the tested pathogens, *Staphylococcus aureus* had the highest prevalence at 37.47%, followed by *Clostridium perfringens* (24.82%), *Escherichia coli* (12.48%), *Salmonella spp*. (9.89%), and *Listeria spp*. (9.80%). The overall prevalence across all pathogens in beef was recorded at 12.03%, with 4,117 positive cases out of 34,234 total samples.

The systematic review results highlight a disparity in the prevalence of pathogenic bacterial contamination in beef between developed and developing countries. In developed countries, contamination accounted for 15.02% of the total, with 2,233 positive cases identified out of 14,864 samples. Conversely, in developing countries, contamination was lower at 9.73%, with 1,884 positive cases reported from a total of 19,370 samples. This indicates a higher proportional prevalence in developed countries despite the larger number of samples analyzed in developing regions. These findings suggest potential differences in testing practices, surveillance systems, and reporting standards between the two groups, which may influence the reported prevalence rates (Barco et al., 2015).

Interestingly, the prevalence of pathogens in beef was higher in developed countries (15.02%) compared to developing countries (9.73%). This trend may be explained by several factors: advanced testing technologies and stricter surveillance systems in developed countries, which enhance detection rates (WHO, 2024), centralized meat processing systems in developed regions that increase cross-contamination risks, higher consumption of raw or undercooked beef (e.g., rare steaks) in developed countries, and more robust reporting protocols leading to better documentation of contamination cases, compared to possible underreporting in developing countries.

These findings highlight the need for targeted interventions to address regional differences in pathogen prevalence. Improving testing and monitoring systems in developing countries and enhancing hygiene in centralized meat processing facilities are critical. Public awareness campaigns on safe cooking practices can also reduce health risks (WHO, 2024). Future research requires examine regional environmental conditions, food safety regulations, and cultural differences in beef preparation to develop effective strategies for mitigating foodborne illnesses globally.

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Correlation Analysis of ONI and DMI for Rainfall in the Cirata Reservoir Area in 2010 – 2023

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Purpose and Background

Global climate phenomena like El Niño, La Niña (measured by the Oceanic Niño Index or ONI), and the Indian Ocean Dipole (measured by the Dipole Mode Index or DMI) significantly influence rainfall patterns, including in Indonesia, where the Cirata Reservoir (Figure.1) serves as a vital water source for hydroelectric power, irrigation, and domestic needs. The reservoir's water availability is highly susceptible to unpredictable rainfall variations driven by these indices, making it crucial to understand their relationship with rainfall to support adaptive and sustainable water resource management.

Figure.1 Views cirata reservoir area

This study aims to analyze the correlation between ONI and DMI indices and rainfall in the Cirata Reservoir area during the 2010–2023 period. The findings are expected to provide insights into the linkage between global climate patterns and local conditions, serving as a foundation for developing climate impact mitigation strategies.

Materials and Methods

The data used in this study is Ocean Nino Index, Dipole Mode Index, and Rainfall Data at Cirata Reservoir in 2010 - 2023. The data obtained from NOAA and NASA (Table.1)

Table.1 Data Source

No	Parameter	Source	Addition
1	Ocean Nino Index	NOAA	Index NINO 3-4
2	Dipole Mode Index	NOAA	Standard
3	Rainfall Data	NASA and NOAA	Resolution 0.05 ˚ x 0.05 ˚

The method used is Multiple Linear Regression (MLR) which is a statistical analysis method to model the relationship between one dependent variable and two or more independent variables. MLR aims to predict the value of a dependent variable based on the value of an existing independent variable.

$$Y = \beta_0 + \beta_1 ONI + \beta_2 DMI + e \quad (1)$$

Y is dependent variable (rainfall), ONI and DMI is independent variables (ONI and DMI), β_0 is intercept(value Y when ONI and DMI = 0), β_1 *and* β_2 is regression coefficients for each independent variable, which shows how much influence the independent variable has on the dependent variable, and e is term errors, or prediction errors that cannot be explained by the model.

Results and Discussion

During the 2010–2023 period (Figure.2), the highest rainfall in the Cirata Reservoir area occurred in the NDJ (November-December-January) period at 379.616 mm/month, while the lowest was in the JJA (June-July-August) period at 129.368 mm/month. This pattern follows seasonal monsoonal

wind influences, with the NDJ period representing the wet season and the JJA period the dry season. The variation in rainfall is also believed to be influenced by global climate indices like the Oceanic Niño Index (ONI) and the Dipole Mode Index (DMI), which can either amplify or reduce the effects of monsoonal winds.

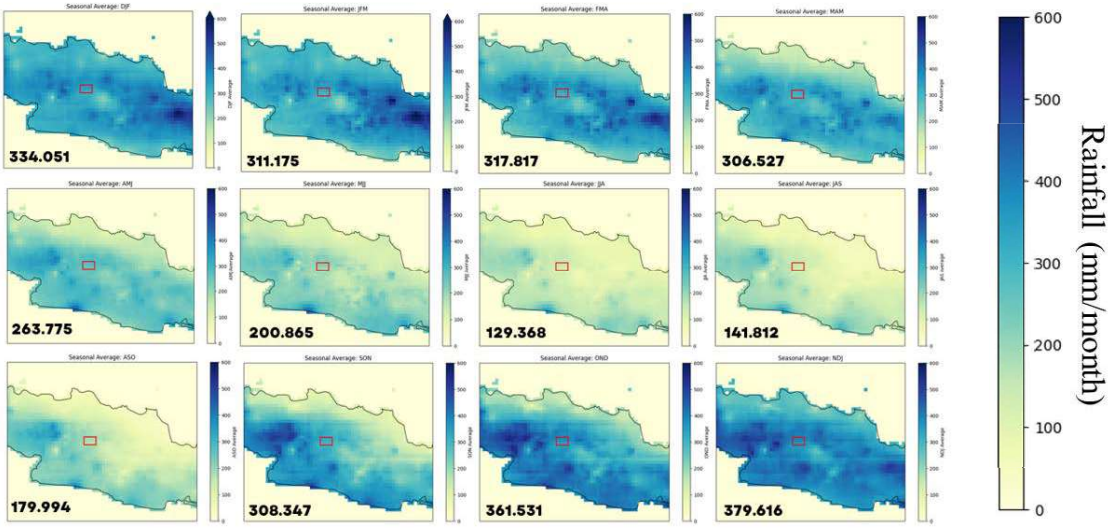

Figure.2 Average Rainfall per 3 Months in 2010 - 2023

The R-squared results from the Multiple Linear Regression (MLR) analysis (Chart 1) indicate that rainfall during the JJA period (June–July–August) has the highest correlation with ONI and DMI, with a value of 0.678, explaining 67.8% of the variability. In contrast, the MAM period (March–April–May) shows the lowest correlation, at 0.021. On average, the correlation across an entire year is 0.42. These results highlight significant monthly variability in the influence of global climate indices, with ONI and DMI playing a dominant role during JJA but having minimal impact during MAM, likely due to the influence of other dominant local factors.

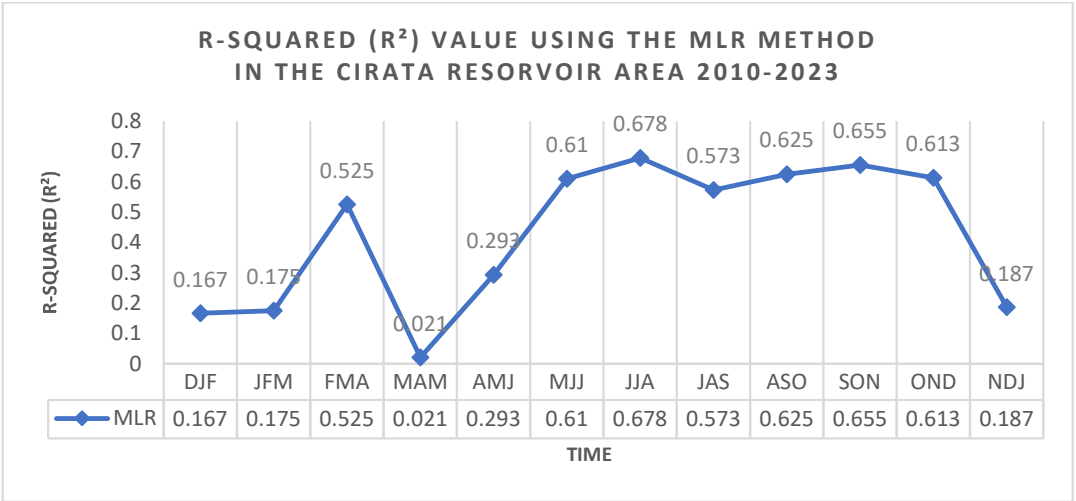

Chart.1 R^2 data showing the relationship between ONI, DMI and rainfall in Cirata Reservoir

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INTER-LIMB ASYMMETRY IN MUAY THAI FIGHTERS DURING A PRE-COMPETITION PHASE

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Purpose and Background

Inter-limb asymmetry refers to strength or functional imbalances between limbs (1), quantified as a percentage difference. Significant asymmetries (>10%) are linked to injury risk and performance decline (2). Monitoring these imbalances provides valuable insights into an athlete's physical status, aiding in the design of tailored training programs to address asymmetry.

Sports involving repetitive unilateral movements, such as kicking in Muay Thai, can lead to limb dominance and metric-specific asymmetries. Muay Thai, characterized by frequent unilateral actions during high training loads (e.g., fight camps), may result in significant asymmetry. However, research on the magnitude and direction of asymmetry in combat sports remains limited. Assessing Muay Thai athletes can inform training and rehabilitation strategies to correct imbalances, reduce injury risk, and enhance performance.

Objective of the Study

To investigate the magnitude and direction of inter-limb asymmetry in Muay Thai fighters during a pre-competition phase.

Materials and Methods

1.1 Experimental procedure

A cross-sectional design will examine the magnitude and direction of inter-limb asymmetry in Muay- Thai fighters during the pre-competition phase. Participants will attend two laboratory sessions:

1) **Familiarization Session:** After obtaining informed consent and identifying the dominant leg, participants will undergo a Dual-Energy X-ray Absorptiometry (DEXA) scan to assess body composition and familiarize themselves with task-specific assessments.
2) **Experimental Testing Session:** Participants will perform a standardized warm-up (5 minutes of low-intensity jogging, followed by bodyweight squats, forward/lateral lunges, and leg swings). They will then complete task-specific assessments in the following sequence: Uni-CMJ, Bi-CMJ, SLH, THOP, and isokinetic testing, with 10-minute recovery intervals between tasks.

1.2 Participants

Twenty professional Muay Thai fighters from Petchyindee Academy will be recruited. Eligibility will be determined based on specific inclusion and exclusion criteria. The study's purpose, procedures, and benefits will be explained, and written informed consent will be obtained. Participants will attend two laboratory sessions and refrain from strenuous exercise 24 hours before testing.

Result

Table 1. Absolute jump metric data (n= 2). Mean ± SD.

Metric	Uni-CMJ		Bi-CMJ
	Left	Right	
Jump Height (cm)	8.95 ± 0.05	8.75 ± 0.35	2.30 ± 0.10
Prop Impulse (N.s)	371.50 ± 48.50	340.00 ± 66.00	427.50 ± 71.50
Ecc Impulse (N.s)	388.00 ± 48.00	382.50 ± 122.50	374.00 ± 68.00
Peak Force (N)	1640.00 ± 295.00	1699.50 ± 247.50	1916.00 ± 324.00

Uni-CMJ = Uni-lateral countermovement jump; Bi-CMJ = Bi-lateral countermovement jump; Prop = Propulsive; Ecc = Eccentric.

Table 2. Isokinetic concentric peak torque (N.m) of knee flexors and extensors with calculated intra-limb H:Q ratio and inter-limb (directional) asymmetry. Mean ± SD

Angular Velocity	Left	Right	Inter-Limb Asymmetry (%)
60 deg/s−1			
Flexion	112.03 ± 26.71	110.62 ± 27.42	1.26%
Extension	201.44 ± 4.81	170.78 ± 32.74	15.22%
H:Q Ratio (%)	54.30 ± 5.45	50.36 ± 9.74	
180 deg/s−1			
Flexion	85.73 ± 17.09	107.69 ± 1.81	20.39%
Extension	166.57 ± 15.71	201.76 ± 4.48	17.43%
H:Q Ratio (%)	51.36 ± 5.88	47.79 ± 7.97	

Discussion

This pilot study was conducted with two subjects, both power athletes (a rugby player and a rower). Due to the small sample size and the specific characteristics of the participants, the results may not be representative or fully applicable to the intended study population.

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Coastal Vulnerability Analysis of Southern Yogyakarta Against Abrasion Threats

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Purpose and Background

The southern coast of the Yogyakarta Special Region (DIY), directly bordering the Indian Ocean, is highly susceptible to abrasion—erosion of the shoreline caused by waves, currents, and human activities. Coastal zones represent dynamic ecosystems influenced by both terrestrial and marine processes, such as sedimentation, tidal currents, and wave action. Given their ecological and economic significance, these areas face increased risks due to natural phenomena and anthropogenic activities like sand mining and deforestation.

Abrasion results in significant environmental and economic losses, with severe impacts on coastal communities and ecosystems. The main drivers include wave dynamics, sediment transport, and human interventions, exacerbated by global sea level rise. Abrasion occurs when sediment transport away from a site exceeds deposition, leading to shoreline retreat. This study focuses on analyzing coastal vulnerability in the southern region of Yogyakarta, highlighting changes in the shoreline over a 22-year period (1989–2011). The analysis aims to identify vulnerable areas and inform effective coastal management strategies.

Materials and Methods

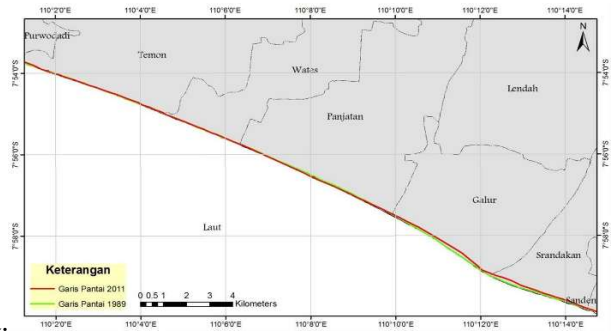
This research is based on a qualitative analysis of existing literature using Landsat satellite imagery from 1989 to 2011 to monitor shoreline changes along the southern coast of Yogyakarta. Literature reviews and geospatial analyses were conducted to interpret changes in shoreline positions and assess vulnerability levels. Coastal vulnerability was classified based on the rates of shoreline change: abrasion (shoreline retreat) and accretion (shoreline advance).

Key areas analyzed include Temon, Wates, Panjatan, Galur, and Srandakan Districts, with shoreline changes quantified in meters per year. The data were processed using GIS tools to produce visual maps of shoreline changes and vulnerability indices, focusing on the interactions of fluvial processes (e.g., sedimentation from rivers) and marine forces (e.g., wave and tidal activity). Anthropogenic factors such as sand mining and vegetation removal were also considered in assessing vulnerability.

Results and Discussion

Figure 1 illustrates the temporal changes in the coastline, comparing the shoreline positions in 1989 (green line) and 2011 (red line). The districts of Galur and Srandakan show a significant landward retreat of the coastline, further corroborating their high abrasion rates. In contrast, Panjatan exhibits a noticeable seaward advancement of the coastline due to accretion, while Temon and Wates show relatively minor changes.

The analysis of shoreline changes along the southern coast of Yogyakarta from 1989 to 2011 highlights significant dynamics, as depicted in Figure 1 Over the 22-year period, districts such as Galur and Srandakan experienced the most severe abrasion, with average rates of shoreline retreat at -10.534 m/year and -7.602 m/year, respectively. This contrasts sharply with Panjatan, which demonstrated substantial accretion at a rate of 4.720 m/year, primarily due to high sedimentation from rivers, particularly the Progo River. Temon and Wates, meanwhile, showed moderate abrasion rates of -0.870 m/year and -0.627 m/year, respectively. These findings illustrate the localized impact of both natural and anthropogenic factors on shoreline stability.

a. 

b.

District	1989-2011		Change (m/year)
	(-)	(+)	
Temon	-2,725	0,984	-0,870
Wates	-1,254	0,000	-0,627
Panjatan	-1,023	10,463	4,720
Galur	-21,068	0,000	-10,534
Srandakan	-15,204	0,000	-7,602

Figure 1. a. Coastline Changes on the South Coast of Yogyakarta in 1989-2011 and b. Shoreline Change (m/year) Source: (Hastuti, 2012)

The vulnerability map in Figure 2 complements these findings, categorizing the coastline into five risk levels: very low (blue), low (green), moderate (yellow), high (orange), and very high (red). Temon and Wates are predominantly categorized as moderate vulnerability, reflecting their relatively stable conditions. Meanwhile, Galur and Srandakan, which face strong wave action are classified as very high vulnerability zones, indicated by red. Panjatan demonstrates a mix of low to very low vulnerability, indicated by green and blue zones, due to the significant accretion bolstered by sedimentation.

These results emphasize the interplay of natural processes and human activities in shaping shoreline dynamics along the southern coast of Yogyakarta. They underscore the need for targeted coastal management strategies, particularly in high-risk zones such as Galur and Srandakan, while leveraging accretion trends in areas like Panjatan for long-term sustainability.

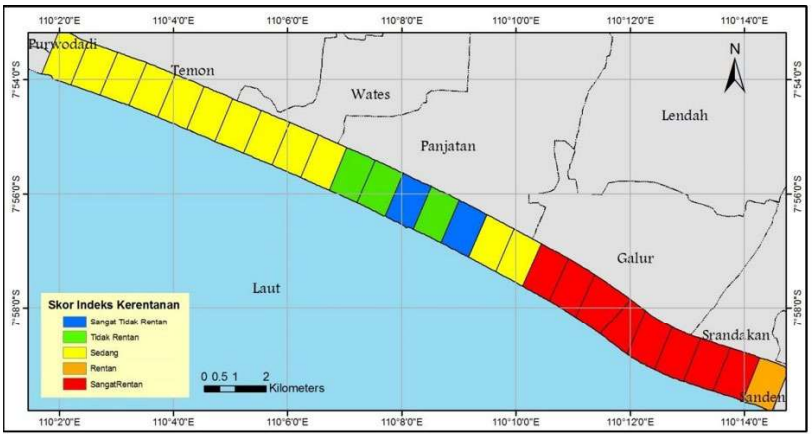


Figure 2. Coastal Vulnerability Index Scores for Southern Yogyakarta Based on Shoreline Change Parameters from 1989-2011 Source: (Hastuti, 2012)

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FOURIER TRANSFORM INFRARED (FTIR) SPECTROSCOPY FOR PLASTIC POLYMER TYPE ANALYSIS

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Purpose and Background

Over the past few decades, plastic pollution in the oceans has become a global issue today. Five trillion pieces of plastic waste weighing more than 260,000 tons are floating on the surface of the world's oceans due to improper waste disposal (Eriksen et al., 2014). Various types of plastics can be found in every part of the ocean such as polypropylene (PP), polyethylene (PE) and polyethylene terephthalate (PET) from the surface to the seabed (Guo & Wang, 2019). Scientists have warned us that if the rapid increase in plastic continues, plastic will outnumber fish in the ocean by 2050 (Geyer et al., 2017). Fourier transform infrared (FTIR) spectroscopy is one method to analyze the type of plastic polymer. Each type of plastic has a unique infrared spectrum, FTIR can assess functional groups based on wave interactions and determine the type of polymer (Tan et al., 2023). Therefore, this study will identify the type of plastic polymer using FTIR from seawater samples taken in Surabaya, Indonesia.

Materials and Methods

Seawater samples as much as 22 liters were taken on the surface at Kenjeran Beach Surabaya at coordinates 7.209901°S and 112.784246°E using a plankton net. The water samples were prepared in the chemistry laboratory then analyzed using FTIR Nicolet iS20.

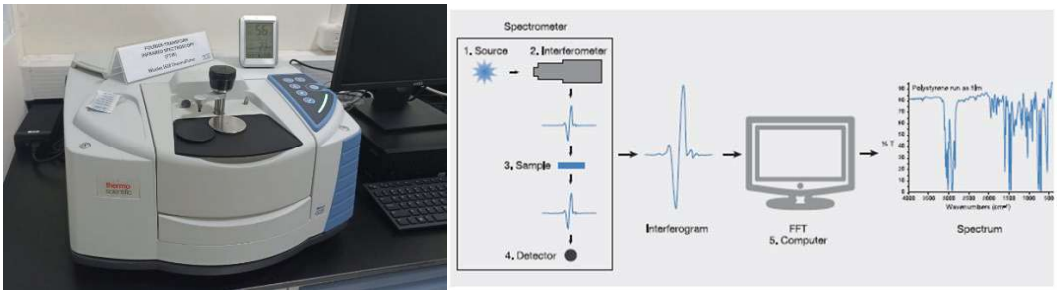
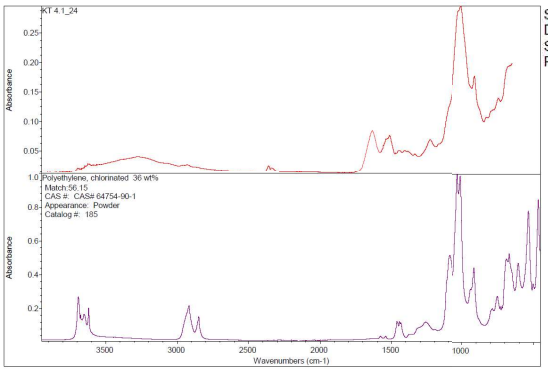


Figure 1. Nicolet iS20 FTIR (left) and its working principle (right) (Source: ThermoFisher, 2022)

Result and Discussion

Based on the results of FTIR analysis, it was found that the most frequent types of plastic polymers are polyethylene and polyester. In industrial production, PE can be processed by blow molding, extrusion, etc. There are many types of polyethylene, including low density polyethylene (LDPE); high-density polyethylene (HDPE); and linear low-density polyethylene (LLDPE). HDPE is commonly used for industrial barrels, medicine bottles, machine oil drums, cosmetic bottles, bottle caps, shopping bags, garbage bags, clothing bags, and disposable gloves in film materials. In addition, HDPE is always used for water supply and drainage pipes, gas pipes, and heating pipes. LDPE is always used for bottles, buckets, basins, cable sheaths, food packaging films, garbage bags, shopping bags, and toys. In pipes, LLDPE is always used for agricultural pipes, water-saving irrigation pipes, and plastic hoses (Chen & Lin, 2021). Polyester is a polymer that contains ester functional groups in its main chain. As a specific material, it most often refers to a type called polyethylene terephthalate (PET) because it consists of an ethylene group and a terephthalate group. PET material has excellent resistance to water, moisture, and chemicals at high temperatures, so it is widely used in the packaging industry, especially for consumables (water bottles, soft drink bottles, and food packaging). PET is mostly used in water bottles (34.6%) and carbonated soft drink bottles (27.1%) in the food industry (Olam, 2021).



Search results for: KT 4.1_24
Date: Thu Mar 07 16:33:07 2024 (GMT+07:00)
Search algorithm: Correlation
Regions searched: 3949.50-649.89

Search results list of matches

	Index	Match	Compound Name
1	51	56.15	Polyethylene, chlorinated 36 wt%
2	792	49.62	Crystalline calcium phosphate (Canis Vulpes)
3	53	44.01	Polyethylene, chlorinated 48 wt%
4	290	43.20	Formaldehyde - aqueous solution
5	320	40.02	Methyl-13C alcohol
6	793	39.10	Polyester with kaolin filler
7	1737	38.11	2-Propyn-1-ol
8	1213	36.62	Propargyl alcohol; 2-Propyn-1-ol
9	40	36.32	CELLOPHANE
10	52	35.93	Polyethylene, chlorinated 42 wt%

Figure 2. FTIR analysis results for polyethylene (PE) and polyester polymer types

Figure 3. Examples of polyethylene (left and center) (Olam, 2021) and polyester (right) products (Source: www.walmart.com)

In the ocean, mostly floating polyethylene particles often attract aquatic animals due to their color and smell; these polyethylenes can cause entanglement or ingestion by marine animals, which can trigger organ damage, apoptosis, genotoxicity, and death. As a result, it is estimated that hundreds of millions of marine animals die each year due to plastic pollution. Similarly, polyester, if degraded into a smaller size, will allow it to be consumed by marine animals and cause health problems for humans, such as through the food chain (Yao et al., 2022).

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Exercise Behaviors of Sports Science Students at Silpakorn University, Sanam Chandra Palace Campus

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Purpose and Background

Nowadays, exercise is recognized as a crucial factor in promoting physical and mental health, especially among students and employees in educational institutions. Exercise not only increases physical strength and flexibility, but also helps to reduce stress and improve mental well-being, contributing to an overall better quality of life. Examining exercise behavior is important to understand the various factors that influence exercise, such as frequency, type of exercise and potential challenges or obstacles. The purposes of this study were to investigate the exercise behavior of sports science students. The study integrates principles from biology, physiology, biomechanics and sports psychology — disciplines that are closely related to sport and play an important role in the development of effective exercise programs. The focus is on the application of sports science findings in practice. The results of this research will support the development of effective and safe training activities Sports Science Students By developing programs that meet the needs of users and removing barriers to exercise, this initiative aims to improve the overall health and well-being of students in the long term.

Methods

This study utilized a descriptive cross-sectional design to explore exercise behaviors of Sports Science students at Silpakorn University, Sanam Chandra Palace Campus. The variables were as follows:

1. Exercise knowledge – Understanding proper techniques and principles.
2. Attitudes toward exercise – Beliefs about its value.
3. Exercise practices – Frequency, intensity, and types of exercise.

Population and Sample Size

The population consisted of 373 sports science students in years 1-4. The researcher calculated the sample size from Krejcie & Morgan tables, which resulted in a total of 340 respondents. (279 Males, 61 Females).

Instruments

The primary data collection tool was a self-administered questionnaire specifically designed to assess exercise behavior of sports science students.

1. Structure of the questionnaire:

Section 1: Demographic information - Collected data on age, gender and year of study.
Section 2: Knowledge about physical activity - Assesses understanding of exercise techniques and principles using multiple-choice questions.
Section 3: Attitude towards physical activity - Measured using a 5-point Likert scale to assess beliefs, opinions and perceptions about exercise.
Section 4: Exercise practices - Assessment of exercise behavior in terms of frequency, intensity, duration and type of activities performed.

2. Reliability and validity:

The questionnaire demonstrated high reliability, with a Cronbach's alpha coefficient of 0.88.
Content validity was ensured by an expert reviews.

Results

1. Participant Demographics: Gender: Male (82.06%), Female (17.94%). Academic Year: Year 1 (33.24%), Year 2 (24.12%), Year 3 (23.82%), Year 4 (18.82%).
2. Exercise Behavior Analysis: Knowledge: Students have an excellent level of knowledge about exercise. Attitudes: Students have an excellent level of Attitudes toward exercise. Practices: Students have an excellent level of Exercise practices.
3. Comparison of significant differences between dependent variables on exercise behavior:

Gender: Both males and females have knowledge, attitude and practice. There was no significant difference at .05. Academic Year: First-year Sports Science students have different attitudes and practices from second-year, third-year, and fourth-year students at a significance level of .05, and second-year students have attitudes about exercise was significantly different from Year 3 at .05.

Discussion

1. Knowledge About Exercise

Sports science students demonstrate an excellent understanding of the basic principles of exercise, especially in the higher years where students have more in-depth and comprehensive knowledge, both in terms of theory and practice. Female students pay attention to choosing appropriate attire, especially in activities that require specific skills such as aerobic exercise or yoga. Appropriate attire not only helps maximize training effectiveness but also enhances safety during practice

2. Attitudes Toward Exercise

Sports science students have a positive attitude towards exercise, with a clear understanding of the benefits of promoting health. Especially in the higher years, students have a deeper attitude and see the importance of exercise in effectively taking care of the health of themselves and others. Students' attitudes towards exercise will vary according to their year of study. Students in higher years tend to have a perspective that understands the importance of exercise for long-term health promotion and sustainable quality of life development.

3. Exercise Behavior in Practice

Exercise behaviors were generally moderate. Strong adherence to facility rules was observed, but participation in physical activities was relatively low, suggesting a need for targeted interventions to encourage more consistent engagement.

Conclusions

1. Knowledge About Exercise

Sports science students demonstrated a solid understanding of proper exercise practices, such as choosing appropriate clothing and footwear, as well as exercising regularly to maintain health and prevent injuries.

2. Attitudes Toward Exercise

Students' attitudes towards exercise varied according to their year of study, with higher-year students having more developed attitudes and a deeper understanding of the benefits of exercise, both in terms of health promotion and disease prevention. Students have an increasing awareness of the importance of long-term exercise and see it as an important component in promoting quality of life.

3. Exercise Behaviors

Students' exercise behavior is moderate, with relatively good compliance with exercise regulations, but lacking consistency in participating in physical activity. The study of the year of study points to the need to design appropriate programs to address barriers and support continued participation in exercise.

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ANALYSIS OF STEEP FACTORS ON THE IMPACT OF SEA LEVEL RISE AND LAND SUBSIDENCE IN THE COASTAL REGION OF INDONESIA

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Purpose and Background

Climate change has resulted in significant phenomena such as sea-level rise (SLR) and land subsidence, which pose severe challenges to coastal sustainability worldwide (Stoll, 2021). Indramayu's selection is critical due to its significant agricultural output and coastal economy, making it highly susceptible to climate change impacts in Indonesia (Sepanie Putiamini, 2023) Utilizing the RCP 8.5 scenario by IPCC, at 2045 a sea-level rise will come into 0.35 meters as shown in Figure 1 (Stoll, 2021). Compounded by land subsidence of 0.429 meters by 2045, derived from CORS CROL measurements indicating an annual rate of -15.9 mm/year (Susilo S. S.-G., 2023). The STEEP framework evaluates social, technological, economic, environmental, and political factors. to address these challenges. It identifies demographic vulnerabilities, assesses financial and infrastructure losses, examines ecological impacts, and evaluates policy effectiveness. This comprehensive approach supports data-driven strategies for resilience and sustainable coastal management (Szigeti, 2012).

Materials and Methods

The analysis of flood inundation and their impact on STEEP conditions integrates sea-level rise (SLR) data based on RCP 8.5 scenarios, land subsidence rates, Digital Elevation Model, population density, and agricultural productivity in Indramayu Regency (Hamzah Latief, 2018). Economic losses are quantified by evaluating the value of affected agricultural land, residential zones, and infrastructure for essential insights for policy and strategic planning.

Results and Discussion

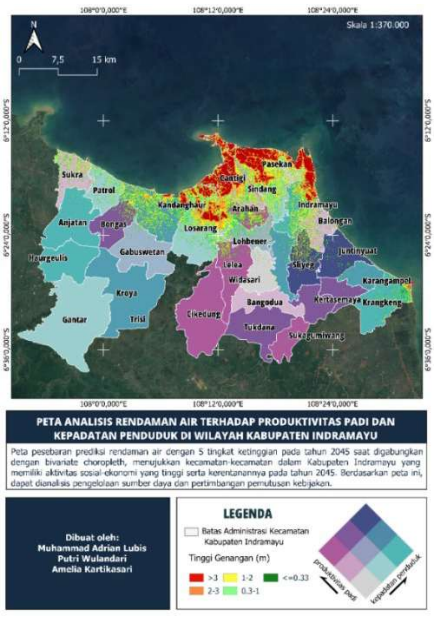

Figure 1 Flood Inundation Map and Its Impact on STEEP Conditions in Indramayu Regency Indonesia

Figure 2 highlights that by 2045, Indramayu Regency approximately will be inundated under water levels with 376.417 km² submerged (18.13% of the total area) of 0.5 to 3 meters. Lot of areas, that vital for rice production and food security, will face reduced yields, alongside significant socio-economic vulnerabilities in densely populated zones. This inundation would affect 40,739.40 ha of agricultural land, 70.19 ha of residential areas, and 687.20 km of roads, leading to an estimated economic loss of Rp 62.72 trillion, predominantly from agriculture. Environmentally, persistent land subsidence (0.0159 m/year) and rising global temperatures (RCP 8.5 scenario) exacerbate coastal vulnerabilities, increasing risks of flooding, ecosystem degradation, and agricultural productivity loss.

The qualitative STEEP analysis highlights critical vulnerabilities. Socially, densely populated northern districts like Cantigi and Sindang face risks of displacement and instability. Technologically, advanced monitoring systems and adaptive innovations are needed for effective mitigation. Economically, high-risk zones like Pasekan emphasize safeguarding food security and minimizing infrastructure losses. Environmentally, ongoing land subsidence and sea-level rise exacerbate ecosystem degradation, requiring restoration and adaptive measures. Politically, governance frameworks and integrated policies are essential for disaster mitigation, sustainable land use, and resilient infrastructure development. Future inundation scenarios highlight the need for strategic planning to address sea-level rise (SLR). The STEEP framework analyses providing a comprehensive matrix for effective and scalable mitigation strategies across sectors. The table will shown in Tabel 1.

Table 1 STEEP Framework Matrix for Adaptive Strategies to Avoid Negative Impacts of Sea Level Rise

Variable	Social	Technology	Economic	Environmental	Political
Social	Conduct training on SLR adaptation.	Raise awareness through technology.	Engage SMEs in adaptive solutions.	Create green spaces to reduce flooding.	Support social innovation for adaptation.
Technology	Use social media for awareness.	Develop SLR monitoring apps.	Innovate energy-efficient solutions.	Use eco-friendly technologies.	Incentivize green tech adoption.
Economic	Host markets for adaptive businesses.	Invest in R&D for SLR solutions.	Fund adaptive SMEs and startups.	Promote sustainable business practices.	Develop fiscal policies for adaptation.
Environmental	Educate on climate preservation.	Use sensors to monitor SLR impacts.	Adopt circular economy principles.	Restore coastal ecosystems.	Enforce environmental regulations.
Political	Increase public input in policymaking.	Enable feedback via digital platforms.	Assess policies for adaptive growth.	Promote sustainable programs.	Support innovation for SLR mitigation.

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CAPACITY BUILDING FOR FARMER GROUP THROUGH INTEGRATED PEST MANAGEMENT (IPM) FIELD SCHOOL

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Purpose and Background

Cloves (*Syzygium aromaticum* L.) are the strategic plantation commodity originating from the Maluku Islands, Indonesia. The spread of clove plants outside the Maluku Islands began in 1769, and started to reach Java, Kalimantan and Sumatera around 1870. Currently, clove plants have spread throughout the world (distan.bulelengkab.go.id, 2018). Buleleng Regency is the largest clove producing area in Bali. There has been a fluctuation in clove production in Buleleng Regency over the last five years. Clove production in Buleleng Regency from 2019 to 2023 was recorded at 1.750 tons, 2.174 tons, 2.288 tons, 2.298 tons, and 2.073 tons (BPS, 2024)

Apart from the impact of climate change, the fluctuations also caused by infestations of white root rot disease *(Rigidoporus* sp.), which can lead to yield losses. Ambengan Village that located in Sukasada District is one of the clove-producing area in Buleleng Regency. However, farmers in this area are worried because currently productive clove plants are dying due to infestations by the disease. Unfortunately, many farmers are still unaware of the prevention and control methods for this disease.

Integrated Pest Management (IPM) is an effective solution to address this problem. IPM can be defined as an approach where a combination of methods is used to manage pest and disease populations, considering economic efficiency and environmental impact compared to the eradicative methods that have been used in traditional practices (Asril *et al*., 2022). The implementation of Integrated Pest Management (IPM) involves cultivating healthy plants adapted to their agroecosystem, conserving and utilizing biological control agents, routinely monitoring pests and diseases so that selective pesticides are only applied when the populations exceed economic thresholds, and empowering farmers to become IPM experts in their own fields (Sopialena, 2018). The aim of this study is to improve farmers' knowledge, skills and awareness in controlling white root rot disease effectively and sustainably focusing on the implementation of IPM through field school.

Materials and Methods

The methods of this field school are socialization, training, mentoring, monitoring, and evaluation for farmer group. This field school was conducted at the Farmer Group of Bhuana Sari in Ambengan Village, Sukasada District, Buleleng Regency. There were 30 farmers participated in this field school, which was carried out from March to July 2024. The detailed implementation of the field school is as follows:

1. Socialization was conducted using a lecture method.
2. Training and mentoring focused on the production of *Trichoderma* bioagents and the establishment of demonstration plots for controlling white root rot disease.
3. Monitoring and evaluation of the field school were conducted using pre-test and post-test questionnaires that would be filled out by the farmers to assess the farmers knowledge of the training provided.

Results and Discussion

A field school is a non-formal education for farmers where the entire teaching and learning process is conducted in the field. This program serves as a learning center for farmers to make decisions, a platform for farmer group development, a place for exchanging field information and experiences, and a demonstration area. The capacity building for farmer group through Integrated Pest Management (IPM) field school on clove plants was conducted by involving the Bhuana Sari Farmer Group as the main participant. Table 1 presents the evaluation results of farmers knowledge before and after the IPM field school program at the Bhuana Sari Farmer Group, as follows:

Table 1. Pre-Test and Post-Test Results of Farmers Knowledge on Integrated Pest Management (IPM) at the Bhuana Sari Farmer Group

Level of Knowledge	*Pre-Test*		*Post-Test*	
	n	**%**	**n**	**%**
Good	17	56,67	28	93,33
Moderate	9	30,00	2	6,67
Limited	4	13,33	-	-
Total	**30**	**100**	**30**	**100**

Based on the pre-test and post-test results of farmers' knowledge levels, it was shown that the field school activities with combination of theory and practice methods were effective in improving farmers' knowledge of the concepts and implementation of Integrated Pest Management (IPM). This effectiveness was evidenced by an increase in the percentage of farmers with good knowledge levels and a decrease in the moderate and limited knowledge level.

During the field school, farmers were provided with materials on major pests and diseases of clove plants, the basic concepts of IPM, pests monitoring techniques, and pests control methods aligned with IPM principles. Additionally, hands-on practice was conducted to produce biological control agents using *Trichoderma* to manage white root rot disease (*Rigidoporus* sp.).

Farmers were actively involved in every stage of the program, starting from the initial observation of plant pest organisms, the production of biological control agents, application on experimental demonstration plots, and monitoring white root rot disease progression. This hands-on practice provided farmers with practical experience in utilizing biological agents as an effective and sustainable alternative for biological control. Moreover, it equipped the farmers with technical skills that they could independently apply on their own farms.

Mentoring was conducted to help farmers monitor the development of white root disease in the field. Farmers were encouraged to actively observe plant conditions and decide pest control methods aligned with IPM principles.

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Development of Thermo/Magnetic responsive Hydrogel for Drug Delivery Application

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Purpose and Background

Cancer is a very serious disease and remains the leading cause of death worldwide. In 2022, there were 1.9 million cancer cases and more than 600,000 related deaths in the United States alone [1]. While chemotherapy, a common treatment for cancer, is highly toxic and causes unpleasant side effects, which limit its effectiveness and suitability for many patients [2]. These chalenges have encouraged researchers to develop smart biomaterials, capable of delivering drugs directly to cancerous tumors while minimizing harm to healthy tissues.

This research focuses on creating a drug delivery system based on poly N-vinylcaprolactam (PNVCL), a biocompatible and themoresponsive polymer. PNVCL is used to prepare polymer composite hydrogels, which are combined with magnetic nanoparticles to enhance functionality. With a Lower Critical Solution Temperature (LCST) of 33–35 °C [3], PNVCL allows for precise controlled drug release. The study also investigates the delivery of doxorubicin, a chemotherapy drug, encapsulated in PNVCL- coated magnetic nanoparticles. The results demonstrate how this system could regulate drug release and selectively target cancerous tissues, offering a promising alternative for cancer treatment.

Materials and Methods

- Materials

  The chemicals used in this study include ferric chloride hexahydrate ($FeCl_3 \cdot 6H_2O$), ferrous chloride tetrahydrate ($FeCl_2 \cdot 4H_2O$), sodium hydroxide (NaOH), acetone, 3-methacryloxypropyl trimethoxysilane (MPS), isopropyl alcohol, ethanol, N-vinylcaprolactam (NVCL), 2-hydroxyethyl methacrylate (HEMA), ammonium persulfate (APS), N,N'methylenebisacrylamide (MBA), Irgacure® 184, methylene blue, and phosphate-buffered saline (PBS, pH 7.4).

- Methods
  1. Magnetic Nanoparticle Synthesis and Functionalization : Fe_3O_4 nanoparticles were synthesized through the co-precipitation of $FeCl_3 \cdot 6H_2O$ and $FeCl_2 \cdot 4H_2O$ using NaOH under nitrogen atmospere. Functionalization with MPS was carried out by refluxing the nanoparticles in isopropyl alcohol with MPS, followed by magnetic separation and thorough washing.
  2. Hydrogel Preparation : Poly(NVCL-co-HEMA) hydrogels were synthesized thorough UV- initiated free radical polymerization, using NVCL and HEMA as monomers, APS as the initiator, MBA as the crosslinker, and Irgacure® 184 as the curing agent. Fe_3O_4@MPS particles were incorporated during polymerization to form composite hydrogels.
  3. Methylene blue loading and Release : Methylene blue was used as model and was loaded into hydrogels by immersion. Drug release was analyzed in PBS at different temperatures using UV-Vis spectrophotmtry.
  4. Materials characterization : The materials were characterized by XRD, FTIR, SEM, and swelling ratio tests to evaluate structure, composition, morphology, and temperature-responsive behavior.

5. Materials characterization : The materials were characterized by XRD, FTIR, SEM, and swelling ratio tests to evaluate structure, composition, morphology, and temperature-responsive behavior.

Result and Discussion

The Fe_3O_4 nanoparticles were synthesized via the co-precipitation method, with XRD analysis confirming their crystalline magnetite structure. Functionalization with 3-Methacryloxypropyltrimethoxysilane (MPS) was verified through FTIR spectroscopy, indicating the presence of Si–O–Fe and C=C groups, enhancing their compatibility with the polymer matrix. SEM imaging revealed the nanoparticles' uniform spherical morphology, facilitating their effective incorporation into the hydrogels.

Poly(NVCL-co-HEMA) hydrogels were prepared via UV-initiated polymerization, embedding the functionalized nanoparticles to create a hybrid material. The hydrogels displayed temperature-responsive swelling behavior, driven by the dual hydrophilic-hydrophobic nature of poly(NVCL). At temperatures below the LCST (33–35°C), the polymer chains adopted a hydrophilic coil-like state, promoting water absorption and maximum swelling, as observed at 25°C. Above the LCST, the chains polymer collapsed into a hydrophobic globular state, expelling water and significantly reducing swelling. This reversible phase transition is crucial for controlled drug delivery, enabling the hydrogels to swell and absorb drugs in cooler conditions and release them in warmer, physiological conditions.

The hydrogels demonstrated efficient loading of methylene blue, with Fe_3O_4@MPS-poly(NVCL-co-HEMA) exhibiting the highest drug release efficiency of 66.76% at 37°C. This controlled release was attributed to the hydrophobic collapse of the polymer, which restricted rapid diffusion and allowed sustained release drug. The incorporation of Fe_3O_4@MPS nanoparticles endowed the magnetic properties to the hydrogel, enabling targeted movement under an external magnetic field, a key benefit for site- specific drug delivery.

The results highlight the hydrogels' optimal performance at 25°C for swelling and at 37°C for effective drug release, combining thermal responsiveness, magnetic functionality, and hydrophilic-hydrophobic phase transitions. These characteristics make the system highly suitable for controlled and targeted drug delivery, offering a significant advantage over conventional chemotherapy by reducing systemic side effects and enhancing drug localization.

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LIBIDO AND SCROTAL CIRCUMFERENCE OF GARUT SHEEP SUPPLEMENTED WITH DIFFERENT UNSATURATED FATTY ACID SOURCES AND ANTIOXIDANTS

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Purpose and Background

Garut sheep is a West Java germplasm asset with the potential to produce meat and has high resilience and productivity (Kamil 2020). However, there has been a decline in their quality in recent years due to the limited number of superior males to mate and the relatively high price. This decline is also primarily caused by using of garut sheep as dexterity animals (Herdis 2017). One of the crucial parameters in determining the quality of males is libido, which plays a significant role in reproductive success, including the quality of the semen produced. It serves as a valuable parameter for assessing reproductive competence (Ahmad *et al*., 2005) and is determined through reaction time, which refers to the duration between exposure to a stimulus and the initial mating attempt. Scrotal circumference is also an indicator of reproductive capacity because the size of the scrotum is correlated with sperm production and testosterone activity (Toelihere 1985). One of the efforts to improve the reproductive quality of males can be done through nutrient manipulation, such as the addition of fatty acids and antioxidants in feed. Omega-3 and omega-6 fatty acids affect sperm cell membranes and increase reproductive hormone activity (Wathes *et al*., 2007). Examples of omega-3 fatty acids are eicosapentaenoic acid and docosahexaenoic acid (EPA and DHA) from fish oil and omega-6 fatty acids from sunflower seed oil (Dubois *et al*., 2007). The addition of PUFA supplements to the diet has been found to modify the fatty acid composition (FAC) of sperm and increase libido (Estienne *et al*., 2008). Meanwhile, antioxidants play a role in reducing oxidative stress that can damage sperm cells and disrupt the body's metabolism. Vitamin E serves as a powerful antioxidant, primarily functioning to neutralize harmful free radicals generated in fatty tissues and membranes. Selenium (Se) is a vital component of the enzyme GSH-PX, which safeguards cellular membranes and lipid-containing organelles from oxidative damage. The synergistic interaction between these two elements is crucial for enhancing productivity and reproductive efficiency in rams (Baiomy *et al.,* 2009). Therefore, this study aims to evaluate the impact of unsaturated fatty acid sources and antioxidants on the libido and scrotal circumference of Garut sheep.

Materials and Methods

All procedures were managed according to guidelines approved by the Ethics Commission for Animal Maintenance and Use of the National Study and Innovation Agency and license number 204/KE.02/SK/11/2023. This study was conducted in the Laboratory of Small Ruminants Nutrient and Feed Science block B, Faculty of Animal Science, IPB University, Bogor, Indonesia under optimal nutrition and housing conditions. The study used 20 garut sheep aged 14 months with a body weight of 33,1 ± 4,9 kg. Feed treatment included P1: control, P2: P1 + canola oil + antioxidants, P3: P1 + sunflower seed oil + antioxidants, P4: P1 + lemuru oil + antioxidants. The diet consisted of 30% Pennisetum purpureum (Napier Grass) and 70% concentrate which was formulated to meet nutritional needs according to NRC (2007), with a Total Digestible Nutrient (TDN) 69,78%-73,46% and Crude Protein (CP) 18,01-19,38%. Diets were offered to animals two times per day, while drinking water was provided ad libitum. Animals were fed at a feeding rate of 3% of animal body weight on as fed basis.

The scrotal circumference was measured using a measuring tape in centimeters (cm) (Paramitha *et al*., 2020) by circling the measuring tape around the base of the scrotum and then descending to the middle of the widest part of the scrotum's circumference (Rahmawati and Winurdana 2022). Libido in sheep was evaluated by observing sexual behavior using a rating system based on (Price 2008), which was the reaction time from the time sheep was brought close to the female sheep until the first ejaculation was recorded as a measure of good libido.

The experimental design was a randomized block design (RBD) with 4 treatments and 5 replications. Statistical analyses were performed using the SPSS software, and the data were analyzed using analysis of variance (ANOVA). Significantly different results were tested using Duncan's test (Steel and Torrie 1993).

Results and Discussion

The results of scrotal circumference measurements and libido observations, following supplementation with various unsaturated fatty acids and antioxidants, are presented in Table 1. The supplementation had no significant effect on scrotal circumference ($P > 0,05$) but showed a tendency to produce a marginally significant effect on sheep libido ($P < 0,1$). The average scrotal circumference of Garut sheep was not significantly affected by supplementation with different unsaturated fatty acids and antioxidants. However, the findings were consistent with those of Wijaya *et al*. (2019), who reported an average scrotal circumference of 26,50 ± 1,23 cm for Garut sheep aged 12 to 18 months. This study confirmed that the scrotal circumference values fell within the normal range. Previous research has demonstrated that scrotal circumference is an easily measurable physical parameter that can be used to select superior males and is correlated with semen production quantity (Wahyudi *et al*., 2022). The fastest first ejaculation time was observed in sheep supplemented with lemuru oil and antioxidants. These results statistically tended to have a significantly different effect ($P<0.1$), indicating a tendency for a real effect in the P4 group compared to the control group (P1). Lemuru oil contained EPA and DHA which could affect the composition of phospholipids on the plasma membrane of the testes and the rate of testosterone synthesis. Higher testosterone levels tended to be associated with more active sexual behavior (Perkins and Roselli 2007).

Table and/or Figure(s)

Table 1 Scrotal circumference and libido of sheep fed rations containing different unsaturated fatty acids and antioxidants

Treatment	Scrotal circumference (cm)	Libido (seconds)
P1	27,92 ± 2,95	24,31 ± 1,81[a]
P2	26,14 ± 1,37	22,01 ± 3,83[ab]
P3	28,32 ± 2,14	22,08 ± 4,33[ab]
P4	28,38 ± 2,86	18,18 ± 3,61[b]
Average	27,69 ± 2,40	21,64 ± 4,05
P-*value*	0,362	<0,1

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INVESTIGATING THE 2022 BANGKA SUBMARINE CABLE DAMAGE: BATHYMETRIC AND TIDAL ASSESSMENT IN BANGKA WATERS

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Purpose and Background

Undersea cables play a crucial role in Indonesia's communication and essential services. However, they are vulnerable to damage from natural forces and human activities. On March 1, 2022, a submarine cable near Bangka Island broke, disrupting services. This study investigates whether bathymetric and tidal conditions contributed to the damage.

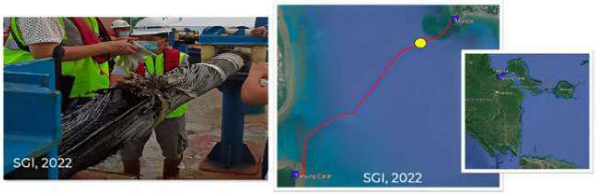

Figure 1 Submarine Cable Damage in Bangka Waters

Materials and Methods

The study focuses on Bangka waters (2° 06.3102' S, 105° 06.2814' E) where the incident occurred at 9:00 PM GMT. Bathymetric data were obtained from GEBCO, BATNAS, and Navionic, while tidal data were collected from BIG's Sadai Station for March 2022.

Figure 2 Submarine Cable Damage Location and Time

Data processing involved correcting for tidal elevations, transducer draft, and echo-sounder depth. Tidal patterns were analyzed using T-Tide methods, comparing actual data to predictions. Regulatory standards were reviewed to assess the cable's installation depth compliance.

Results and Discussion

Bathymetric data analysis revealed no significant seabed anomalies or hazardous features near the cable break. The underwater terrain was stable, with depths of 20-30 meters, indicating no sharp slopes or reefs that could impact the cable. Tidal analysis

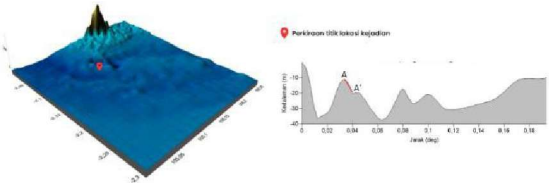

Figure 3 3D Model of The Location of Event (BATNAS)

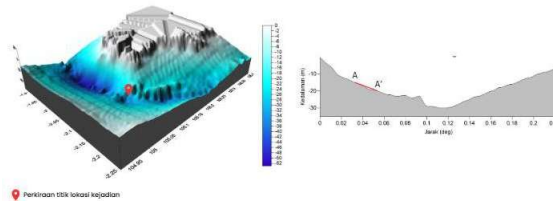

Figure 6 3D Model of The Location of Event (GEBCO)

showed that the incident coincided with a spring tide, with a tidal range of 2.044 meters. The Formzahl number (F) classified the tidal type as Diurnal. The cable's depth met the standards outlined with Indonesian regulations.

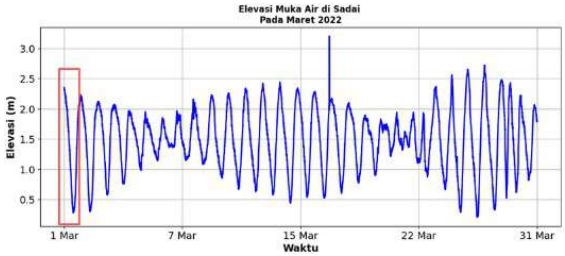

Figure 5 Sea Surface Elevation March 2022, Sadai Station

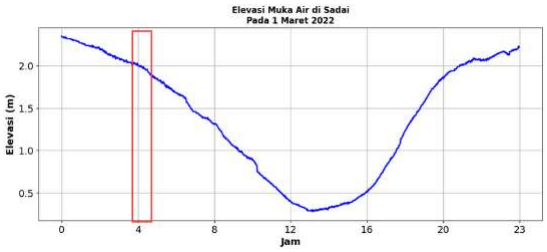

Figure 4 Sea Surface Elevation 1st of March 2022, Sadai Station

The absence of anomalies suggests that bathymetric conditions and tidal patterns were not responsible for the damage. Instead, other factors such as mechanical interference or human error are more likely causes of the incident.

The findings of this study indicate that neither seabed morphology nor tidal forces played a role in the Bangka submarine cable breakage on March 1, 2022. The stable underwater terrain and normal tidal conditions suggest that the damage was likely caused by other factors, such as mechanical interference or human error. Further investigations are necessary to explore potential external influences, including vessel activities and engineering failures, to ensure the long-term protection of submarine cables in the region.

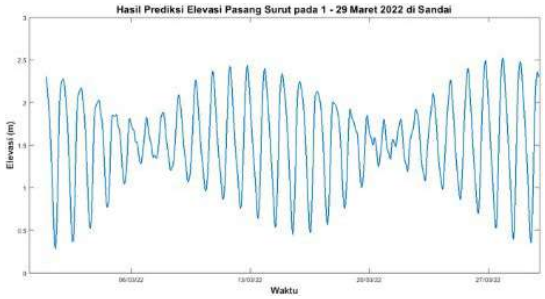

Figure 8 T-Tide Prediction for Tidal Elevation 1-29 March 2022, Sadai Station

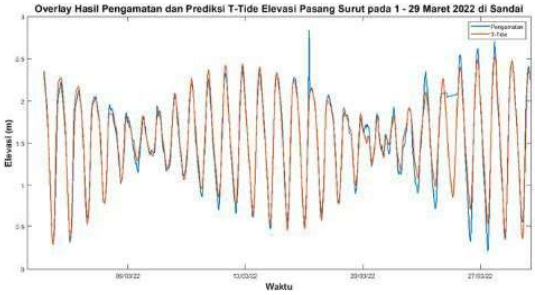

Figure 7 Overlay of Field Data and T-Tide Prediction for Tidal Elevation 1-29 March 2022, Sadai Station

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Lorentz Transformations and Basic Kinematic Results of Special Relativity

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Purpose and Background

The purpose of this study is to explore the foundational aspects of the Lorentz transformations and their applications in the context of special relativity. Special relativity, formulated by Albert Einstein, revolutionized our understanding of space, time, and motion. It is built on two postulates:

(1) the laws of physics are invariant in all inertial frames of reference (the principle of relativity), and (2) the speed of light in a vacuum is constant, independent of the motion of the source or the observer.

These principles necessitate a redefinition of classical mechanics to accommodate relativistic effects, such as time dilation, length contraction, and the relativity of simultaneity. The Lorentz transformations provide the mathematical framework for these phenomena, offering precise relationships between space and time coordinates in different inertial frames. This study also investigates related concepts such as 4-vectors, light cones, proper time, and relativistic Doppler shifts, which are critical for understanding the interplay of kinematics and relativistic effects.

Materials and Methods

The study begins by mathematically formulating the Lorentz transformations under the assumption of homogeneity and isotropy of spacetime. This ensures that the transformations maintain the invariance of the speed of light and linearity between inertial frames K and K'. The key equations are derived using Einstein's postulates and include:

1. Simple Lorentz transformations for space-time coordinates (x, y, z, t).
2. Representations of transformations using matrix algebra for compact and efficient computation.
3. Norm invariance of 4-vectors under Lorentz transformations, establishing their utility in relativistic kinematics.

The light cone framework is employed to analyze the causal relationships between events and to differentiate between spacelike, timelike, and lightlike separations. Proper time and time dilation are evaluated using experimental scenarios, such as the decay of charged pions and clock discrepancies observed in general relativity experiments involving cesium atomic clocks.

To further solidify the theoretical framework, relativistic velocity addition formulas are derived, demonstrating the interplay between velocity components in different inertial frames. Experimental verification is referenced, including Fizeau's experiments on light speed in moving liquids and the Ives-Stilwell experiment on transverse Doppler effects.

Results and Discussion

The derivations and analysis confirm the transformative implications of the Lorentz transformations. Key findings include:

- **Invariance of the Speed of Light:** The spherical wave fronts from a light source maintain symmetry in all inertial frames, verifying the second postulate of special relativity.
- **Time Dilation and Proper Time:** The relationship between coordinate time and proper time shows significant deviations from classical mechanics, exemplified by experimental observations of pion decay and cesium atomic clocks. These validate the time dilation effects predicted by relativity.
- **Relativistic Velocity Addition:** The derived formula ensures that no object exceeds the speed of light, upholding the consistency of special relativity. Observational evidence, such as aberrations in star positions, corroborates these results.
- **Relativistic Doppler Effect:** The shift in frequency and wavelength due to relative motion is accurately predicted using Lorentz transformations, with experimental validations from the Ives-Stilwell experiment.

The analysis also highlights distinctions between relativistic and classical frameworks, particularly in scenarios involving high velocities or gravitational fields. While classical mechanics suffices for low-velocity phenomena, the relativistic framework is indispensable for high-energy physics, astrophysics, and cosmology.

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Assessing the Impact of Savanna Fires on Sentinel-1 C-Band Backscatter Time Series in the Bromo Tengger Semeru National Park

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Purpose and Background

Forest and land fires in Indonesia have occurred not only in peat and forest areas but also in the savanna area over the conservation zone recently. As reported by Jong (2021) , Indonesia's new epicenter of forest fires has shifted away from Sumatra and Borneo. In 2023, burned areas in Indonesia increased to 1.161.192 hectares compared to fire events in 2022, predominantly occurring in savanna areas in East Nusa Tenggara (NTT) and West Nusa Tenggara (NTB) (KLHK, 2024) . Therefore, monitoring burned area in savanna ecosystem in Indonesia should be considered a priority. Remote sensing technology has been used to provide spatial information on forest and land-burned areas. However, the study of savanna fire mapping and monitoring using remote sensing is still limited, especially in the Indonesia region.

A recent study demonstrated the effectiveness of spectral response and Enhanced Vegetation Index (EVI) are useful in differentiating burned and unburned pixels within savanna fire events in NTT (Vetrita et al., 2022). A primary challenge in utilizing passive remote sensing data for burn scar mapping in tropical savannas is the frequent cloud cover. Synthetic Aperture Radar (SAR) data, particularly C-band Sentinel-1, offers a viable alternative due to its cloud-penetrating capabilities, as evidenced by several existing studies (Halliday et al., 2021; Mathieu et al., 2019; Philipp & Levick, 2020). Previous investigations often neglected the influence of terrain topography on SAR backscatter values, as these studies frequently focused on relatively flat areas. This study aims to investigate temporal changes in multi-polarization backscatter from Sentinel-1 SAR data in response to savanna fire events and its severity, while explicitly considering the impact of complex terrain on the observed backscatter signatures by selecting a study area characterized by significant topographic variation.

Materials and Methods

This study was conducted within portions of the Bromo Tengger Semeru National Park (TNBTS) in East Java, Indonesia, focusing on savanna fire events that occurred in September 2023. The study area encompasses complex terrain, being situated within the ancient Tengger volcanic caldera. We utilized interferometric-wide Sentinel-1 SAR data with VV and VH polarizations, acquired in ascending orbit mode, covering the study area from April 1, 2023, to December 31, 2024, to encompass the September 2023 fire events. These images were obtained from the Google Earth Engine (GEE) platform and subsequently pre-processed using the Sentinel-1 SAR Analysis Ready Data code developed by Mullissa et al. (2021). This pre-processing included an additional border noise correction, speckle filtering employing the Lee algorithm with an 11x11 kernel size, radiometric terrain flattening, and conversion of the output to decibels (dB). To assess burn severity, we generated a burn severity map using the dNBR (difference Normalized Burn Ratio) derived from median NBR images acquired before (August 28, 2024) and after (September 10-25, 2023) the fire events using Sentinel-2 imagery.

To investigate temporal backscatter changes, we calculated a 30-day moving average of the available 52 Sentinel-1 images acquired between April 1, 2023, and December 31, 2024, resulting in 21 time-series images. Subsequently, we extracted backscatter values from each image at 300 randomly selected sample points within the study area. These sample points were distributed across different burn severity classes: 100 points within the high severity area, 100 points within the moderate-high severity area, and 100 points within the moderate-low severity area. Additionally, 10 points were manually selected within unburned areas. Finally, the mean backscatter values for each point set were calculated and plotted on a time-series graph to analyze temporal backscatter variations.

Results and Discussion

In this study, we excluded the low-severity class from further analysis due to its significant overlap with unburned agricultural landcover pixels. Figure 1 illustrates the temporal changes in the 30-day moving average of Sentinel-1 SAR backscatter (Gamma Nought, γ^0) for each burn severity class and unburned areas. Prior to the fire event (September 2023) (red mark on Figure 1), VH backscatter exhibited higher values than VV for all classes, including unburned areas. Notably, the pre-fire backscatter values of the high-severity class were lower than those of the moderate-high and moderate-low severity classes. When the fire event occurred, backscatter values decreased across all classes except for the unburned areas, where a slight increase was

observed. However, the magnitude of the decrease in VV backscatter within the high-severity class was less pronounced compared to VH backscatter and other severity classes.

Figure 1 30-Day Moving Average of SAR Sentinel-1 Gamma Nought backscatter coefficient of Savana area from April 2023 to December 2024

Following the burn event (October 2023), backscatter values exhibited an increase across all burn severity classes, with VV polarization displaying a convergence among them. Notably, the VH polarization of the moderate-low severity class initially exhibited a trend towards approaching the non-burned values, subsequently surpassing them by May 2024. Conversely, the VV polarization of the non-burned area demonstrated a distinct divergence from the burned areas commencing in June 2024. These observed post-fire backscatter variations are likely attributable to the onset of seasonal vegetation regrowth following the region's rainy season. These findings suggest that VH polarization may offer enhanced sensitivity for burn area detection, as it exhibited a pronounced decrease across all severity classes relative to VV polarization. Future research should investigate the relationship between backscatter response and factors such as topography, post-fire vegetation regrowth, and rainfall rates. This is crucial because vegetation water content and soil moisture significantly influence temporal correlation patterns and are critical for accurately identifying burned areas immediately following fire events (Belenguer-Plomer et al., 2019).

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USING EXPERIMENTS IN TEACHING PHYSICS ACCORDING TO THE 2018 GENERAL EDUCATION CURRICULUM IN VIETNAM

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Purpose and Background

Experiments are an important means in the cognitive activities of learners to test the correctness of knowledge, verify the correctness of inference and knowledge, and help learners apply knowledge into practice. ... The 2018 General Education Curriculum also clearly identifies: "Experiments and practice play a particularly important role in forming concepts, rules, and laws of Physics. Therefore, the Physics program focuses on training students in the ability to learn the properties of Physics objects through experimental and practical content from different perspectives. This study focuses on theoretical and practical research, presenting the role and characteristics of Physics experiments; and skills that need to be trained for students in Physics teaching. Analysis of the use of experiments in Physics teaching before and after 2018.

The role of experiments in teaching Physics at high school

Experiments form the foundation of teaching Physics in high schools, offering students a way to explore and deeply understand scientific concepts. Through experimental activities, students directly observe and interact with physical phenomena, allowing them to validate their theoretical knowledge and cultivate critical thinking skills. This process not only helps to verify the accuracy of theories but also develops reasoning, analytical abilities, and problem-solving skills.

Moreover, experiments help students relate physics knowledge to real-life phenomena, enhancing their engagement and enthusiasm for learning. When conducting experiments, students not only improve their practical skills but also build patience, meticulousness, and teamwork. In the 2018 curriculum, experiments played an even more prominent role, emphasizing application and hands-on learning. This approach aims to foster students' self-study abilities and independent research skills, and equip them with essential knowledge and skills for today's rapidly advancing scientific and technological landscape.

Types of experiments in teaching Physics

Physics experiments in teaching can be conducted by teachers or by students under teacher supervision. Based on participant involvement, experiments can be categorized into teacher demonstration and student-led experiments. They can also be classified by type: introductory experiments, phenomenon observation experiments, reinforcement experiments, practical experiments, applied problem-solving experiments, and extracurricular experiments. The role and timing of each type differs, with each having specific characteristics and instructional requirements.

Another classification is based on the availability of school-provided resources: equipped experiments and improvised (homemade) experiments. The latter type, "homemade experiments," are constructed with everyday materials and crafted by hand to demonstrate a wide range of physical phenomena and processes. Such experiments are advantageous in that they are visual, affordable, easy to set up, and involve minimal time or resources while also promoting hands-on learning and sparking students' curiosity. However, these experiments may have limitations such as lower aesthetic appeal, less durability, and possible inaccuracies.

Using experiments in teaching Physics according to the 2018 General education curriculum

In previous curricula, experiments in physics were primarily used as illustrative tools to support theoretical instruction rather than as a primary means for students to actively explore knowledge. The experiments were usually teacher-conducted for students to observe, with only a few students directly

participating because of equipment and time limitations. These demonstrations typically aimed to confirm pre-existing knowledge, with teachers providing conclusions based on student observations. This approach helped reinforce theory but limited the students' active role in scientific exploration.

Conversely, the 2018 curriculum has shifted the role of experiments from mere illustration to a core tool enabling students to explore and construct knowledge independently. Experiments now serve as a means for students to formulate hypotheses, conduct verifications, and draw conclusions. The new textbooks and curriculum encourage students to perform experiments at home using readily available materials, for example, using household items to observe principles of buoyancy, capillarity, or material resistance, thereby demonstrating the connection between scientific knowledge and everyday life.

Another significant difference is the curriculum's emphasis on developing skills such as observation, reasoning, and problem-solving. While earlier experiments focused mainly on observation, the 2018 curriculum's approach required students to go through the scientific process, including questioning, designing experiments, collecting and analyzing data, and drawing conclusions. This not only enhances students' critical thinking abilities but also prepares them for independent research skills, an essential competency in the 21st century. Additionally, the new curriculum and textbooks encourage collaborative project-based group learning. Instead of working individually, students can collaborate on small projects such as optimizing the efficiency of solar-powered devices or studying the effects of materials on frictional forces. This approach fosters teamwork, communication, and collaboration skills, essential abilities for students to adapt to future learning and professional environments.

Conclusion

Using experiments in teaching physics according to the 2018 General Education Curriculum has marked a major step forward in science education in Vietnam. Compared to the traditional approach, the new curriculum treats experiments not merely as illustration tools but as core components for exploring, developing reasoning skills and practical abilities, and applying knowledge in real-life scenarios. Experiments now play a role in empowering students to formulate hypotheses, independently explore, collaborate, and actively discover science. Through innovative experimental projects and detailed practical guidance, students not only hone their skills, but also cultivate passion and a comprehensive understanding of science.

The new curriculum, with its easy-to-conduct, life-connected experiments and active teaching methods, helps students develop a holistic set of competencies, build scientific thinking, and meet the needs of modern development. This serves as a solid foundation for enhancing the quality of physics education in secondary schools, contributing to the research and creative capabilities of the young generations, aligning with global integration trends and advancements in science and technology in the 21st century.

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Millikan's oil drop experiment

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Purpose and Background

In 1909, Millikan began measuring the electric charge carried by a single electr-on. He placed oil droplets into an electric field and altered the direction of the field. By measuring the velocities of the oil droplets as they fell and rose, the charge of each droplet was able to be calculated.

Materials and Methods

A fine mist of oil was sprayed into a chamber containing two parallel metal plates connected to an adjustable voltage source. Some of these oil droplets became electrically charged through ionization or friction during the spraying process. The chamber was equipped with a microscope and a light source to observe the motion of individual droplets. The droplets were allowed to fall under gravity, and their terminal velocity was measured, which allowed their radius to be calculated using Stoke's law. By applying an electric field across the plates, the electric force acting on the droplets could counterbalance the gravitational force, causing them to remain stationary or move upward at a steady velocity. The charge on each droplet was then calculated based on the balance of forces. Repeating this process for multiple droplets revealed that all observed charges were multiples of a fundamental value, the elementary charge.

Results and Discussion

By using a tracker, we can obtain vf and vr to calculate the charge on each oil droplet. Dividing this value by the charge of an electron will reveal how many electrons the oil droplet carries. In the experiment, after determining the charge of each oil droplet, we used the least squares method for analysis and ultimately calculated the charge of a single electron as q=1.601×10−19. This result is quite close to the known elementary charge, but there are several areas for improvement. Firstly, more data points should be selected, as during the experiment, oil droplets often became unobservable, resulting in insufficient usable data. This limited the accuracy of the experimental results. If the observation conditions could be improved to enhance the stability of the oil droplets or increase the sensitivity of the equipment, more effective data points could be obtained, leading to more reliable results and a more precise verification of the elementary charge value. Additionally, better control of external interference factors, such as airflow or temperature fluctuations, could further optimize the accuracy of the experiment. As someone who aspires to become a high school physics teacher, I believe this experiment holds significant importance. In Taiwanese high school textbooks, the Millikan oil drop experiment is regarded as one of the most essential experiments. It serves as a crucial gateway for students to explore and understand the microscopic world. Therefore, I think it is vital for anyone planning to become a high school physics teacher to have a thorough understanding of this experiment. By mastering its principles and implications, educators can better guide students in appreciating the foundational concepts of physics.

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MAPPING THE DISTRIBUTION OF POTENTIAL ACID SULFATE SOILS USING REMOTE SENSING BASED ON COASTAL LANDSCAPE CHARACTERISTICS

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Purpose and Background

Acid Sulfate Soils (ASS) are a type of soil that is naturally formed from sediments containing sulfate and is commonly found in coastal areas around the world (Atsemegiorgis et al., 2023), including Indonesia. ASS is known to be hazardous because the oxidation process can release sulfuric acid and heavy metals that damage ecosystems, agriculture, and air quality (Muilu, 2021). Most ASS is found in coastal areas with high development pressure and increasing population, so accurate spatial information on ASS distribution is essential to support effective decision-making in coastal area management (Widyatmanti & Sammut, 2017). However, accurate identification of acid sulfate soils is a difficult task and requires expensive and time-consuming field and laboratory tests (Muilu, 2021). Therefore, an efficient approach is needed to produce ASS distribution maps that support sustainable coastal development planning and optimal resource management. To identify larger areas more cost-effectively, remote sensing methods can be an obligation. This study aims to map the distribution of potential ASS based on the analysis of coastal landscape characteristics by utilizing remote sensing data in some parts of the coastal areas of Pesawaran Regency.

Materials and Methods

This study was conducted in some parts of the coastal areas of Pesawaran Regency, Lampung Province, Indonesia. The satellite imagery data used were Landsat 8 OLI, Sentinel 2A MSI, and Planet Scope. Moreover, other spatial data used in this study are digital elevation model (DEM), soil type, geology, and tidal data. The multi-level mapping approach was used, which involved multi-resolution remote sensing data combined with field data to obtain information on landscape and soil characteristics at the study site. Identification of potential ASS based on landscape characteristics refers to the approach of five main environmental factors needed for ASS development (Hole and Campbell, 1985; McKenzie et al., 2008; Walker, 1989), which are the presence of iron, the presence of sulfate sources, organic material, low-energy environments, and reduction conditions that have been spatially realized into a mapping model using QGIS mapping software. In addition, field measurements of soil samples, including pH_F and pH_{FOX}, were also carried out as indicators in identifying potential ASS (Ahern et al., 1998). Soil sampling was carried out based on land units representing each coastal typology that helps form ASS. This land unit is generated from landform and land use information. Soil measurement and sampling are carried out at a depth of 0-0.7 m.

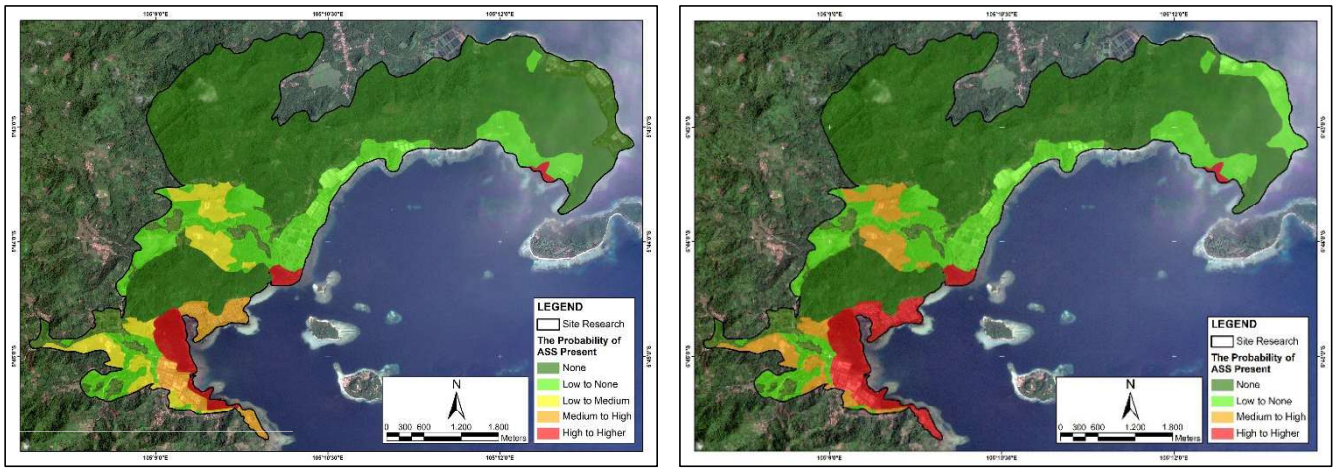
Results and Discussion

The potential acid sulfate soil (PASS) formation was identified using a remote sensing approach, which provided spatial information on the distribution of coastal landscapes, combined with field soil analysis. Based on the analysis using a multi-level mapping method, the coastal landscape in the study area was classified into three typologies: terrestrial depositional coasts, marine depositional coasts, and volcanic coasts. The tidal range of 0.5-1 m (classified as mikrotidal) in the study area facilitates ASS formation through fine sediment deposition, anaerobic conditions, and organic material accumulation. Two estuaries in the region also play a role by providing ideal conditions such as sulfate sources, anaerobic environments, organic sedimentation, and low-energy systems. The terrestrial depositional coast comprises two landforms. Floodplain landforms show low to none PASS in agricultural land use and none potential in residential areas. However, rice fields in this landform exhibit low to high PASS, with lower pH_{FOX} values reflecting sulfidic oxidation potential. In intertidal swamps and coastal plains, mangrove land use demonstrates high to very high PASS, supported by silty clay soil texture rich in organic matter and significantly acidic pH_{FOX} values. Other land uses, such as aquaculture, unused land, plantations, and rice fields, exhibit low to high PASS. On marine depositional coasts, land uses such as aquaculture, plantations, and unused land are relatively stable, with low to none PASS, while residential areas show none ASS potential. Meanwhile, volcanic coasts in hilly areas exhibit none PASS in either forested or residential land use due to environmental characteristics that do not support ASS formation. This study is expected to serve as a valuable reference for planning and managing land use in coastal areas to support sustainable development.

Table 1. Potential Acid Sulfate Soil Distribution Based on Coastal Landscape Characteristics and Field Soil Survey

Coastal Typology	Land-form	Land-use	Vegetation	Depth 0-0.5 m			Depth 0.5-0.7 m		
				pH_F	pH_{FOX}	The Probability of ASS Present	pH_F	pH_{FOX}	The Probability of ASS Present
Terrestrial Depositional Coasts	Floodplain	Plantation	NBWV	7.76	5.66	Low to None	7.76	5.9	Low to None
		Settlement	NBWV	N/A	N/A	None	N/A	N/A	None
		Rice Field	NBWV	7.4	4.42	Low to Medium	7.31	3.1	Medium to High
	Intertidal Swamp	Aquaculture	NBWV	8.84	7.4	Low to None	9.02	7.58	Low to None
		Aquaculture	Mangrove	7.8	3.1	Medium to High	8.2	2.78	High to Higher
		Mangrove	Mangrove	7.76	2.54	High to Higher	7.85	2.46	High to Higher
		Unused Land	Mangrove	7.4	4.42	Low to Medium	7.31	3.1	Medium to High
		Plantation	NBWV	7.76	5.66	Low to None	7.76	5.9	Low to None
		Rice Field	NBWV	7.4	4.42	Low to Medium	7.31	3.1	Medium to High
Marine Depositional Coasts	Coastal Plain	Aquaculture	NBWV	8.75	8.3	None	8.57	7.58	Low to None
		Aquaculture	Mangrove	8.39	6.62	Low to None	8.48	5.98	Low to None
		Mangrove	Mangrove	7.76	2.54	High to Higher	7.85	2.46	High to Higher
		Plantation	NBWV	7.67	6.22	Low to None	7.67	6.3	Low to None
		Settlement	NBWV	N/A	N/A	None	N/A	N/A	None
		Unused Land	NBWV	8.84	7.76	Low to None	8.75	5.58	Low to None
Volcanic Coasts	Hill	Forest	NBWV	N/A	N/A	None	N/A	N/A	None
		Settlement	NBWV	N/A	N/A	None	N/A	N/A	None

N/A: soil sample is not available. NBWV: Non-brackish water vegetation



(a) (b)

Figure 1. Map of Potential Acid Sulfate Soil Distribution (a) Depth 0-0.5 m and (b) 0.5-0.7 m

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Improving Students' Critical Thinking Skills Through Technology-Based Learning Media on Climate Change Material

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Purpose and Background

The advancement of information and communication technology has significantly transformed the education landscape. When utilized effectively, such technology can support learning in remarkable ways, including the application of satellite data. Satellite data offers real-time and dynamic access to information, making learning more contextual and relevant to real-life challenges. To enhance cognitive, affective, and psychomotor competencies, it is essential to employ teaching methods that motivate students to be creative, confident, and capable of critical thinking in their assessment of information (Pujiasih, P., Isnaeni, W.,&Ridlo, 2021).

In Indonesia, the integration of technology, particularly satellite data, is still in its developmental phase and faces several challenges, such as limited infrastructure and a lack of teacher familiarity with data access. The implementation of the independent curriculum in Indonesia encourages students to cultivate critical thinking skills through problem-based learning projects. Focusing on critical thinking should encompass both the teaching content (knowledge) and the methodologies for locating and evaluating information (Nhat, H.T., Lien, N.T., Tinh, N.T., Hang, N.V.T., & Trang, 2018; Isnaeni et al., 2021). Critical thinking, recognized as a vital component of 21st-century skills, plays a crucial role in addressing everyday issues and enhancing awareness of outer space. The importance of mastering critical thinking strategies and procedures was ranked as the second most essential skill determining a student's future success, both academically and professionally, in 2020 (Yaniawati, P., Maat, S. M., Supianti, I. I., & Fisher, 2022). As human activities on Earth increasingly disrupt the equilibrium of outer space, it becomes imperative to foster an awareness of its significance. To cultivate a forward-thinking generation equipped for the 21st century, this studies aimed at improving students' critical thinking skills through technology-based learning methods.

Materials and Methods

The method used in this study is experimental. The research design used is one group pretest-posttest pre-experimental design. This design is used to determine the increase in students' critical thinking skills between before and after learning. The research subjects were 45 junior high school students in Bandung, West Java, Indonesia. Sample selection was done through purposive sampling. Learning is carried out using a problem-based learning model with digital media, namely data accessed directly from the ESA website (https://cfs.climate.esa.int/). The critical thinking test given in this study refers to the critical thinking indicators proposed by Ennis, (2011).

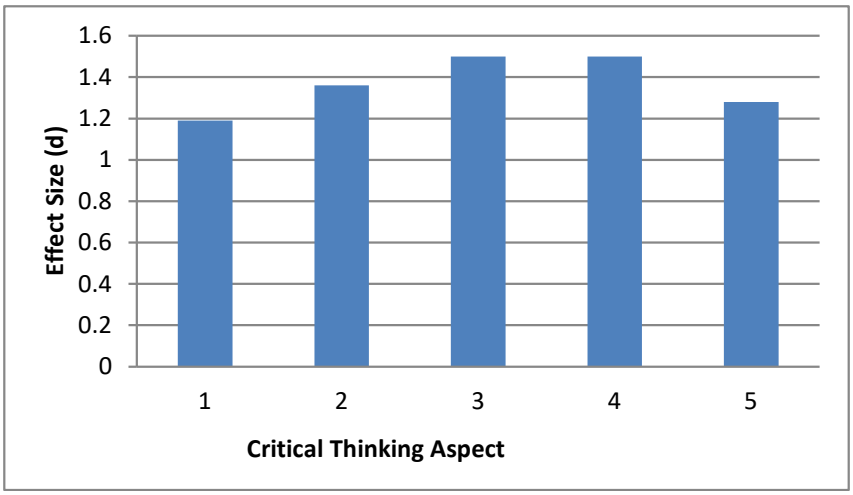
Results and Discussion

Table 1. Recapitulation of Pre-Test and Post-Test Results

Test	N	Min.	Max.	Mean	Std. Deviation	Effect Size	Criteria
Pre-Test	45	05	55	24,16	11,51	1,45	High
Post-Test	45	38	92	65,04	16,67		

The improvement in students' critical thinking ability following treatment had been assessed through hypothesis and n-gain tests. In this study, the normality test had utilized the Kolmogorov-Smirnov test for one class (one sample test), and the results indicated a significance value of 0.109, which confirmed that the data had been normally distributed. The hypothesis test conducted through the t-test had revealed a significance level value of 0.05. According to the rules governing the t-test, H0 had been rejected, and Ha had been accepted. These findings indicated a significant difference between the pretest and posttest results. The data presented in Table 1 had shown an increase in scores from the pre-test to the post-test. This demonstrated an enhancement in students' critical thinking skills before

learning, as reflected in the pre-test scores, and after learning, as measured by the post-test scores. Additionally, the effect size coefficient calculated from the results had suggested that the increase in critical thinking skills among 45 samples fell within the high category, with a coefficient value of 1.45. This aligns with Cohen's classification, indicating that a coefficient value ranging from 0.8 to 2.0 is categorized as high. Therefore, it has been established that learning through technology-based media is effective in enhancing students' critical thinking skills.



Aspect Description:

1. Providing Basic Explanation
2. Building Basic Skills
3. Summarize
4. Providing Further Explanation
5. Strategy and Tactics

Figure 1. Improving Critical Thinking Skills

The analysis of the data presented in the table indicates that each component of critical thinking ability assessed in this study achieved an effect size coefficient greater than 0.8. According to Cohen's criteria, this value denotes a high effect size ($d > 0.8$), suggesting that all dimensions experienced significant improvement. Notably, the aspect of critical thinking demonstrating the highest enhancement was the ability to draw conclusions, whereas the least improvement was observed in the provision of basic explanations. These findings suggest that critical thinking skills among students can be significantly enhanced through the implementation of contextual and technology-based learning methodologies. Additionally, the collaborative use of digital learning resources has a positive influence on the development of students' critical thinking abilities. It is therefore crucial for educators to embrace technological advancements and effectively incorporate these tools into their teaching practices.

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IMPROVING AND ENHANCING EDUCATION OF DALI YUNNAN

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Purpose and Background

This report investigates the current situation of education in Dali, Yunnan Province, in order to improve and improve the education system in Dali, Yunnan Province, and solve the problems of uneven distribution of education resources between urban and rural areas, insufficient integration of ethnic minority culture and education, limited integration of vocational education development and local economy, and lack of higher education resources. Located in the western Yunnan Province of China, Dali is a region known for its rich history and diverse minority cultures. Dali, as a major ethnic minority settlement, has a profound cultural heritage. Bai, Yi, Naxi and other ethnic groups coexist here, which is a model of multi-cultural exchange. In the field of education, Dali covers all levels from basic education to higher education, with special emphasis on bilingual teaching and cultural programs to help ethnic minority students master Mandarin while inheriting ethnic culture; At the same time, vocational education is closely integrated with the local economy such as tourism and agriculture to provide practical talents for regional economic development. However, the backward facilities of rural schools, weak teachers, the impact of exam-oriented education on the overall development of students, and the lack of higher education resources make it difficult for the education system to fully meet the needs of regional social and economic development. Therefore, through the optimal allocation of educational resources and policy innovation, Dali's education system is expected to achieve a higher level of development and support regional coordinated development.

Materials and Methods

The research objective of this study is to evaluate and analyze the effect of Dali City's educational policy innovation and provide a scientific basis for improving and optimizing Dali City's education system. The research mainly uses literature analysis and case study methods.

This study focuses on topics such as urban-rural education gap, ethnic minority culture and language education, vocational education development and higher education resource optimisation. At the same time, cases of policy innovations such as the Dali bilingual education model, the practice of vocational education integrated with the local economy, and distance education are analysed in depth to assess their effectiveness in improving the equity and quality of education, thus providing scientific basis and policy recommendations for improving the Dali education system.

Figure1: Bilingual Education Program

Results and Discussion

The study found that Dali's education system has advantages in combining cultural diversity with vocational education but also faces several challenges. Through bilingual education and ethnic culture programs, schools help ethnic minority students preserve their culture while adapting to modern education. Vocational education is closely integrated with the local economy, producing skilled workers for sectors such as agriculture and tourism, which increases graduate employment rates. Tea Yanmei (2019) highlighted that educational development in Dali Prefecture, especially in areas with significant ethnic minority populations, successfully integrates ethnic culture into school curricula, helping bridge the gap between traditional and modern education. However, the urban-rural education gap remains a major issue, with rural schools facing poor facilities, high teacher turnover, and limited resources, hindering educational equity. Tian Huifang (2021) pointed out that rural areas in Dali counties suffer from significant disparities in educational resources, which affects the delivery of quality education. Additionally, the education model's focus on college entrance exam results restricts students' development of comprehensive and innovative abilities.

Moreover, higher education resources are insufficient. The limited subject development and research at Dali University have led to a brain drain, with students migrating to urban centers. Tea Yanmei (2019) discussed the challenges of providing higher education opportunities in rural areas and the resulting student migration, exacerbating the brain drain. To address these problems, the study suggests that distance education and the twinning of urban and rural schools can help narrow the education gap, while the deep integration of vocational education with local industries can enhance students' practical skills and employability. Bilingual education and ethnic culture programs can promote cultural inheritance and strengthen students' cultural identity. Expanding higher education platforms and constructing regional universities would not only increase education access but also offer more opportunities for local students. Tian Huifang (2021) emphasized the need for educational transformation to address these imbalances and proposed expanding local higher education institutions to retain talent and support regional development.

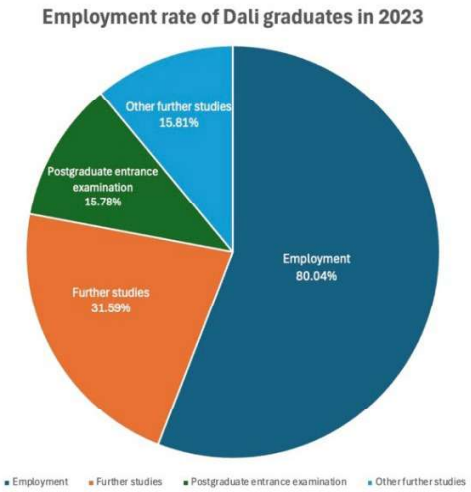

Figure2: Dali Graduate Employment Rate

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The Sound Produced by The Corrugated Pipes

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Purpose and Background

A plastic corrugated pipe, when swung manually, produces a specific sound and tone. Due to its open-ended nature, the frequency can be predicted via the standing wave formula. Incorporating correction terms (Binnie, 1961), the theoretical model should account for the corrugation geometry. This research investigated the acoustic properties of corrugated pipes, focusing on sound generation caused by airflow and the parameters influencing sound frequencies, particularly the relationships among airflow speed, pipe length, and sound frequency, to assess the applicability of theoretical models.

Material and Methods

Two plastic corrugated pipes were used to examine the effects of varying pipe lengths and airflow speeds. Airflow speed was controlled using a blower with 11 speed settings, and an anemometer measured the airflow. Sounds produced were recorded using a smartphone and analyzed for peak frequencies using Audacity software.

Results and Discussion

Experiment 1: Effect of Airflow Speed

When the pipe was swung manually, higher angular velocities generated higher frequency peaks. Using the blower, the pipe's sound often contained multiple frequency modes. At very high airflow speeds, only blower noise was recorded, indicating that sound generation depends on maintaining appropriate airflow conditions.

Experiment 2: Effect of Pipe Length

Pipe length significantly influenced the mode number of the standing wave. For instance, at a sound frequency of approximately 900 Hz, the mode number was 7 for a pipe length of 1.15 m and 10 for a length of 1.62 m. This demonstrates that similar frequency values may not correspond to the same mode number in pipes of different lengths.

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Solar Charger

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Purpose and Background

The understanding of renewable and sustainable energies is crucial to the development of the clean energy sources, especially in developing countries. Solar energy, among other renewable sources of energy, is a promising and freely available energy source for managing long term issues in energy crisis [1]. Solar panel is used to harness the power from the Sun. Therefore, this energy will not be able to harness when there is no sunlight or during the night. A solar powered battery charger is presented, where a photovoltaic (PV) panel is used to convert solar power into electricity and a DC/DC converter and current sensor are used to control the output power of the PV panel and the charging current for the battery [2].

In this study, we aim to create a solar charger controlled by Arduino Uno having an atmega328 as a microcontroller. We will build DC/DC buck converter and current sensor to convert the input voltage into lower output voltage and measure the current flowing into the battery.

Materials and Methods

In the process of solar charger, we will use p-channel MOSFET model IRF9540N to control the flow of the voltage. P-channel MOSFET is placed on the high voltage side of the load. To control a p-channel MOSFET we need to add NPN (2N2222) transistor that can be controlled by the Arduino by connecting it to pin ~ 9 and used it to drive the MOSFET. We also need to add a current limiting resistor $2\ k\Omega$ to protect the Arduino and a pull up $1\ k\Omega$ resistor to the driver so that the gate source potential difference is zero when the transistor is off and less than negative 3V when the transistor is on. We need to put another $560\ \Omega$ resistor to step down the voltage in case that the input voltage from the solar panel is over the MOSFET's rating (the gate source voltage is -20V) [3].

In Arduino IDE, we use analogWrite to create the input PWM signal to switch the transistor and use analogRead command to read the voltage and convert the result based on the resistor used in the voltage divider and printing the code to the serial port. To reduce the switching harmonic, we add LC filter with $330\mu H$ inductor and $100\mu F$ capacitor. Since the LC PWM frequency of pin ~ 9 is 490Hz this is outside the effective range of the LC circuit which is about 5kHz, we need to increase the PWM frequency delivered by the Arduino using the timeOne.h library in Arduino IDE with the duty cycle depending on the SimplePID code. We're using INA219 current sensor to control and monitor the charging process in the battery. We also need to use $5\ k\Omega$ and $1\ k\Omega$ resistors to measure the voltage flowing into the battery. We use code to control the charging rate with PID controller. Our solar charger is completed.

Results and Discussion

The result from our solar charger controlled by Arduino Uno showed that by using $2 \times 6.00V$ solar panels which can actually generate (8.00-9.16) V under the temperature range of (30.6-33.5)℃ located at Royal University of Phnom Penh, we can generate voltage in the range of (7.20-7.80) V. These output voltages resulted from the code we used to control the charging signal and limit the constant voltage flow into the batteries by setting the Arduino to control the transistor to the flowing of input voltage into the MOSFET. Therefore, when we measure the output voltage through Arduino, the voltage received in the range of (7.29-7.89) V. These resulted from the error in the Arduino measurement ability. The little switching harmonic (peaks on the graph) is around 0.01V. However, our solar charger is acceptable to use since the ripples are too small that can be neglectable.

All in all, we can charge the battery when there is sunlight shining on the panels and measure the current and voltage flowing into it. This renewable and recharge battery can be used in other useful purposes.

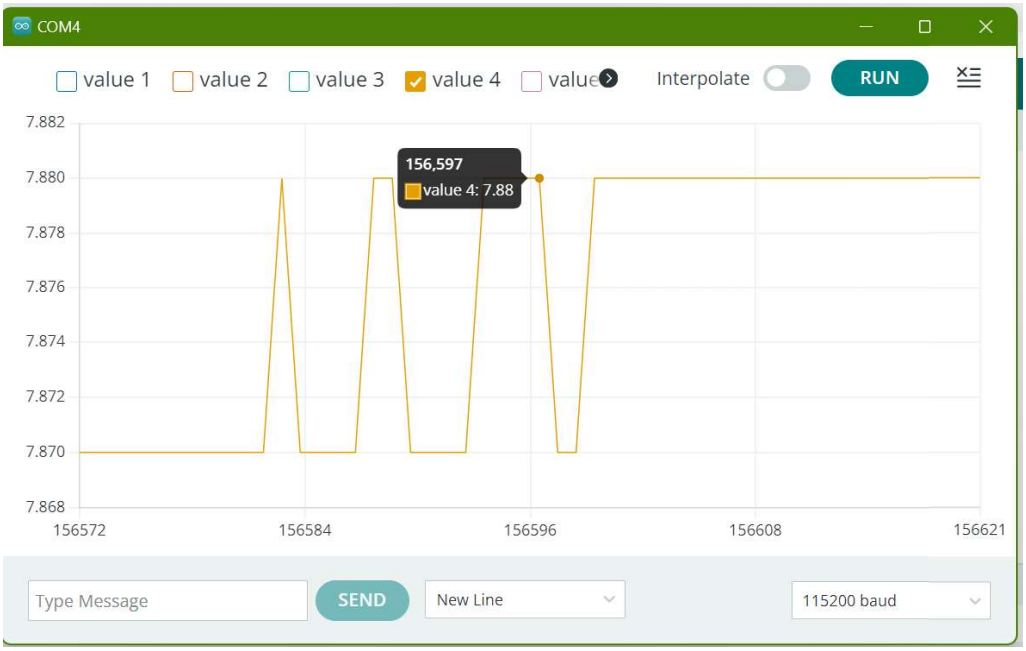

Figure 1: The graphic shows the flow of voltage being charged into the battery measured by Arduino Uno with a 0.01V ripple.

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Research on the Importance of Online Education Platforms for Educational Leaders

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Purpose and background

After the COVID-19 epidemic, the importance of distance education and online education has been recognized by the field of pedagogy throughout the world. Not only has online education been widely used in daily educational activities, but the field of education management has also attached great importance to online education platforms. Scholars in the field of education have made many explanations and arguments about the powerful functions of online education platforms, and the popularity of online education platforms also means new perspectives and methods for education managers. Therefore, based on this trend of the times, it is of great research value to study the significance of online education platforms for educational leaders. This study mainly conducted visits and questionnaire surveys to investigate the usage and popularity of online education platforms in several different high schools in China, in order to study the evaluation and understanding of education leaders towards them. It is obvious that online education platforms will become increasingly important in future educational work, so it is particularly important to identify the problems faced by online education platforms in the process of popularization.

Material and methods

Wang Zhouhong pointed out in his article that Internet education has become the trend of the whole world, and expressed concern about the relatively backward situation of China's Internet education model. By reviewing her literature, we can find that Internet education has provided a new perspective for the education model, which has made the incredible number and size of educational resources in the past a very fast and convenient form of management. Through this new type of educational management, information transmission events in traditional educational management can be greatly shortened, and resource management costs can be reduced. Imagine if students' homework could be quickly corrected through online platforms, and thousands of teaching materials could be sent to each student in an instant. What an efficient way of education would this be. Due to the limitations of time and space, as well as financial constraints, the author conducted research by releasing questionnaires online and conducting online interviews with several education professionals. This research with significant practical significance should focus on the division and distribution of satisfaction.

Result and discussion

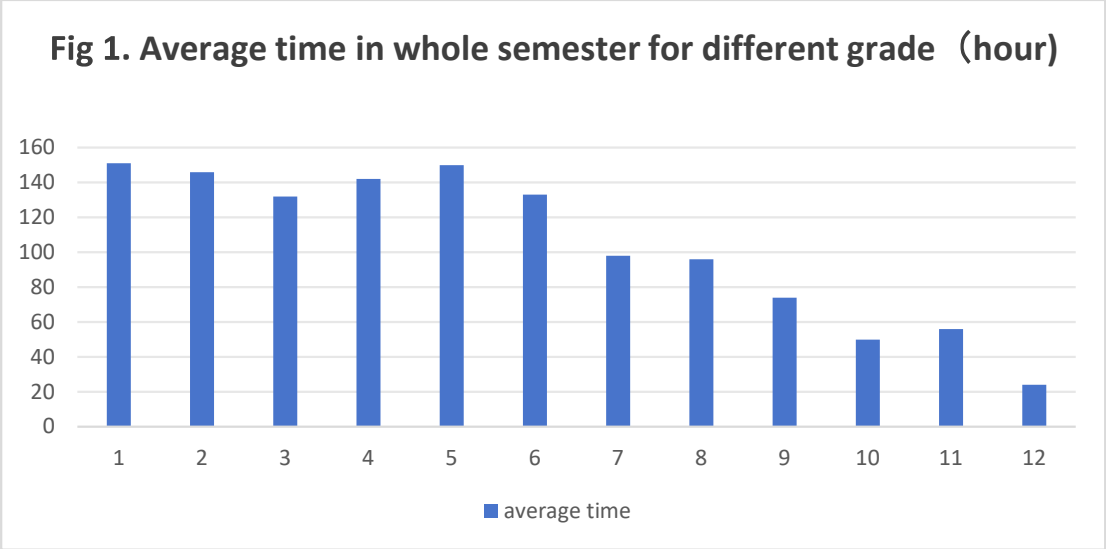
Firstly, we conducted a statistical analysis of the usage of several different online teaching tools. We can see that most universities prefer platforms such as Tencent Meeting and DingTalk Classroom, which have complete functions and can support a large number of teaching interactions. These platforms also provide powerful functions such as sending and receiving assignments, online exams, etc., which can effectively reduce management and commuting costs, and better help teachers and students arrange

and negotiate teaching time and content.

Afterwards, we collected data on the usage time of online education platforms by different grades. Perhaps based on China's long-standing educational tradition and the serious phenomenon of solely relying on scores, we can find that the higher the grade, the sparser the use of online education.

Finally, the author's personal interview records are summarized. The author interviewed several educators from their alma mater, namely elementary school, junior high school, high school, and university. The author found that primary schools and universities tend to favor online education, while middle and high schools hold a more reserved attitude towards online education. At the same time, the introduction of new educational equipment and obtaining the right to use educational platforms also put forward certain requirements for the financial resources of schools themselves, which must be closely related to China's long-standing educational tradition.

Therefore, based on literature review, field visits, and questionnaire survey results, the author can conclude that in order to better promote online education among Chinese education leaders, greater education investment is needed, and China's educational philosophy needs to be gradually changed. This may be a very long process, but it is also something that must be experienced.



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CHARTING MARINE PLASTIC POLLUTION: MODELING MACROPLASTIC TRAJECTORY WITH OPENDRIFT

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Purpose and Background

The problem of macroplastic pollution in the ocean is closely related to the increasing trend of marine litter, especially on Java Island. By 2022, Java Island will produce 10.1 million tons of waste, 18.55% of which will be plastic (Annur, 2023). The high population and economic activity in Java and oceanographic conditions that can trap macroplastic particles exacerbate this problem (Rainer, 2023). So numerical modelling is needed to track and monitor the distribution of macroplastic trajectories in the region.

Materials and Methods

The data used in this research is from Copernicus Marine Service (CMEMS) in the Global Ocean Physics Reanalysis dataset, which can be downloaded at https://doi.org/10.48670/moi-00021. It has a spatial resolution of 0.083 x 0.083 degrees and is temporal daily from January 1, 2023, until August 31, 2024. The data will be input for OpenDrift software to simulate the microplastic trajectory modeling (Dagestad et al., 2018). Then, we assumed that the amount of macroplastic for 1 particle is equal to 1 kilogram.

The model will be simulated in a forward time scheme for 1 year with a time step is 1 day, and the model uses the stranded scenario that conditions if the particle interacts with the boundary (shoreline) will have a particle velocity of 0, so it will be considered as stranded rubbish particles. Then, macroplastic data was obtained from several existing literature, for example, DKI Jakarta amounted to 24 particles/day, in Cirebon 9 particles/day, and in Cilacap 13 particles/day, so that the number of particles included in the trajectory model amounted to 73,000 particles.

Results and Discussions

According to Figure 1. The map of macroplastic trajectories in the Java Sea, the red point is the stranded particles, the green point is the initial particle, and the blue point is the active particles, then the grey line is the trajectory line of the particle. The map explains the condition of the final time for each particle. They are divided into three conditions: initial, active, and stranded. The initial particle is the position of the particle in the first step of time, and the stranded particle is the position of the particle that interacts with the shoreline and then has 0 particle velocity. Then, active particles are particles that are still actively moving on the sea surface.

A total of 68,769 particles (94.2%) were deposited on the coastline, while 4,231 particles (5.8%) remained active. Particles from Jakarta were all deposited on the coastline, predominantly moving westwards. Particles from Cirebon were partly stuck on the coastline up to Jepara and partly moved into the Java Sea. Meanwhile, particles from Cilacap are partly stuck on the coastline up to Christmas Island, and others move east or west. This particle movement is influenced by ocean currents, such as the Java North Current in Cirebon and Jakarta, the Java South Current in Cilacap, as well as the Indonesia Through Flow and South Equatorial Current phenomena.

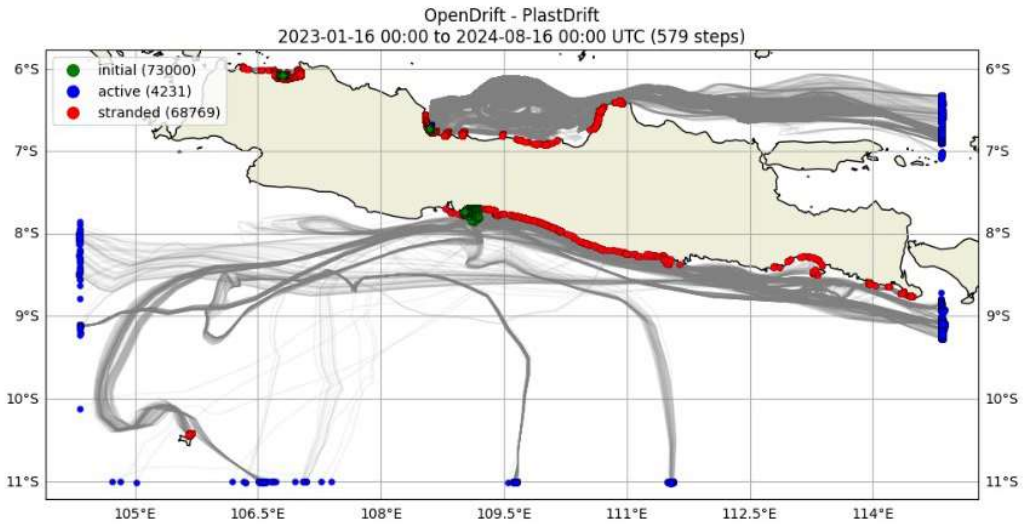

Figure 1. The map of macroplastic trajectories in the Java Sea, the red point is the stranded particles, the green point is the initial particle, and the blue point is the active particles, then the grey line is the trajectory line of the particle.

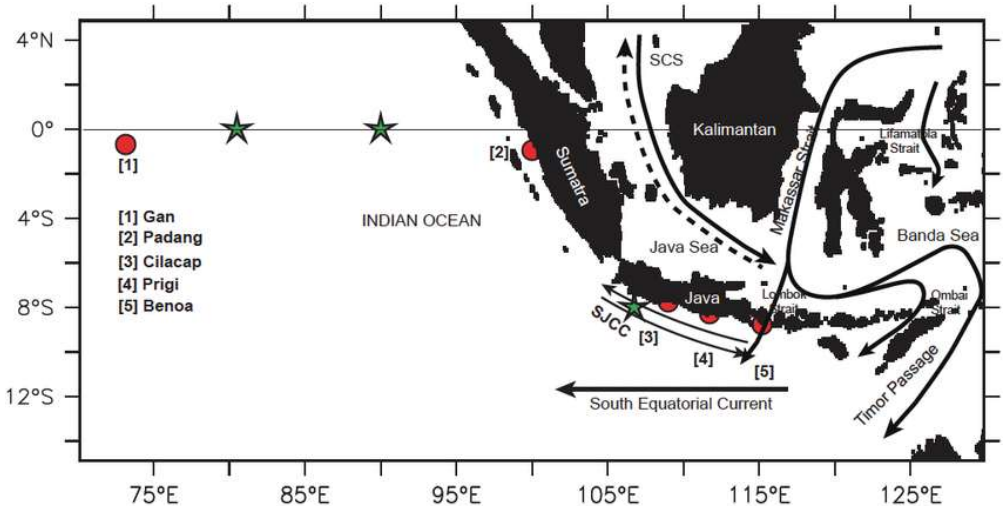

Figure 2. Map of ocean currents in the Java Sea, the arrow is the pathline of the sea current, the abbreviations stand for: South Java Coastal Current (SJCC), South China Sea (SCS) (Utari et al., 2019)

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TREATABILITY STUDY FOR DYE-MANUFACTURING WASTEWATER: ADVANCING SUSTAINABLE DEVELOPMENT GOALS (SDGs)

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Purpose and Background

The dye-manufacturing industry, vital to textile production, contributes significantly to environmental pollution through wastewater discharge containing harmful organic and inorganic pollutants, including non-biodegradable dyes. This negatively impacts aquatic ecosystems and public health. Addressing this issue aligns with the United Nations Sustainable Development Goals (SDGs), specifically SDG 6 (Clean Water and Sanitation) and SDG 12 (Responsible Consumption and Production). This study evaluates the feasibility of coagulation, biodegradation, and ozonation processes to remove pollutants from dye wastewater, supporting sustainable industrial practices and compliance with Thailand's effluent standards, including the 300 ADMI color limit.

Materials and Methods

Real wastewater samples were collected from a dye-manufacturing factory at effluent from the 1st-stage decolorization by cation polymer addition as shown in figure 1. Parameters such as pH, color (ADMI), COD, BOD, were analyzed to characterize the samples. Coagulation tests were conducted using commercial cationic polymer. The supernatants were analyzed for their color reduction efficiency. Ozonation experiments were conducted using a ProMinent ozone generator, with ozone diffused into wastewater samples using an aquarium diffuser. The effects of ozone dosage and retention time on color and organic pollutant removal were systematically evaluated.

Results and Discussion

The collected wastewater samples showed high variability in pollutant concentrations, with ADMI color levels reaching 4,250 ± 70, SCOD values up to 2,110 ± 74 and BOD equal to 510.71 ± 8.9 mgL^{-1}. These findings underscore the complex and challenging nature of dye-manufacturing wastewater. Coagulation using the commercial cationic polymer was the most effective in color removal but left residual color levels exceeding the 300 ADMI standard as shown in figure 2.

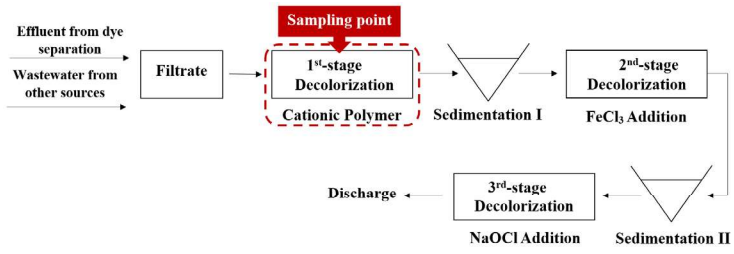

Figure 1 Wastewater treatment schematic of dye-manufacturing factory

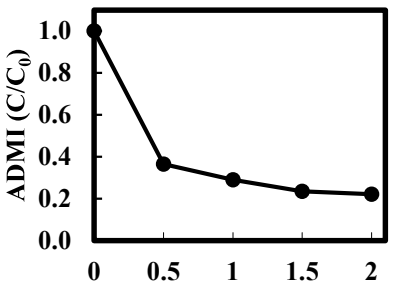

Figure 2 Decolorization performance of the coagulation process

Ozonation demonstrated excellent performance in reducing color to below 300 ADMI as shown in figure 3 and partially removing COD and BOD by 13-18% and 42% as shown in figures 4 and 5, respectively. Although ozonation effectively decolorized the wastewater as shown in figure 6, its standalone application was insufficient for complete pollutant removal. Integrating ozonation with biological processes could provide a sustainable hybrid solution, aligning with SDG 6 by improving water quality and SDG 12 by promoting resource efficiency.

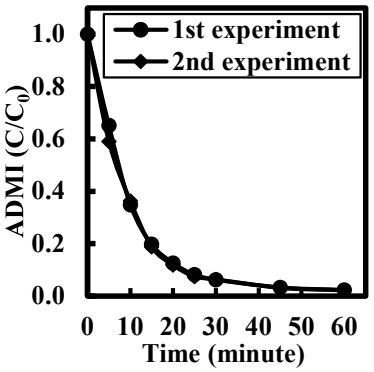

Figure 3 Decolorization performance of the ozonation process

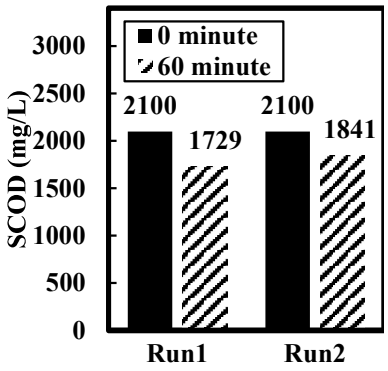

Figure 4 COD removal of the ozonation process

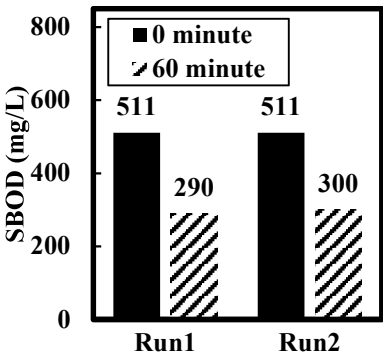

Figure 5 BOD removal of the ozonation process

Figure 6 The comparison of effluent from the 1st-stage decolorization by cation polymer addition treated by ozonation process for 60 minutes

Conclusion

This study addresses the treatment of dye-manufacturing wastewater, emphasizing both challenges and solutions. Coagulation with cationic polymers effectively reduces initial color, while ozonation ensures robust decolorization and partial removal of organic pollutants. However, neither method alone is sufficient for the complex pollutant matrix. A hybrid approach integrating ozonation and biodegradation is recommended to achieve comprehensive treatment and meet stringent effluent standards. Advanced, integrated methods can minimize environmental impact, support sustainable water management, and align with SDG goals.

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Utilization of Plastic Bottles and Cow Dung as Construction Materials for the Production of Eco Blocks

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Purpose and Background

Plastic pollution continues to be one of the most significant environmental challenges in 2025, with its impacts worsening due to increasing production and improper disposal. According to the United Nations Environment Programme (UNEP, 2023), over 9 billion tons of plastic waste have been generated globally, with only 9% being recycled. This has led to severe environmental consequences, including ocean pollution, habitat disruption, and contributions to greenhouse gas emissions. Similarly, cow dung, a readily available agricultural byproduct, contributes to methane emissions and global warming if not managed effectively (Bukenya, 2022). Addressing these issues requires innovative, sustainable solutions.

Eco blocks, made from plastic bottles and cow dung, present a promising avenue for reducing waste and mitigating environmental impacts. Studies have shown that plastic waste can enhance the strength of construction materials while cow dung contributes to better binding properties and thermal insulation (Chaurasia & Gangwar, 2019; Fernando et al., 2019). This study explores the feasibility of combining these materials to create durable, eco-friendly construction blocks. By incorporating both plastic waste and cow dung, the research aims to promote sustainability while providing an alternative to traditional building materials.

Materials and Methods

The materials used in this study include 1.5 kg of cement, 450 g of shredded plastic bottles,kg of dried cow dung, 6 kg of utility sand, and 3.7 L of water. The equipment utilized includes a plastic container as a molder, cement trowels, scissors, a weighing scale, a measuring tape or ruler, a concrete nail, and a hammer.

To prepare the eco blocks, the researchers measured and mixed the materials for three formulations. Block A consisted of 500 g of cement, 100 g of plastic, 100 g of cow dung, 2 kg of sand, and 500 mL of water. Block B used 500 g of cement, 150 g of plastic, 400 g of cow dung, 2 kg of sand, and 1500 mL of water. Block C incorporated 500 g of cement, 200 g of plastic, 600 g of cow dung, 2 kg of sand, and 1700 mL of water. The sand, cement, shredded plastic, and cow dung were thoroughly mixed on a flat surface, with water added gradually to achieve a uniform consistency. The mixture was then placed into a plastic molder and left to dry under direct sunlight for 7 days.

Testing involved two methods. The nail penetration test assessed the compressive strength and ability of the blocks to hold a nail without cracking. The water absorption test measured the percentage of water absorbed after submerging the blocks in water for 24 hours, using the formula:

Water Absorption = [(final density – initial density) / initial density] x 100%

Results and Discussion

Test	Block A	Block B	Block C
Nail Penetration Test	Held the nail in place without cracking.	Slightly cracked but held the nail.	Broke and failed to hold the nail.
Water Absorption Test	Initial: 1050 g; Final: 1200 g; Absorbed: 14.28%	Initial: 1050 g; Final: 1181.25 g; Absorbed: 12.5%	Dissolved in water; undetermined.

Analysis

- Block A remains the strongest and most water-resistant, with a moderate absorption rate of 14.28%.
- Block B, despite a lower absorption rate (12.5%), showed compromised structural integrity due to slight cracking during the nail penetration test, indicating it is weaker than Block A.
- Block C failed the water absorption test, as it dissolved in water, making it unsuitable as a construction material.

Block A outperformed Blocks B and C in both strength and water resistance, making it the most viable candidate for sustainable construction. Block B's slight cracking and moderate absorption rate render it less reliable, while Block C remains unsuitable due to its inability to maintain structural integrity.

Conclusion

The findings indicate that eco blocks incorporating plastic bottles and cow dung, particularly Block A, are viable as construction materials. These blocks not only mitigate environmental issues but also provide durable and sustainable alternatives for building applications. Further research is recommended to explore their compressive strength and long-term durability under varying conditions.

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Application of Online Collaboration Tools in University Project Learning

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Purpose and Background

With the rapid development of digital technology, the application of online collaboration tools in the field of education has gradually become an important means to improve teaching quality. Online collaboration tools such as Google Docs, Slack, Trello, Zoom, etc. have gradually been introduced into university classrooms and become auxiliary tools for students' project learning. Through these tools, students can carry out efficient teamwork across time zones and regions, share information, discuss problems and track project progress in a timely manner. Therefore, the use of online collaboration tools plays a vital role in improving project learning effects, enhancing students' learning motivation and improving team collaboration efficiency. Especially in university project-based learning (PBL), the use of online collaboration tools effectively promotes collaboration and knowledge sharing among students, and improves learning participation and efficiency. Project learning is a student-led educational method that allows students to collaborate through actual project tasks to solve complex problems and cultivate students' critical thinking, innovation and teamwork abilities. Additionally, it emphasizes promoting students' active learning and problem-solving abilities through actual project tasks, and online collaboration tools provide strong technical support for this learning method. However, the traditional project learning model often relies on offline collaboration, which is limited in time and space. Especially in the case of distance learning and cross-regional collaboration, communication and information sharing between students face great challenges.

Materials and Methods

In the study, a total of 200 college students were randomly divided into two groups: one group used traditional face-to-face collaboration for project learning, and the other group used online collaboration tools (such as Google Docs, Trello, Slack, etc.) for project collaboration. Each group had 100 students, including: traditional collaboration group: These students rely on face-to-face teamwork, and all communication, document sharing, and progress tracking occur in a physical environment. On the other hand, online collaboration tool group: these students use online collaboration tools for task assignment, document collaboration, real-time communication, and progress management throughout the project learning process. By comparing these two groups of students, the researchers were able to evaluate the specific impact of online collaboration tools on project learning efficiency, especially in terms of changes in project completion, team collaboration effectiveness, learning participation, and academic performance.

Project Learning Efficiency Indicators	Traditional collaboration methods	Online Collaboration Tools
Project completion	65%	85%
Team collaboration effect	60%	80%
Learning participation	50%	75%
Academic achievement	70%	85%

Research results and discussion

The analysis showed that the application of online collaboration tools in university project learning improved collaboration efficiency and learning participation. Students who used online collaboration tools showed higher collaboration efficiency and stronger learning participation in the process of completing project tasks than students in traditional methods. Through online tools such as Google Docs and Trello, students can share documents and track project progress in real time, avoiding repeated transmission and omission of information. In addition, these tools support real-time feedback and multi-angle discussions, which greatly improves students' learning motivation and sense of commitment to the project.

Although online collaboration tools have played an important role in improving the effectiveness of university project learning, they also have some limitations. For example, some students may feel uncomfortable when using these tools in the early stage and may need additional technical support. Therefore, schools should provide systematic training courses to help students familiarize thems

elves with the use of tools. In addition, the popularization of online collaboration tools also needs to solve the limitations of equipment and networks, especially students in remote areas may face unstable networks. Schools should consider providing these students with equipment support and network solutions to ensure that all students can participate in project learning equally.

All in all, this paper argues in favor of the application of online collaboration tools in education to improve the quality of learning. However, early course training, familiarity with the use of networks tools, and the popularization of online collaboration tools still need to be further improved and strengthened.

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HOW TO PROMOTE THE EDUCATION INDUSTRY IN JIULONGPO DISTRICT, CHONGQING

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Purpose and Background

With the rapid development of China's economy, the demand for talent has undergone significant changes. On one hand, there is a growing need for highly skilled and innovative professionals in cutting-edge fields. On the other hand, the demand for technical talents in modern industries is also steadily increasing. However, vocational education, as a key component of the talent development system, faces numerous challenges, with one of the most prominent being societal bias.

For a long time, many parents have held traditional stereotypes about vocational schools, perceiving them as inferior to general high schools and universities. They worry that choosing vocational education might limit their children's future career opportunities. This mindset has led to a lack of appeal for vocational education, further hindering its development and transformation.

To address these issues, this study takes Jiulongpo District in Chongqing as an example to analyze the existing educational pathways and their associated challenges. The research aims to explore the current state, challenges, and opportunities of vocational education, while proposing practical recommendations for its transformation and upgrading. This effort seeks to optimize the allocation of educational resources and align talent development with the needs of economic and social development.

Materials and Methods

Documentary research and case analysis.

Results and Discussion

In summary, the education system in Jiulongpo District has shown a relatively balanced development trend as a whole, especially in the allocation of educational resources and the setting of school types. However, with the diversification of educational needs and changes in the socio-economic environment, there are still some problems that need to be solved. First, the uneven regional distribution of educational resources and the single educational model mean that some students, even if they have high academic potential, may not be fully developed due to resource limitations of the school they attend. Secondly, parents still have great resistance to the traditional perception of vocational education, which leads to students' failure to discover and cultivate their professional interests and skills at an early stage. In addition, the increasing competitive pressure in the job market has also made parents more inclined to push their children to enter ordinary high schools, resulting in the "involution" phenomenon within the education system.

In response to these problems, the innovative measures proposed have important practical significance. By improving the teaching staff, strengthening resource sharing among schools, promoting the combination of vocational education and digital learning, and introducing more forward-looking vocational education policies, it will help break the bottleneck of current education development and promote the diversification and balanced development of the education system. In particular, it can effectively improve society's understanding of different educational paths and provide students with more diverse growth space by helping parents overcome stereotypes about vocational education and providing students with clearer career development paths.

Ultimately, only through systematic and comprehensive reforms and innovations can we truly achieve educational equity, optimize resource allocation, improve the quality and efficiency of the entire education system, and lay a more solid foundation for the education cause in Chongqing and even the whole country.

Figure 1: The children are learning about smart technology knowledge

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A Comprehensive Comparison of the IB Educational Model and Traditional Education: A Case Study of IB, Taiwan, and Japan

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Purpose and Background

Education systems play a pivotal role in shaping students' skills, attitudes, and competencies for the future. The International Baccalaureate (IB), Japan's educational system, and Taiwan's 108 Curriculum Guidelines each represent distinct approaches to education, with unique philosophies, objectives, and teaching methods.

This study aims to compare these three systems, focusing on their frameworks, lesson plan designs, and teaching methodologies, with an emphasis on physics education. The analysis seeks to provide insights into how different systems nurture students' learning abilities and contribute to a broader understanding of global education.

Materials and Methods

This study utilizes research data from three educational systems: IB, Japan, and Taiwan. The analysis begins with a review of each system's educational program to identify their educational philosophies and objectives. Lesson plan comparisons focus on specific examples from IB and Taiwan: "Flip the World" (IB) and "Train Accidents" (Taiwan). These lesson plans are examined to highlight differences in instructional design, teaching methodologies, and the integration of interdisciplinary elements. The comparative approach is adopted to analyze key aspects, including **Learning Objective**, **Plan System**, **Teaching Method**, **Time Requirements**

Results and Discussion

The comparative analysis reveals distinct differences in educational approaches, as summarized in the table below:

System	IB	Japan	Taiwan
Learning Objectives	Learner Profile Critical Thinking Global awareness	Subject Content and Subject matter Experiment methods and skills	
Instructional Strategies	SOI Inquiry Instructional Strategy	Progressive; Didactic Teaching is the mainly used strategy in school.	
Time Requirements	Inquiry Long time	Progressive Short time	

While the IB system promotes student-centered learning and global competence, the Japanese and Taiwanese systems excel in providing strong foundational knowledge and practical skills. These differences are not about determining which system is better but rather understanding the diverse ways education can be tailored to meet specific cultural and societal needs. For example, IB's emphasis on inquiry can inspire Japan and Taiwan to adopt more exploratory teaching strategies, while Japan and Taiwan's strong curriculum frameworks can provide structure to IB practices.

By analyzing IB, Japanese, and Taiwanese education systems, this study highlights the importance of diverse educational philosophies and teaching methods. Each system has unique strengths that can inspire educators worldwide to broaden their perspectives and enhance their teaching practices.

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Perceived Challenges of Pre-Service Science Teachers in Teaching Junior High School Physics

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Purpose and Background

The introduction of the K to 12 curriculum in the Philippines adopted a spiral progression approach (SPA) for science education, where all major disciplines—physics, chemistry, biology, and earth science —are taught in every grade level of junior high school (JHS) with increasing complexity (Garcia, 2021). SPA requires JHS science teachers to handle all four fields, however most of them are trained through discipline-based degrees that focus on at most two specializations. This misalignment often leaves teachers struggling to effectively teach disciplines outside their expertise (De Borja et al., 2020).

To address this mismatch, the Commission on Higher Education (CHEd) revised science education degrees to adopt a general science approach, combining biology, chemistry, physics, and earth science into a single degree: the Bachelor of Secondary Education (BSEd) major in Science (Teo et al., 2022). This adjustment aims to prepare aspiring teachers for the demands of the SPA in JHS science. However, the extensive scope of scientific knowledge poses challenges to this generalist approach, as the complexity of each discipline requires significant focus and time (Casadevall & Fang, 2014). Consequently, merging the four fields into one program may result in rushed discussions and a limited understanding of each science discipline.

With the potential gap in topic mastery and skills for a specific science discipline due to a generalist degree, this study explored the perceived challenges of pre-service teachers in effectively teaching physics. Their insights may help assess whether the current science degree provides the necessary competencies for teaching comprehensively science disciplines, particularly physics.

Materials and Methods

An unstructured one-on-one interview was conducted with ten pre-service science teachers, selected through purposive sampling. All participants had at least one session of physics teaching experience. Participation was voluntary, and consent forms were completed to ensure ethical compliance. The unstructured interview used probing questions, focusing on participants' science degree experiences and their perceptions of teaching JHS physics. Notes were taken, and with permission, interviews were audio-recorded. Responses were analyzed using thematic analysis.

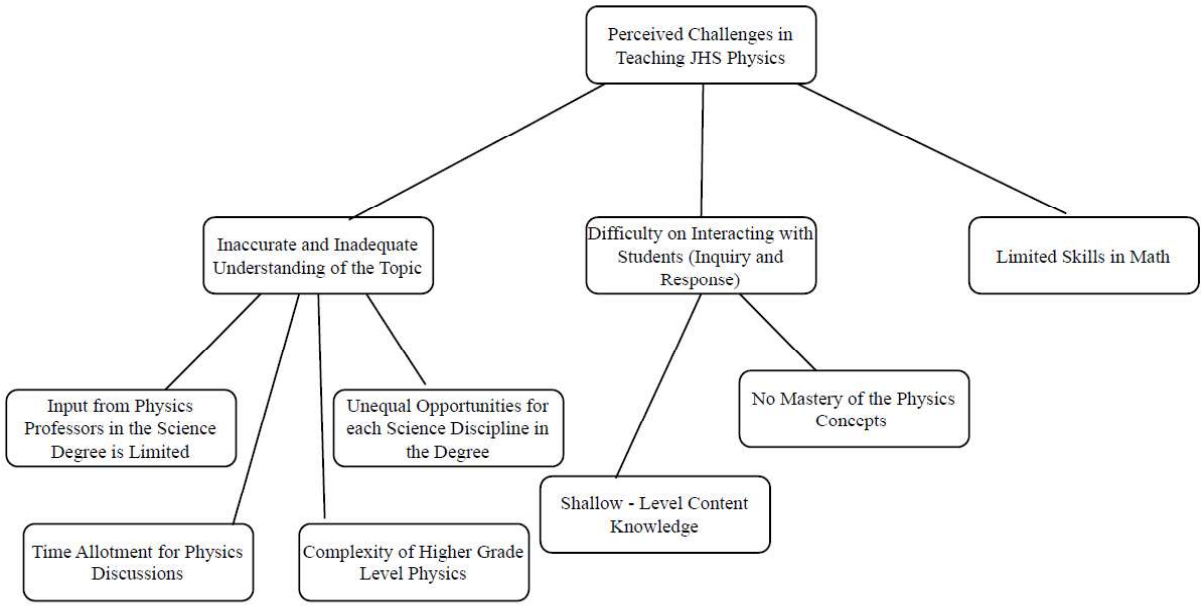
Results and Discussion

Three organizing themes emerged from participants' interviews about their perceived challenges in teaching Physics: (1) inaccuracy and inadequacy in understanding the topic, (2) difficulty on interacting with students, and (3) limited skills in math. Some of these challenges aligned with the findings of Handtke & Bogeholz (2023). Basic themes were also generated to elaborate the perceived challenges. Figure 1 presents the network of themes illustrating these challenges.

The first organizing theme, “inaccuracy and inadequacy in understanding the topic,” implies that pre-service teachers may hold misconceptions in physics, affecting their lesson delivery. Four organizing themes support this challenge, as shown in Figure 1. First, limited input from physics professors, due to reliance on student reporting and videos during class discussions, contributes to the issue. Second, insufficient time for physics discussions leads to rushed or incomplete lessons. Third, the perception that other science disciplines, like biology, receive more class time, dedicated laboratory sessions, and detailed coverage suggests that the degree does not prioritize in-depth physics understanding. Lastly, the complexity of physics limits participants' understanding to the basic concepts.

Figure 1

Thematic Network on the Perceptions of the Pre-Service Science teachers in Teaching JHS Physics in terms of Challenges



The second organizing theme, “difficulty in interacting with students,” indicates that pre-service science teachers struggle to respond effectively to students’ ideas and ask thought-provoking questions. Two basic themes support this challenge, as shown in Figure 1. First, pre-service teachers feel that their physics knowledge is insufficient and not in-depth, hindering their ability to address students' ideas. Second, they acknowledge a lack of mastery in physics concepts, affecting their ability to respond promptly and effectively to students' queries and suggestions.

The final organizing theme, "limited skills in Math," highlights pre-service science teachers' lack of confidence in their calculation skills necessary for problem-solving in physics. Participants noted that the mathematical applications of physics pose an additional hurdle in teaching the subject.

The perceived challenges in teaching JHS physics by pre-service teachers may stem from their generalist science curriculum, which covers four major disciplines. This approach limits opportunities for in-depth learning in each area, potentially leading to an incomplete understanding of the concept and insufficient teaching skills in specific scientific fields, such as physics.

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Cultural Perspectives on Vulnerability and Capacity in the Mentawai Islands Amidst Earthquake and Tsunami Threats

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Purpose and Background

The Mentawai Islands Regency in West Sumatra represents one of Indonesia's most vulnerable regions to natural disasters, particularly earthquakes and tsunamis, as evidenced by LIPI's (2012) documentation of several major 7.7 magnitude earthquakes in 1935, 2007, and 2010, with an even more concerning potential for an 8.8 magnitude earthquake beneath Siberut, Sipora, and North Pagai Islands. To address these significant threats to national security, Bakornas PB (2007) emphasizes the importance of understanding local risks through community engagement, recognizing that effective disaster risk reduction requires not only identifying hazards, vulnerabilities, and capacities but also actively incorporating local wisdom and traditional knowledge from communities who serve as both the subject and primary beneficiaries of these efforts.

Materials and Methods

The method used in this research is a literature review, which involves systematically identifying, analyzing, and synthesizing existing research and knowledge to address the research objectives.

Results and Discussion

Sumatra Island, particularly the Mentawai region, is an active tectonic area located in the convergence zone between the Indo-Australian and Eurasian plates. The interaction between these plates produces oblique convergence consisting of dip-slip components in the subduction zone and strike-slip components along the Sumatran fault, making this region highly susceptible to major earthquakes up to Mw ≥ 8 SR. This condition is exacerbated by challenges in community preparedness systems, such as limitations in early warning systems, misconceptions about earthquakes and tsunamis, and difficult access to safe areas, as revealed in a joint study conducted by LIPI, BNPB, AIFDR, and AusAid in 2011.

The impact of these tectonic conditions is particularly evident in two main villages in the Mentawai Islands: Maileppet Village on Siberut Island and Tuapeijat Village on Sipora Island. Maileppet Village, with its 12.49 km coastline and population of 1,459 people, and Tuapeijat Village, which serves as the regency capital with a population of 4,215 people, both face serious challenges in disaster mitigation due to their direct proximity to the sea. This situation demands enhanced community capacity and reduced vulnerability through better understanding of local geological and social conditions.

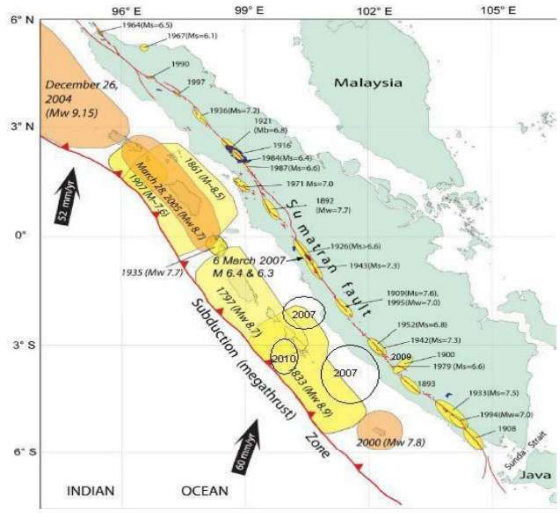

Figure 1. Segmentation of Earthquake Sources in the Sumatra Megathrust Zone and the Bukit Barisan Mountains (Source: Sitorus, P. B. R. 2018)

a.

Sector	Vulnerability Indicator	Maileppet	Tuapeijat
Social	Housing Conditions	Vulnerable	Vulnerable
	Risk Perception	Vulnerable	Vulnerable
	Livelihood	Not Vulnerable	Vulnerable
	Disaster Planning and Preparedness	Vulnerable	Vulnerable
Physical	Buildings and Infrastructure	Vulnerable	Vulnerable
	Critical Facilities	Vulnerable	Vulnerable
Economic	Types of Agricultural Crops	Not Vulnerable	Vulnerable
	Savings	Not Vulnerable	Vulnerable
Environmental	Environmental Damage	Vulnerable	Vulnerable

b.

Sector	Capacity Indicator	Maileppet	Tuapeijat
Social	Social Capital	Adequate	Inadequate
	Defense Mechanisms	Adequate	Inadequate
	Adaptation Strategies	Adequate	Inadequate
	Memory of Past Disasters	Inadequate	Inadequate
	Disaster Planning and Preparedness	Inadequate	Inadequate
Physical	Physical Capital	Inadequate	Inadequate
Economic	Economic Capital	Inadequate	Inadequate
Environmental	Environmental Capital	Inadequate	Inadequate

Figure 2. a. Vulnerability Assessment Results for Maileppet Village and Tuapeijat Village and b. Capacity Assessment Results for Maileppet Village and Tuapeijat Village (Source: Sitorus, P. B. R. 2018)

A comparative analysis of disaster vulnerability between Maileppet and Tuapeijat villages reveals distinct patterns: Maileppet shows mixed resilience with vulnerabilities in social and physical sectors but strength in traditional economic practices through agriculture and livestock, while Tuapeijat demonstrates comprehensive vulnerability across all sectors. Although Maileppet exhibits adequate capacity in social capital, survival mechanisms, and adaptation strategies, both villages face significant challenges, particularly in disaster memory and preparedness planning; notably, while Maileppet's traditional Mentawai cultural practices promote environmental harmony and provide some protective factors through sustainable farming and wooden housing structures compliant with earthquake resistance guidelines, the ongoing acculturation with foreign influences has created complex social dynamics that affect both communities' disaster resilience, suggesting a need for an integrated approach that combines traditional wisdom with modern disaster preparedness strategies.

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On Improving and Enhance Education in Liaoning Province, China: A Study of Anshan City

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Purpose and Background

The paper focuses on educational development in Anshan City, Liaoning Province, emphasizing the progress and challenges documented in recent years. Research conducted by institutions such as the Anshan Education Bureau (2024) indicates that while advancements have been made in school construction and teacher training, persistent issues hinder progress. These include resource inequalities between urban and rural schools, limited application of technology in teaching, and a heavy reliance on exam-oriented education systems. This analysis aims to explore these issues and identify effective strategies for addressing them, based on prior research and comparative studies.

Materials and Methods

This study adopted documentary analysis. Data collected between 2020 and 2024 serve as the foundation for this analysis. The materials included quantitative data on school funding, teacher-student ratios, technology access, and graduation rates in urban and rural areas of Anshan City. Survey findings from 300 participants—comprising teachers, students, and parents—were reviewed to gauge perceptions of current educational challenges. Additionally, examples from cities such as Hangzhou and educational models in Finland, as studied by researchers including Wang (2023) and Zhang (2021), were examined for their relevance to Anshan's context. Statistical analyses using SPSS software and case study methods informed the conclusions drawn.

Results and Discussion

The study illustrated significant disparities in resource allocation and educational outcomes between urban and rural schools in Anshan City. For instance, urban schools reportedly receive an average of ¥150,000 in funding annually, compared to ¥60,000 for rural schools (Anshan Education Bureau, 2024). Teacher-student ratios are more favorable in urban settings (1:20) than in rural ones (1:32). Similarly, 85% of urban schools have access to multimedia teaching tools, while only 35% of rural schools do. These discrepancies contribute to unequal graduation rates, with urban schools achieving 90% while rural schools lag at 65%. Further analysis of survey data highlights two critical challenges. The first challenge is insufficient teacher training in technology: reviewed surveys indicated that 70% of rural teachers lack adequate training in using digital tools, a barrier to integrating technology effectively into classrooms. This finding aligns with Lü's (2022) research on technological applications in education. The second challenge is an exam-centric education culture: over 80% of surveyed students and parents expressed dissatisfaction with the current evaluation system, which prioritized exam performance over creativity, critical thinking, and practical skills. This observation echoes findings by Zhang (2021) on the limitations of test-focused educational models.

Based on the analysis of successful practices documented in the literature, the following strategies are suggested:

1. Increased Financial Support for Rural Schools: Research by Li (2023) underscores the importance of allocating additional resources to rural schools to address infrastructure deficits and attract skilled educators.

2. Technology Integration through Digital Platforms: Studies by UNESCO (2021) and Huang (2020) advocate for the use of digital platforms to bridge the resource gap between urban and rural

schools. These platforms can enable resource sharing and provide teachers with training opportunities.

3. Reform of the Education Evaluation System: Drawing on Finland's experience, Zhang (2021) suggests adopting comprehensive evaluation methods that emphasize creativity, teamwork, and problem-solving skills over rote memorization and test scores.

Table 1: The main differences in the distribution of educational resources and results of urban and rural schools in Anshan City

Indicator	Urban Schools	Rural Schools	Disparity(Urban/Rural)
Average School Funding (¥)	150,000	60,000	2.5:1
Teacher-Student Ratio	1:20	1:32	-
Multimedia Access (%)	85%	35%	2.4:1
High School Graduation (%)	90%	65%	-

Through these data, it can be clear that the unequal distribution of urban and rural education resources is the main reason restricting the development of rural education. Table 1 provides the data analysed from Huang (2020), Chen and Wang (2022), and the Anshan Education Bureau (2024) for putting forward targeted education policy suggestions.

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SCIENTIFIC LITERACY OF STEM AND NON-STEM K-12 GRADUATES IN BSE SCIENCE PROGRAM

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Purpose and Background

The importance of scientific literacy is increasing daily and science education is essential in emphasizing and fostering the necessary knowledge and competencies. Reports emphasize its role in preparing students for impactful careers (American Society for Engineering Education, 2017). Enriching teacher preparation programs to enhance scientific literacy is critical, as suggested by Karamustafaoğlu et al. (2013). However, in a test conducted by Programme for International Student Assessment (PISA) in 2018, the Philippines got a relatively low score in scientific literacy, 132 points behind the Organisation for Economic Co-operation and Development (OECD) average of 489 points, and in 2022, only 23% of students reached Level 2 or higher in science, compared to the OECD average of 76%, signaling a need for improvement.

The K-12 curriculum's tracks and strands aim to equip students for college and the workforce (AMA University, 2021). Despite the implementation of the K to 12 curricula, there is still a challenge with the readiness of college institutions to accept students who took a senior high strand that is not oriented to the college program they want to pursue. Research shows a gap in performance between STEM and non-STEM students, with STEM students consistently scoring higher in assessments and general averages (Manalo et al., 2019). BSE science majors must have high levels of scientific literacy, as it indicates their preparedness to teach science.

Therefore, the researchers sought to determine the correlation between the K-12 curriculum exit and scientific literacy of BSE Science majors and the difference in scientific literacy between STEM and non-STEM K-12 graduates enrolled in Pangasinan State University, Bayambang Campus.

Materials and Methods

The study was conducted using a quantitative research method with a descriptive-correlational design. A 30-item researcher-made scientific literacy test, aligned with PISA (2018) competencies in interpreting data and evidence scientifically, was administered to first-year BSE Science students. The test underwent face and content validation and was assessed for internal consistency using the split-half reliability method. The data collected were analyzed using statistical methods. Frequency statistics were used to profile participants, and the scientific literacy levels were evaluated based on a rating scale by Henukh et al. (2018). To determine the correlation between K-12 curriculum exit (STEM or non-STEM) and scientific literacy, Point-Biserial Correlation was conducted via SPSS software at a 0.05 significance level.

Results and Discussion

I. Scientific Literacy of BSE Science Students in Interpreting Scientific Data and Evidence

Table 1. *Level of Scientific Literacy of First-year BSE Science Students*

	Mean	Mean Percentage	Standard Deviation	Descriptive Equivalent
Male	19.35	64.50	4.030	Good
Female	17.58	58.60	4.259	Fair
STEM	19.57	65.23	3.381	Good
Non-STEM	16.31	54.37	4.503	Fair
Total	18.05	60.17	4.245	Fair

The table shows that males scored 64.50% (Good), while females scored 58.60% (Fair). STEM K-12 graduates had a higher mean score (65.23%, Good) compared to non-STEM graduates (54.37%,

Fair). Overall, participants achieved a mean score of 18.05 out of 30 (60.17%, Fair) on the scientific literacy test.

II. Correlation between the Profile of BSE Science Students

Variables	Coefficient of Correlation	P-Value	Extent of Relationship
Sex	-0.185 *(not significant)*	0.111	*No Relationship*
Curriculum Exit	-0.386 *(very highly significant)*	<.001	*Weakly Negative Correlation*

Table 2. *Results of the Correlation Analysis Between the Profiles of the Respondents and their Level of Scientific Literacy*

The table reveals that the p-value for the relationship between sex and scientific literacy is 0.111, which exceeds the 0.05 significance level. This indicates no significant correlation between sex and scientific literacy. Additionally, the point-biserial correlation coefficient of -0.185 confirms no association between the two variables. In contrast, the correlation analysis between curriculum exit and scientific literacy shows a p-value of <.001, which is below the 0.05 significance level, indicating a significant correlation. The point-biserial correlation coefficient of -0.386 suggests a weak negative relationship between curriculum exit and scientific literacy.

III. Development Plan for Improving Scientific Literacy

This study's findings suggest the importance of considering a development plan to enhance scientific literacy among BSE Science students. The researchers developed a plan that aims to enhance the scientific literacy of BSE Science majors, focusing on their ability to interpret data and evidence scientifically. It addresses educational factors, cognitive challenges, practical skills, resources, and motivation through targeted interventions over 8 to 12 months. Divided into phases, the plan includes clear objectives, outcomes, milestones, and resource allocation while identifying risks and mitigation strategies.

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CONNECTION BETWEEN BANDUNG'S LANDSCAPE TO FLOOD DISASTER AND FLOOD MANAGEMENT

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Purpose and Background

Flood is term of disaster for a big amount of water that overflows within their normal body water condition submerging areas that are not supposed to. Flood could create big impacts seeing how it affect materials and non-materials losses such as souls and human creation. Indonesia experienced a lot of flood disaster especially places with such a compact population like urban cities. Bandung is both an urban city and a regency with such a unique topography, located in about 700 meter above sea level and at a basin at the same time. Bandung's high location affected its weather and climate considering its relatively cool temperature especially in their highest point. However, this uniqueness is not the main focal considering the many cases of disasters especially flood still occurs in Bandung area. Bandung city and regency needs to focus on their disaster management seeing that people tend to visit due to its uniqueness and will increase as time goes by and bad management system will disrupt the beauty of Bandung itself. This research aims to evaluate about the connection about Bandung's landscape and its disaster events.

Material and Methods

The method used in this research is by a literature review, collecting from scientific papers and researches in conjunction with data collection through various credible resources. Potential papers will go through deep analysis and further validation in order to meet the main objective of this research. Literature review helps examine the flood control over the past years as well as geographic parameter of Bandung. Bandung contour map that shows the topography itself will be downloaded from Digital Elevation Model National (DEMNAS) processed through QGis as a data visualization software. Validation of data is provided by data statistics from BPS-Statistic Indonesia that shows the comparison of flood disaster in certain area of Bandung.

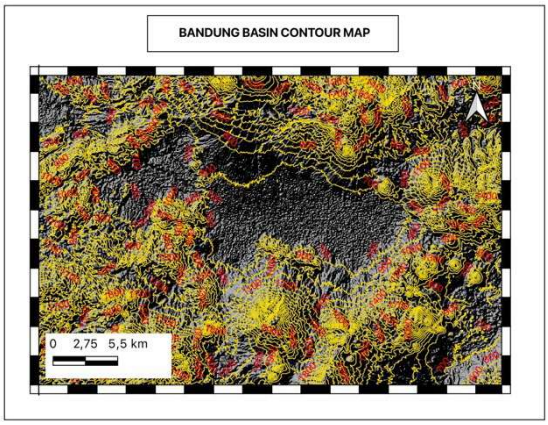

Figure 1. Bandung Basin Contour Map

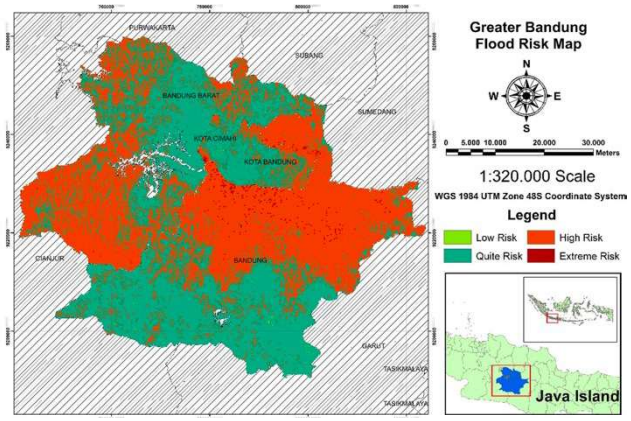

Figure 2. Bandung Flood Risk Map (Source: Agustina et al., 2023)

Results and Discussion

Bandung is located in a basin known as Bandung Basin surrounded by an active volcanic area of Mount Tangkuban Perahu. Bandung consists of two types of area, city and regency and both of these areas experienced same type of disaster which is flood. It is known that flood has occurred from a long time ago and most of it is caused by wet season. Nowadays, the cause of flood has become more complex due to the increase of population which leads to negative impact to the environment. However, topography is one of the parameters that needs to be studied about its impact to flood disasters. Bandung

is dominated by flood susceptibility on the high-risk scale in their lowland area means that the flat area in the center of the basin with the highland area surrounding has caused prolonged flood (Moe et al., 2018).

Observing the area of Kota Bandung and Bandung as shown in **Figure 2**, northern area tends to have lower risk of flood than the southern area. The northern part of Bandung has slightly higher elevation area although it is included as a dense urban area. Flood may take place in the northern part of Bandung but the frequency is not as high as the southern part. Southern part of Bandung is known as the area of Bandung Regency that has a fairly dense urban area in combination with how diverse the elevation of land that makes irregular shape of slope that increase the risk and duration of flood (Agustina et al., 2023). Dense urban area generates a bad drainage system and hard management of environmental system which supposedly act as water absorbing storing process when it is time for wet season. As far as we know about how water flows from high area to low area, water from rain will most likely to converge at the lowest point which is the center to southern part of Bandung. In addition, there are possibilities of flood coming from river that overflows knowing that Bandung Regency is crossed by the path of the longest river in West Java, Citarum River.

It is clearly obvious that topography in Bandung plays a huge role in how flood flows in majority of area in Bandung, although it is not severely significant but there is a difference between the northern part that include the area of Bandung city has lower flood susceptibility than southern part that include the area of Bandung city. This result is supported by the data from BPS-Statistic that shows number of flood disaster in 2 years, 2018 and 2019 as shown in table below.

Table 1. Number of flood disaster (Source: BPS Statistic Indonesia)

Location	Number of flood disaster	
	2018	2019
Bandung City (North)	59	60
Bandung Regency (South)	54	50

This result leads to the need of flood control and management both by the government and the people itself. The government is the one that could take bigger actions; therefore, it needs to be highlighted that the process of flood management is started by the government itself and has to have the impact for the community in order to produce real action from the citizen. The process of flood management started from analyzing the first cause of flood and could be done by maintaining it. For example, maintaining drainage system and slum area with such a dense populist and improvement of river dimension and maintaining its cleanse from garbage (Setiadi et al., 2023).

In conclusion, area in with disadvantages such as dense populate with being in the middle of the lowest point of a basin makes a high risk of flood susceptibility and needs a great care of its management. The area itself also causes increase the difficulty of flood management process so it has to be the main focus point of Bandung's government. Flood has too many disadvantages when it comes to it risks so it is better to prevent it from happening.

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BPS Statistic Indonesia.

Improving and Enhancing Education of Yunnan Province

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Purpose and Background

Yunnan is a province characterized by its border location, mountainous terrain, and diverse ethnic composition. Due to historical and geographical reasons, the province's economic development lags behind, and widespread rural poverty has led to 2.6 million impoverished students in compulsory education. Significant disparities exist in economic and educational levels among regions and ethnic groups, with school dropouts and withdrawals being common, particularly among girls in impoverished areas.This paper uses Lijiang Huaping High School for Girls, founded by Zhang Guimei, as a case study to analyze the strengths, issues, and challenges of education in Yunnan's poverty-stricken areas. It also proposes innovative policy recommendations to support the sustainable development of education and the promotion of digital education in Yunnan.

Materials and Methods

Documentary research and case analysis.

Results and Discussion

Zhang Guimei integrates the concept of moral education into every aspect of teaching, consistently promoting quality education and dedicating herself to cultivating well-rounded socialist builders and successors. When the school faced difficulties, she not only relied on the strength of party member teachers but also actively sought support from local party organizations. Through close cooperation with the government, schools, families, and society, she created better learning conditions for the students. However, due to its remote location in the mountains, the school faced challenges such as a shortage of teachers and a lack of educational resources.

Table 1 Statistics of teachers and students in Yunnan Province in 2022

Type of education	Number of schools	Number of students enrolled (10,000 people)	Number of full-time teachers (10,000 people)	Student-teacher ratio
Total	33955	1061.86	62.83	-
General high school	641	105.29	7.64	1:13.78
Ordinary undergraduate	-	-	3.1	1:24.04
Vocational college	-	-	1.5	1:34.41

Additionally, local traditional views were deeply entrenched, and girls' right to education was not guaranteed. Families were more inclined to educate boys, leading to many girls dropping out or missing out on education altogether. Furthermore, students in poverty-stricken mountainous areas generally had weak basic knowledge, lacked effective study methods, and were unmotivated to learn.

To improve education in Yunnan, the following measures can be considered: first, promote gender equality in education by establishing scholarships, conducting educational awareness campaigns, offering career planning activities, and collaborating with enterprises to provide employment opportunities, thereby increasing female participation in education; second, implement the Western China Program to strengthen teacher training and provide living allowances; third, promote sustainable education development by increasing investment in educational infrastructure and resources; and fourth, develop digital education by utilizing online courses, virtual laboratories, and artificial intelligence technology to offer diverse learning resources and reduce the education gap between urban and rural areas.

The implementation of these comprehensive measures will help narrow the education gap between urban and rural areas, providing students in Yunnan's remote mountainous regions with more equitable and high-quality educational opportunities, thereby improving education in Yunnan.

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EXPLORING STUDENTS' VISUOSPATIAL THINKING SKILLS THROUGH MOLECULAR GEOMETRY SKETCHES

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Purpose and Background

Chemistry involves a lot of visual information. Such as the use of molecular models and representation of chemical processes using diagrams and tables. External representations and visualizations serve as valuable tools for making the microscopic aspects of chemistry more tangible and understandable (Gilbert, 2009; Dickmann, 2019). Reasoning with visual information requires a skill known as visuospatial ability (Wu, 2003). Many studies have shown that visuospatial abilities positively affect chemistry learning outcomes (Harle, 2011).

In practice, however, teachers often assume that students possess strong visuospatial skills, leading to this ability being overlooked in the learning process (Rau, 2015). Despite this assumption, many learning difficulty arise from students' lack of visuospatial abilities, such as struggles with creating and interpreting chemical representations or using them to explain other concepts (Wu, 2003; Rau, 2015). Therefore, Understanding students' visuospatial thinking is crucial for identifying appropriate learning strategies to ensure effective teaching in the future.

This study aims to investigate students' visuospatial abilities. To achieve this, the activity of sketching molecular structures was utilized as a means to explore their visuospatial thinking. Drawing serves as an external representation, which is an integral part of the representation process. Drawing also allows students to assess their evolving understanding of a scientific model (Stieff, 2020). The molecular geometry sketches created by students during the learning process provided insight into their understanding of molecular geometry concepts.

Materials and Methods: TIMES NEW ROMAN, 11 POINTS BOLD

The study employed a descriptive qualitative approach. The participants in this study included 74 prospective chemistry teacher students from chemistry education program. A convenience sampling technique was used. Data was collected from all participants using a worksheet containing instructions for drawing molecular geometric sketches. Data analysis was conducted through interpretation and categorization of the students sketch based on visuospatial skill (Visualization, Translation, Symetry Plane & Representation).

Activity 1. Draw a sketch of the molecular geometry of the following molecules based on known XRD experimental data (bond angles and lengths) below.

SF_6 Length bond S-F = 1,58 Å Bond angle = 90°

Figure 1. Learning activity instructions: drawing molecular geometry

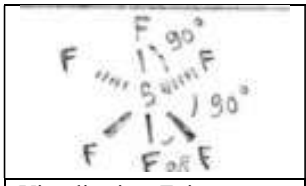
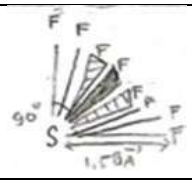
The data was collected during general chemistry courses with a total of 4 credit hours. In the activity, students were asked to draw molecular sketches based on XRD experimental data, such as angles and bond lengths. Students were provided with a protractor to measure the accuracy of the angles in their sketches.

Results and Discussion

Based on Kozma's (2005) representational competence, one of the visuospatial abilities is to produce representations that express understanding of entities and the underlying chemical processes. In this research, molecule's sketches made by students based on macroscopic representations (Experiment data) and submicroscopic representation (3D Visualization) are used as a tool to reveal visuospatial abilities. Student sketches provide information related to the visuospatial reasoning that students use in producing representations (molecular geometry sketches) based on other representations of the same entity (experimental data and 3D visualizations). The students' sketches show various results, as shown in Table 1. The interpretation of these sketches is based on visuospatial indicator

criteria needed for understanding the concept of molecular geometry, including visualization, symmetry planes, representation, and translation. In the context of molecular geometry learning, visualization is the ability to mentally picturing the geometric shape of a molecule and representing it in an external form. Translation is the ability to interpret 3D features of molecular geometry (Dash-wedge cue) into a 2D image. Symmetry plane is the ability to recognize the geometric features of a molecule and its arrangement in a plane. Representation is the ability to represent molecular geometry accurately (Carlisle, 2015).

Table 1. Example of coding of student molecular sketch images based on XRD experiment data (angles and bond lengths).

			
Visualization: Exist Translation 3D: Exist Symetry plane: Correct Representation: Correct for 3D representation	Visualization: Exist Translation 3D: Exist Symetry plane: Inorrect Representation: Incorrect for 3D representation	Visualization: Exist Translation 3D: No Exist Symetry plane: Correct Representation: Correct for 2D representation	Visualization: Exist Translation 3D: No Exist Symetry plane: Incorrect Representation: Incorrect for 2D representation

The sketch analysis results reveal several patterns in students' molecular geometry sketches. For the visualization ability indicator, overall students (n=74) were able to depict molecular geometry in their sketches, although the shapes varied. Regarding the translation ability indicator, 29 students incorporated 3D representation features in their sketches, but 9 of them misunderstood the meaning of these features. Meanwhile, 45 students did not include 3D representation features in their sketches. For the symmetry plane indicator, 68 students correctly positioned the atomic arrangement within the molecular plane, while 6 students made errors in placing the atomic arrangement within its plane. For the representation indicator, 41 students made correct representations of atomic angles and planes and 33 students made incorrect representations of atomic angles and planes.

Conclusion

The results show that most students have difficulty in the translation indicator, spesifically in translating 3D features into their sketches. This indicates that students lack understanding of the meaning of 3D features in the image. Additionally, in the representation indicator, there are still many students who show images that are inaccurate in terms of angles and symmetry planes of the image. This suggests the potential benefits of incorporating visuospatial training into learning, as spatial abilities are dynamic and can be enhanced through targeted interventions and training (Harle, 2011).

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Using Microcontroller in STEM Project to Develop Computational Thinking Skills

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Purpose and Background

The rapid advancement of technology necessitates equipping learners with essential 21st-century skills, including computational thinking (CT). CT is a problem-solving process involving decomposition, pattern recognition, abstraction, and algorithm design (Wing, 2006). These skills enable learners to approach complex problems systematically, making CT a cornerstone of modern education. Research by Brennan and Resnick (2012) and Grover and Pea (2013) highlights the critical role of CT in fostering logical reasoning, innovation, and adaptability in a technology-driven world. Internationally, the Organization for Economic Co-operation and Development (OECD) underscores the importance of CT by incorporating it into the PISA 2025 framework, emphasizing its relevance in digital literacy and problem-solving in scientific contexts (OECD, 2023). In Thailand, however, PISA assessments reveal significant gaps in students' computational skills, calling for innovative educational interventions.

STEM education (Science, Technology, Engineering, Mathematics) has emerged as a powerful approach for addressing these challenges. By integrating interdisciplinary knowledge and hands-on activities, STEM fosters problem-solving and creativity. Project-based learning (PBL), a cornerstone of STEM education, enables students to engage deeply with real-world challenges, making learning relevant and practical (Krajcik & Shin, 2015).

Microcontrollers, such as Arduino Uno R3, are cost-effective and accessible tools that can bring STEM projects to life. They allow students to design, build, and program devices that address real-world problems, enhancing engagement and reinforcing computational thinking skills (Banzi & Shiloh, 2015). This study explores the effectiveness of using microcontroller in STEM projects to develop CT skills and investigates students' attitudes toward this innovative approach to learning.

Materials and Methods

The study adopts a structured three-phase approach based on the PBL framework:

1. Foundation Phase: Students revisit fundamental concepts in science, technology, engineering, and mathematics relevant to their projects. This phase ensures a strong knowledge base, aligning with recommendations from Weintrop et al. (2016).
2. Skill Development Phase: Students receive hands-on training in using Arduino microcontroller, focusing on programming, algorithm design, and integrating sensors. This phase fosters computational thinking through practical engagement, following Shute, Sun, and Asbell-Clarke (2017).
3. Project Execution Phase: Students collaboratively design and develop projects addressing real-world challenges. Examples include building automated systems or IoT devices, emphasizing the engineering design process (Slough & Milam, 2013).

Data collection methods include:

- Pre-and post-tests to measure computational thinking skills, covering dimensions such as decomposition, abstraction, and algorithmic thinking (Dagiene & Stupuriene, 2016).
- Attitudinal surveys evaluating students' emotional, cognitive, and behavioral engagement with microcontroller-based learning, following frameworks by Eagly and Chaiken (2007).

Results and Discussion

The integration of microcontroller into STEM projects is expected to significantly enhance students' computational thinking abilities. The use of tools like Arduino enables learners to break down complex problems, design algorithms, and iteratively test solutions, fostering a deeper understanding of CT concepts (Grover & Pea, 2013). Additionally, hands-on learning with microcontroller encourages creativity, innovation, and problem-solving in an engaging and practical environment (Lin et al., 2020).

Preliminary studies indicate that microcontroller-based projects also positively influence students' attitudes toward STEM learning. By linking abstract concepts to tangible outcomes, these projects make learning more accessible and relatable, increasing student motivation and confidence (Taneja & Ahluwalia, 2020). Moreover, collaborative PBL activities enhance teamwork, communication, and critical thinking, preparing students for the interdisciplinary demands of future careers (Yadav, 2020).

This research contributes to the growing body of evidence supporting the use of technology-enhanced learning strategies in STEM education. It demonstrates that integrating microcontroller into classroom activities can bridge the gap between theoretical knowledge and practical application, empowering students to tackle the challenges of the digital age.

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Wavelength Wars: An Educational Card Game for Teaching Electromagnetic and Seismic Waves to Grade 7 Learners

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Purpose and Background

In many developing countries, numerous students struggle to develop the necessary conceptual understanding required for solving physics problems. Additionally, students often face motivation challenges and negative attitudes towards physics, viewing it as an abstract subject with little practical application. Traditional methods, which often focus on memorizing formulas and manipulating equations without fostering a deep understanding of physical concepts, exacerbate these issues (Ogunleye, 2014; Elby, 2013).

To address these challenges, it is essential for teachers to employ a variety of pedagogical techniques that promote active student participation and engagement. The increasing popularity of Game-Based Learning (GBL) presents an innovative approach to enhance science education. By incorporating games into the classroom, educators can create interactive and enjoyable learning experiences that facilitate student understanding and motivation. Studies have shown that students who engage in game-based learning exhibit higher levels of interest, retention, and problem-solving skills compared to those taught through traditional methods.

The researcher developed an educational card game as a supplementary instructional material for teaching the selected science topic to Grade 7 students and evaluated its effectiveness. The specific goal was to create a card game aligned with the content of the chosen topic, "Waves as Carriers of Energy," which emerged from a pre-survey conducted by the researcher.

Materials and Methods

The researchers employed a quantitative method to evaluate the numerical results of the provided assessment. This involved assessing the ratings given by science teachers toward the developed card game, the scores obtained by students during the pretest and posttest, and the ratings given by students toward the developed card game, as well as the students' perception of the card game. An ADDIE model (Molenda, 2003) was used for the gathering the data up from the formulation of the game down to the implementation and evaluation process. An adopted research instruments were used for the validity and acceptability of the developed card game.

Results and Discussion

The level of validity of the educational card game can be considered highly valid. The overall mean scores and the predominant "Strongly Agree" interpretations support the conclusion that the game is effective, well-received, and meets its educational objectives successfully. The minor areas for improvement noted by the expert graphic designers suggest that while the game is already strong, there is room for further enhancement to achieve an even higher level of validity. The level of readability, based on a Flesch Reading Ease score of 72.7 and a 7th-grade educational level, is classified as "fairly easy to read". This infers that the texts are accessible and comprehensible to middle school students (7th graders) and potentially to a broader audience, making it suitable for its intended educational purpose.

The findings from the study indicate that the Educational Card Game developed to address misconceptions about waves has proven highly effective, valid, and well-received among students. Significant improvements in post-test scores demonstrate the game's success in enhancing learning outcomes, while high mean scores and positive feedback underscore its validity and effectiveness in achieving educational objectives. Moreover, the game's readability, assessed as accessible to middle

school students, ensures broad comprehension and engagement. Student feedback further highlights the game's acceptability, with strong ratings for enjoyment, ease of understanding, and perceived usefulness, affirming its role as a successful educational tool.

Figure 1

Wavelength Wars: The developed Card Game

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STEM-Integrated Place-Based Learning: an Approach to Improve Students' Problem-Solving Abilities to Support SDGs

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Purpose and Background

Problem-solving skills are essential abilities that encompass a broad range of cognitive functions and play a crucial role in various fields, especially in education and science. In the dynamic landscape of education, problem-solving is considered a key competency that students must possess (Banawi et al., 2024; Choudhar et al., 2022). The 21st century has had a significant impact, including the rapid advancements in science and technology. Access to information is virtually unlimited, making it easier to obtain, but the validity of this information is often uncertain. As a result, students are required to master skills that enable them to address these challenges, including problem-solving abilities that demand higher-order thinking skills such as critical thinking, discussion, decision-making, and scientific reasoning, all of which are essential for solving contemporary issues (Banawi et al., 2024; Sarathy, 2018; Sukri, A., Rizka, M. A., Purwanti, E., Ramdiah, S., & Lukitasari, 2022; Yılmaz-özcan & Tabak, 2019). In line with this, the term "sustainable" refers to the concept of human life in harmony with the limitations of nature, maintaining a balance in three main dimensions: social, economic, and environmental (Novidsa et al., 2020) The application of the SDGs in education has led to the concept of Education for Sustainable Development (ESD), which aims to develop individuals' competencies to empower themselves, reflect on their actions, and consider social, cultural, and economic aspects both now and in the future, as well as their environmental impacts from local and global perspectives (Rieckmann, 2017). ESD equips students with the knowledge, skills, values, and attitudes necessary to process information, make decisions, and take responsible actions for the environment, economic sustainability, and social justice for both current and future generations. This approach to education, which emphasizes the application of knowledge, skills, values, and attitudes, also aligns with the competencies needed in the 21st century.

Educational literature shows that Place-Based Education (PBE) is used in various academic fields for diverse purposes, such as community-focused education, environmental education, and bio-regional education. While PBE is rooted in environmental education, it differs from traditional ecological education approaches. This is because PBE researchers focus not only on the natural environment but also on the social environment (Smith, 2007). In Place-Based Education (PBE), the teaching and learning process can take various forms—ranging from formal to informal, from simple lessons to comprehensive PBE programs, and from personal and family activities outside the classroom to classroom-based activities. All of these offer benefits that can positively impact students, educators, and the community (Elbaz, 2023). This approach also encourages students to produce knowledge rather than consume it. In other words, students not only learn by "consuming" knowledge, but also by designing, proposing solutions, and developing procedures to solve real-world ecological problems (McInerney et al., 2011). One form of learning that results in solutions within the curriculum is STEM, which can be applied to PBE. This aligns with the views of previous researchers who have stated that the STEM and PBL learning models can serve as effective approaches for PBE (Elbaz, 2023). Therefore, this study will integrate the PBE model with STEM, resulting in the research title "STEM-Integrated Place-Based Learning: An Approach to Improve Students' Problem-Solving Abilities to Support SDGs.

Materials and Methods

This study employs a quantitative descriptive research design to illustrate the use of place-based learning. This learning approach aims to enhance students' competencies in developing solution-oriented thinking regarding issues in their local environment. This approach addresses the gap between the theory students have learned and its practical application in real life, fostering a greater impact on their surroundings (Kurniawan, 2020). The learning process follows the steps outlined by OECD (2024) which focuses on place-based education, To measure students' problem-solving competencies, the indicators developed by Chabibah *et al* (2019) are used, Each item in the statement will be measured using a 4-point Likert scale, consisting of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The highest score, 4 points, is assigned to Strongly Agree, while the lowest score, 1 point. These indicators are used to describe how students can apply their understanding to address environmental issues occurring in their local area. Given that problem-solving skills are one of the essential competencies that students must possess, the use of place-based learning with a STEM-PBL approach encourages students to be aware of the issues in their surrounding environment, critically evaluate potential solutions, and actively engage in solution-oriented activities to address local environmental problems.

Results and Discussion

Essentially, problem-solving skills are one of the competencies that students must possess. According to previous studies, problem-solving skills are crucial in the context of 21st-century skills (Makiyah et al., 2021). The results from prior research revealed improvements in students' problem-solving skills. The indicators measured in the study focused on student's ability to identify local environmental issues, formulate relevant strategies to address these issues, implement these strategies as steps toward the proposed solutions, and verify whether the solutions effectively solved the identified problems. The research data indicates that, based on the indicators assessed, students showed a high average score both before and after the treatment. Therefore, place-based learning integrated with STEM can enhance students' problem-solving skills. The overall average improvement in scores can be seen below.

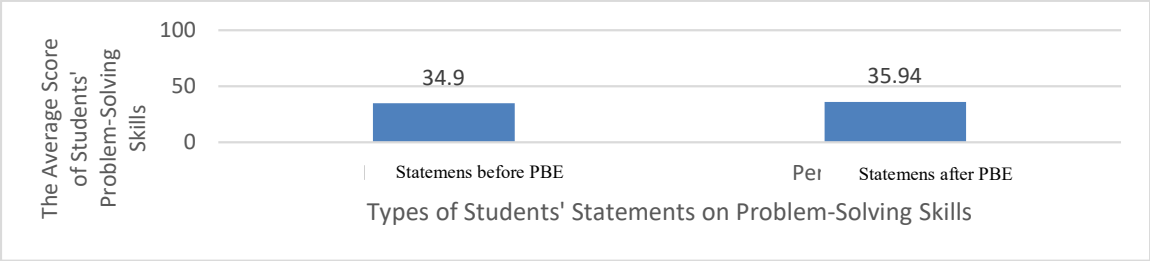

Figure 1. The Average Score of Students' Problem-Solving Skills

Based on Figure 1, it was found that students' problem-solving skills improved from 34.9 before the intervention to 35.94 after the intervention, as measured by scores. Although the increase seems small, place-based learning has provided a stimulus for students to engage in problem-solving when addressing real-world issues. This is because the problems presented are related to the student's local environment, making them more attuned to the issues around them. By approaching problems close to the students' context, it has a positive impact on their engagement. Previous studies on place-based learning indicate that this approach influences students' understanding and skills in applying knowledge to real-life situations (Soucy et al., 2024). Problem-solving skills are among the essential competencies that students need to acquire, as they allow students to apply their knowledge in real-life contexts.

Place-based learning essentially emphasizes real-world problems that are encountered in the student's learning environment. Throughout this process, students engage in a series of activities aimed at addressing issues in their immediate surroundings. Since learning can take place anywhere, place-based learning facilitates such activities. When implemented, place-based learning has the potential to enhance students' knowledge and sense of responsibility. Previous studies have shown that place-based learning significantly improves students' knowledge, attitudes, and responsible behaviors (Adeyemi, 2023). Therefore, with the improvement of students' knowledge, attitudes, and responsibility through place-based learning, it is expected to also enhance their environmental problem-solving skills. This is particularly relevant as environmental issues are common challenges faced by students (Surakusumah, 2019)

The results of the study showed an increase in students' problem-solving skills before (34.9) and after (35.94) the implementation of place-based learning. This improvement is attributed to the student's active involvement in the learning process. This aligns with Burner's assertion that learning becomes more meaningful when students discover concepts on their own (Widodo, 2021). In place-based learning, students are encouraged to identify and solve the problems they will investigate. This approach is designed to stimulate students to develop their problem-solving skills. Given that problem-solving is one of the key competencies in 21st-century skills that students must acquire (Bernie & Charles, 2009).

Students' environmental problem-solving skills refer to their ability to actively contribute to addressing environmental issues. These skills were measured using a questionnaire, which focused on four key indicators: 1) formulating the problem; 2) formulating strategies; 3) implementing the strategies; and 4) verifying the solution. These four indicators are based on the instrument developed by Chabibah et al (2019)

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Development of Collaborative Problem Solving Competency of Eighth Graders through Problem-Based Learning

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Purpose and Background

This research aimed to develop **Collaborative Problem-Solving (CPS)** competency among Grade 8 students through **Problem-Based Learning (PBL)** in an online learning environment via Microsoft Teams during one academic semester. The study assessed five CPS competency indicators 1) Identifying perspectives, knowledge, and abilities of group members. 2) Understanding problems, tasks, constraints, and appropriate solutions. 3) Communicating effectively within the group during collaboration. 4) Monitoring group progress and evaluating task success. 5) Providing feedback and adjusting roles to fit the situation.

Online learning posed challenges, such as limited communication and collaboration due to students' unfamiliarity with group members. From the literature, PBL combined with collaborative learning is an effective approach for developing CPS competencies (Chirathonphakdi, 2011). However, earlier studies lacked specific guidelines for improving individual CPS indicators, particularly in online contexts. This study addressed these gaps by identifying effective practices for implementing PBL to enhance CPS competency in rapidly changing learning environments (Office of the Education Council, 2007)

Materials and Method

The study utilized the **Kemmis and McTaggart (1998)** action research framework, involving four steps: Planning, Action, Observation, and Reflection. Three cycles were conducted based on learning plans covering topics such as fossil fuels, renewable energy, and geological changes.

Data Collection Tools

1. **CPS Observation Rubrics**: Assessed behavior across five indicators.
2. **Learning Activity Sheets**: Captured problem-solving behaviors.
3. **Self-Assessment Forms**: Evaluated communication and monitoring behaviors.
4. **Teacher Reflection Journals**: Documented student behaviors and teaching practices

Data Collection

Students participated in activities for each cycle and completed self-assessment forms to reflect on the five CPS behaviors. Researchers gathered data using observation rubrics and learning activity sheets to identify areas of improvement and challenges.

Data Analysis

1. Individual CPS Competency Analysis: Students were categorized into three levels (high, moderate, and needs improvement) based on their scores.
2. Behavioral Indicator Analysis: Average scores for each indicator were presented using bar charts and radar graphs to evaluate improvements and persistent challenges.
3. Good Practice Identification: Thematic analysis of teacher reflection journals and research findings was conducted to develop effective teaching strategies for each cycle.

Result and Discussion

The CPS behavior assessment revealed three areas where students performed well

1. Understanding problems, tasks, constraints, and appropriate solutions.
2. Communicating within the group during collaboration through explanation, negotiation, reasoning, or argumentation to achieve effective solutions.
3. Monitoring group progress and evaluating task success.

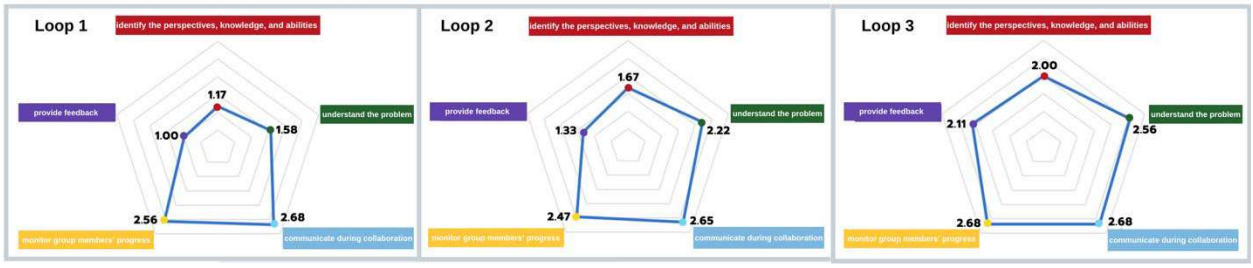

Figure 1 The average scores of the entire class for each behavioral indicator of collaborative problem-solving competency.

These results found that real-world and socially relevant problems increase students' interest and engagement. Similarly, Cholsin, Kijkuakul, and Chuachuad Chaiyasith (2018) showed that multimedia and relatable scenarios effectively stimulate students' interest. However, unlike these studies, this research found limited improvement in two areas:

1. Identifying perspectives, knowledge, and abilities of group members.
2. Providing feedback and adjusting roles based on situational needs.

The lack of progress in these areas may stem from students' unfamiliarity with new group members in the second cycle, as relationships require time to develop.

Good Practices Identified

1. Scenario-Based Questions: Encouraged understanding by highlighting similarities and differences between problems, aligning with findings by Tayom et al. (2017).
2. Collaborative Competitions: Motivated students to share perspectives, enhancing problem-solving comprehension (Pawang & Chookampeng, 2020).
3. Work Plans: Enabled students to monitor tasks and address challenges systematically, as supported by Nettratsamee et al. (2019)

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The plan for improving and strengthening Education in Henan province

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Purpose and background

Henan Province, located in central and eastern China, is one of the birthplaces of Chinese civilization with a rich history and cultural heritage. Geographically, it serves as an important transportation and economic hub, with Zhengzhou's "Airport Economy Zone" playing a key role in high-end manufacturing and international trade. While Henan has made progress in inheriting and innovating its traditional culture, challenges remain. These include a limited range of cultural transmission models and an uneven distribution of education resources, especially in rural areas, leading to a significant urban-rural education gap. This paper aims to propose innovative cultural development strategies to enhance Henan's cultural soft power by studying the value and transmission mode of Henan's traditional culture, and to explore ways to optimise the allocation of educational resources, providing feasible countermeasures to promote the balanced development of urban and rural education in Henan Province.

Materials and methods

This study adopted documentary research method and case analysis method to analyze the policy documents, academic research and statistical data of Henan traditional culture and urban and rural education. Examples included Shaolin Kung Fu, Kaifeng chrysanthemum, village wisdom education and other successful practices and related festivals. The research also drew on the cultural protection experience of Japan and South Korea, as well as the practice of intelligent education in the balanced development of urban and rural education in Zhejiang.

Results and discussion

In terms of innovative cultural development strategies, the study found that Henan traditional culture, such as Shaolin Kung Fu and Yu Opera, is of great value in the field of enriching cultural connotation and dissemination (Xu, 2019). Digitalization and cultural and creative industries are the direction to promote the development of innovation, such as Shaolin Kung Fu to expand international influence through short videos, digital media and other forms (Henan Daily, 2021). Cultural heritage should be integrated with modern media platforms to expand its reach and appeal, while avoiding the harm that over-commercialization could cause to its intrinsic values (Zhang, 2018, p. 45; Li, 2017, pp. 132-134). The promotion of Shaolin Kung Fu serves as a successful example, demonstrating the synergy of cultural content and economic benefits through cultural tourism and the development of innovative cultural products (Chen, 2021, p. 87).

In terms of optimal allocation of educational resources, there are problems such as shortage of high-quality teachers and low coverage rate of smart education in rural areas of Henan province (Blue Book of Education Development of China, 2022). Distance education has begun to achieve results, but the

coverage and efficiency need to be improved (ref: General Office of the Ministry of Education, 2009). In terms of policy, we should increase investment in urban and rural education, improve the treatment of rural teachers, and promote smart education technology (The Central Committee of the Communist Party of China and The State Council, 2021). Zhejiang's "community school" model provides a reference for integrating educational resources (Zhejiang Provincial Department of Education, 2021). Combined with successful cases, this study provides practical reference for cultural innovation and education optimization in Henan province.

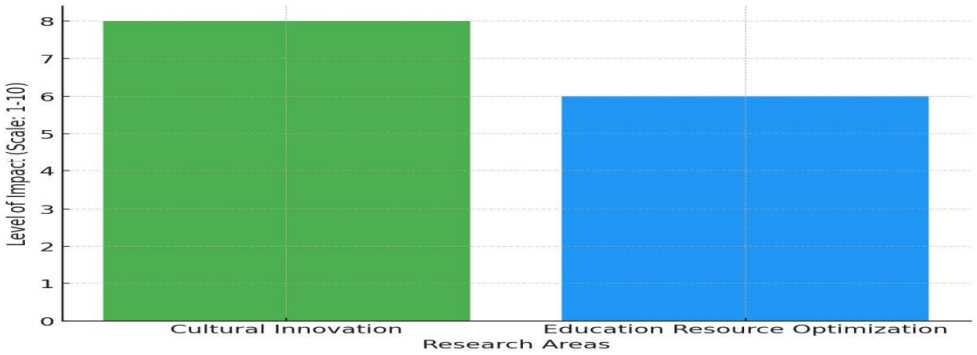

Figure 1: Impact of Cultural Innovation & Education Resource Optimization

Figure 1 represents the impact of "Cultural Innovation" and "Education Resource Optimization" in the context of the research you provided. The values are hypothetical, with cultural innovation having a slightly higher impact compared to education resource optimization.

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Development of a Creative Thinking and Innovation Course Focusing on Design Thinking Process and the Bio-Circular-Green (BCG) economy Model for upper secondary school students in science schools

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Purpose and Background

This research aimed to develop a creativity and innovation course emphasizing the design thinking process and the Bio-Circular-Green (BCG) economy Model for upper secondary school students in science schools. The study was designed to foster learning aligned with the development of 21st-century skills. A qualitative research approach was primarily employed, supplemented by quantitative data to enhance the credibility and reliability of the findings. The frameworks of the design thinking process and the BCG Model were thoroughly analyzed to establish effective curriculum development guidelines. Furthermore, the study evaluated learning outcomes; creativity and innovation skills, and students' attitudes toward the developed course. The sample consisted of 24 Grade 10 students from Science High School, purposively selected based on their willingness to participate. The findings revealed that the integration of the design thinking process and the BCG Model included essential components applicable to curriculum development: understanding learners (Empathy), defining problems (Define), brainstorming ideas (Ideate), developing prototypes (Prototype), and testing solutions (Test). These components were adapted to align with the principles of the BCG Model. The developed curriculum effectively enhanced students' creative thinking, innovation skills, problem-solving abilities, self-awareness in their work, and flexibility in teamwork. Students expressed high levels of interest and satisfaction with the course, highlighting the benefits of learning through the design thinking process and BCG Model approaches. Moreover, they provided constructive suggestions for improving the teaching and learning processes. The outcomes of this research can contribute to the advancement of innovative education and provide a model for curriculum development in science schools and other educational institutions in the future.

Materials and Methods

Data were collected both qualitatively and quantitatively. The qualitative data included in-depth interviews with teachers and students, reflections on their experiences with the course, and classroom observations to record learning behaviors, teamwork, and problem-solving activities. Quantitative data were gathered through questionnaires to measure creativity, innovation skills, problem-solving abilities, and students' satisfaction with the course. The qualitative data were analyzed using an inductive procedure, while the quantitative data were used to support the findings and enhance the credibility of the study.

Results and Discussion

The findings indicate that the integration of the design thinking process and the Bio-Circular-Green (BCG) Model was pivotal in the development of an effective curriculum. This integration comprised essential components suitable for curriculum development, including understanding learners (Empathy), defining problems (Define), brainstorming ideas (Ideate), developing prototypes (Prototype), and testing solutions (Test), all of which were adapted to align with the principles of the BCG Model. Moreover, the developed curriculum significantly enhanced students' creative thinking,

innovation skills, problem-solving capabilities, self-awareness in their work, and adaptability in teamwork. The students exhibited high levels of engagement and satisfaction with the course and provided valuable suggestions for refining the teaching and learning processes. These findings offer a framework for the advancement of curriculum development in science schools and other educational institutions in the future.

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“Brilliant as a Child, Not Necessarily Outstanding as an Adult?” — An Exploration of Self-Identity in Gifted Adults

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Purpose and Background

Gifted education has become a vital focus in modern systems due to globalization and technological advancements, increasing the demand for highly capable, creative, or gifted students. However, despite their academic success, gifted students often face psychological and social challenges, such as self-identity conflicts and emotional struggles. Taiwan current focus on academic achievement overlooks the psychological aspects of gifted education, potentially hindering holistic development. This study explores the self-identity of adult gifted individuals through an online form response. It aims to address gaps in Taiwan’s research on the emotional dimensions of gifted education and offer strategies for schools and families to support holistic development and mental well-being.

Materials and Methods

This study was conducted using online form responses, with participants who had previously been identified as mathematically and scientifically gifted students. Drawing from previous research on the self- identity of Black gifted individuals and related studies on the self-identity of gifted students in Taiwan. The research team identified five representative "keywords" for gifted students to understand how they perceive and select terms that represent giftedness. The study also developed eighteen research questions to investigate various aspects of self-identity among gifted students. The types of identity examined include gifted identity, family identity, peer identity, talent identity, and social identity. The team will compile the collected data and analyze the feedback for further insights.

Results and Discussion

This study included six participants, three current graduate students, two medical interns, and one elementary school teacher. Table 1 presents the number of responses for gifted identity keywords selected by the participants from the five keywords representing gifted identity. Among these, "creativity" was the most frequently chosen. Based on the participants' responses, gifted individuals generally demonstrate a certain level of self-identity. Family, peers, and societal relationships all play significant roles in shaping their identity, indicating that the self-identity of gifted adults is influenced by multiple factors. Gifted individuals exhibit diversity in defining their personal traits. Therefore, education should emphasize holistic development and provide opportunities for them to excel beyond academic domains, helping them better adapt to both academic and life challenges.

keywords	Curiosity	Creativity	Sensitivity	Perfectionism	Talent
number of times	5	3	3	2	1

Table1 The number of responses for gifted identity keywords

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Assessing Scientific Literacy and Preferences of Pre-Service Science Teachers Across Physics, Chemistry, Biology, and Earth Science

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Purpose and Background:
Scientific literacy refers to the ability to apply knowledge of science concepts and processes to make informed decisions and engage effectively with the world around us. For pre-service science teachers, possessing a strong foundation in scientific literacy is essential not only for their own understanding but also for their ability to teach science concepts effectively in the classroom. Evidently,teachers with strong subject matter knowledge have a more profound effect on student achievement in science (Baumert et al., 2010). Likewise, teachers' enthusiasm and preference for specific science subjects can influence how they approach teaching those subjects, thereby affecting their students' interest and success in those fields (Gorard & See, 2015). Therefore, this research can help in developing targeted teacher preparation programs that enhance the overall quality of science education.

Materials and Methods:
This study involved 37 pre-service science teachers of Pangasinan State University Lingayen Campus. This is a descriptive and comparative research design aiming to determine the preferences and scientific literacy of pre-service teachers across four disciplines. The research utilized a 40-item multiple choice questions consisting 10 item per science discpline (Biology, Chemistry, Earth Science, and Physics) which administered via Google Form. The collected data were analyzed using both descriptive and inferential statistiscal methods to assess the comparison of the participants' overall performance across disciplines and whether there were significant differences in the scientific literacy levels using one-way ANOVA (Analysis of Variance).

Results and Discussions:
1. Participants' Preference Across Biology, Chemistry, Earth Science and Physics

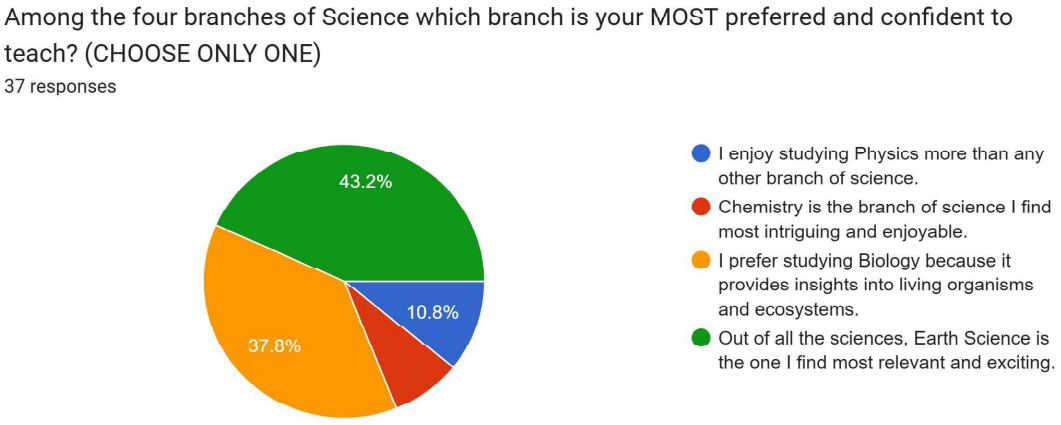

Figure 1: Participants' Preference Across Four Disciplines

The results indicate a significant variation in preferences across the four branches of science. These findings suggest that **Earth Science** is the most preferred branch with 43.2% response while **Chemistry** is the least preferred branch with only 8.1% favoring it.

2. Participant's Scientific Literacy Across Biology, Chemistry, Earth Science and Physics

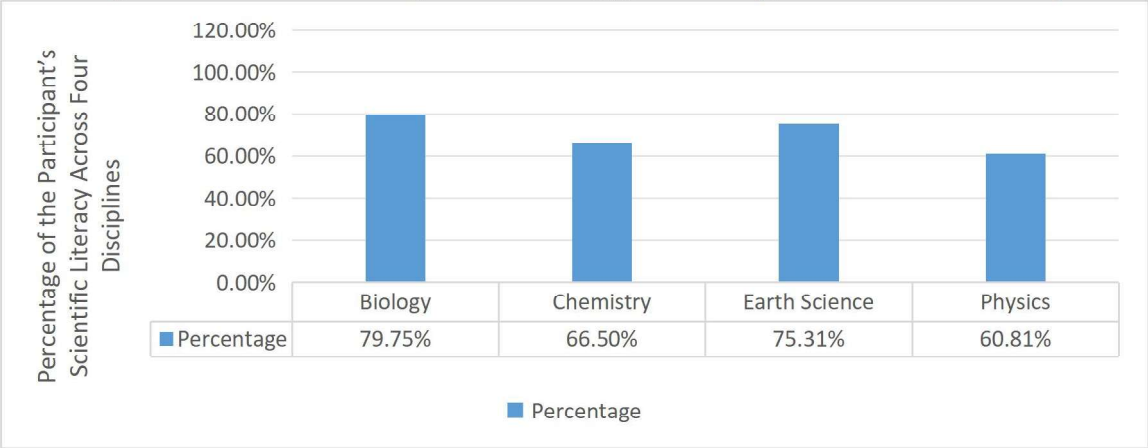

Figure 2: Participants' Scientific Literacy Level Across Four Disciplines

The results showed that pre-service teachers exhibits the highest scientific literacy in **Biology,** with an average score of 79.5% while **Physics** has the lowest average literacy score , at 60.81 %.

	EARTH SCIENCE	PHYSICS	BIOLOGY	CHEMISTRY
Scores per Item	29	27	35	25
	35	34	35	26
	23	27	31	24
	33	29	24	32
	32	20	37	26
	15	6	27	17
	34	32	28	13
	15	15	34	31
	36	18	19	28
	27	17	25	24
Average Mean	29.6	22.5	30.0	24.6
	Overall Mean:			26.675

$$SSB = n \times \sum (\text{Group Mean} - \text{Overall Mean})^2$$

$$SSB = 10 \times [(29.6 - 29.675)^2 + (22.5 - 26.675)^2 + (30.0 - 26.675)^2 + (24.6 - 26.765)^2] = 418.589$$

$$MSB = \frac{SSB}{df_{between}}$$

$$MSB = \frac{418.589}{3} = 139.53$$

$$SSW_{total} = SSW_{Earth\ Science} + SSW_{Physics} + SSW_{Biology} + SSW_{Chemistry}$$

$$SSW = 569.2 + 690.5 + 311 + 301.6 = 1872.5$$

$$Df_{within} = 37 - 4 = 33$$

$$MSW = \frac{SSW}{df_{within}}$$

$$MSW = \frac{1872.5}{33} = 56.72$$

$$F = \frac{MSB}{MSW} = \frac{139.53}{56.72} = 2.46$$

Table 3: Data Analysis using one-way ANOVA test

The results indicate a significant difference in the scientific literacy levels and subject preferences of pre-service science teachers across the disciplines of Biology, Chemistry, Earth Science, and Physics. The findings reveal that while the majority of pre-service teachers demonstrated a strong preference for Earth Science, their highest levels of scientific literacy were observed in Biology. This suggests that personal preference does not necessarily align with proficiency or literacy, highlighting the need for targeted strategies to balance interest and competence across all scientific disciplines.

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Improve and Enhancing Education in Shandong

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Purpose and Background

The purpose of this conference is to examine the current status of Shandong's education system and analyze its strengths, existing problems, and recent policy achievements to improve education equity, quality, and prevention. By discussing issues such as college entrance examination pressure, the urban-rural education gap, and insufficient higher education resources, the conference will focus on core issues and strive to find practical solutions and innovative solutions to further improve the overall level of education in Shandong Province. The ultimate goal is to fully understand the current status of Shandong's education development and promote its development in a more balanced and equitable direction.

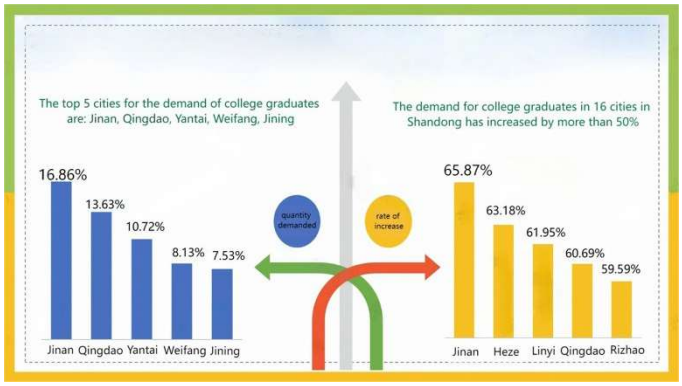

Figure1: Demand of university graduates in Shandong in 2021

Materials and Methods

This report rigorously analyzes the current condition and challenges of Shandong's education system utilizing various resources and approaches. The materials consist of policy documents and official reports related to Shandong's education reform, statistical data on urban and rural educational resources and academic performance, vocational education employment statistics, higher education resource distribution, and insights from teachers, students, and parents obtained through interviews and questionnaires. At the same time, combined with existing literature and education cases in other provinces, it provides a comparative perspective for Shandong. In terms of methods, qualitative analysis is used to evaluate policy effectiveness and extract interview themes, and quantitative analysis of education resource distribution and project implementation results, supplemented by field observations of urban and rural schools, vocational colleges, and universities, is used to gain an in-depth understanding of policy implementation and the teaching environment. In addition, the research results have been feedbacked and verified by educators and policy experts to ensure the accuracy and practicality of the analysis. Through these methods, this study strives to fully reveal the strengths and weaknesses of Shandong's education system and provide a basis for future policy improvements

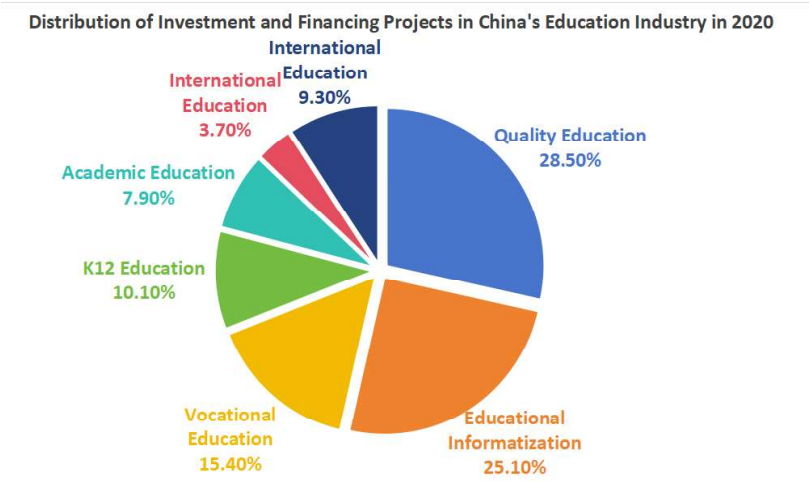

Figure2: Distribution of financing matters in China's education industry in 2020

Results and Discussion

Shandong's education system has advanced in vocational and rural education but still faces challenges like college entrance exam pressure, urban-rural resource gaps, limited higher education capacity, and traditional teaching methods. The intense focus on exams restricts creativity and increases student stress (Chen & Zhang, 2019), highlighting the need for diverse evaluation methods like portfolios (Liu et al., 2022). Despite efforts like the "Digital Education Resource Sharing Plan" (China Education Daily, 2021), urban-rural disparities persist, which could be addressed through the "Smart Education Platform" and rural teacher incentives (Xie et al., 2023). Higher education struggles with limited funding and fewer research opportunities compared to regions like Beijing (Xu & Li, 2021). Vocational education, while industry-aligned, suffers from societal bias, requiring better promotion and expanded pathways to higher education (Wang & Fang, 2020; Gao et al., 2022). Traditional teaching methods also limit creativity, calling for more training in innovative practices through programs like the "National Teacher Training Program" (Ministry of Education, 2021). Addressing these issues could help Shandong create a more inclusive and innovative education system for future growth.

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ASSOCIATING SCIENCE TEACHING APPROACHES TO STUDENTS' MOTIVATION: AN ANALYSIS

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Purpose and Background

The Philippines faces significant challenges in fostering student enthusiasm for science education, which is crucial for sustaining high performance both academically and in future career choices. Recent results from the Programme for International Student Assessment (PISA) indicate that the Philippines consistently ranks among the lowest in science literacy, highlighting a pressing need for innovative approaches to engage students in this vital subject area.

This study explored the association between teaching styles and student motivation in the context of science education.the study investigated the level of practice of five teaching approaches in science classrooms used by senior high school teachers of Grade 11 students in the selected schools of Pangasinan I. This study also sought to understand the perceived level of motivation among selected Grade 11 students of Pangasinan 1 in the three area of basic psychological needs: autonomy, competence, and relatedness. The primary goal of the study was to come up with a model for a better lesson plan that combines the best science teaching methods with students' motivational needs. This would make the teaching and learning experience more productive and, in the end, lead to better student outcomes and academic performance for Grade 11 students in Pangasinan I.

Materials and Method

This study utilized the descriptive – survey method of research. A stratified random sampling method was used to250 science students enrolled in the last quarter of SY 2023-2024 in senior high-level science classes from 10 public schools of Pangasinan I.

Results and Discussion

The level of practice of science teachers on various teaching styles is the degree of usage of five teaching approaches used in science classrooms of Grade 11 HUMSS and STEM students taking the science core subject of the DepEd curriculum. The teaching approaches are categorized into six main styles where Eclectic Approach (Combination of two or more approaches) was the most frequently observed dominant teaching style, with 45.60% of students reporting observing this approach. Among five teaching approaches where the study focuses, **Direct instruction,** is the highest with **16.80%** of students reporting observing this approach, followed by Collaborative teaching 12.40%, Reflective Teaching 11.60%, Inquiry-based Teaching 10.40%, and Personalized Teaching 3.20%. Also, it was recorded that students acquired various motivations from their science teachers. The most frequently reported motivation is relatedness, with 30.80% of students indicating that they feel motivated by their teacher's efforts to create a sense of connection and belonging in the classroom and the least is Competency with 15.20%.

Interestingly, a significant portion of students (34.00%) report acquiring multiple motivations from their science teachers. The most common combination of motivations is relatedness and autonomy, with 18.40% of students indicating that they feel motivated by both factors.

These analyses can provide valuable insights into how motivation can be fostered in the science classroom and what strategies and techniques teachers can use to promote student motivation and engagement.

Table 1: *Results of Correspondence Analysis between Teaching Approaches and Areas of Motivation*

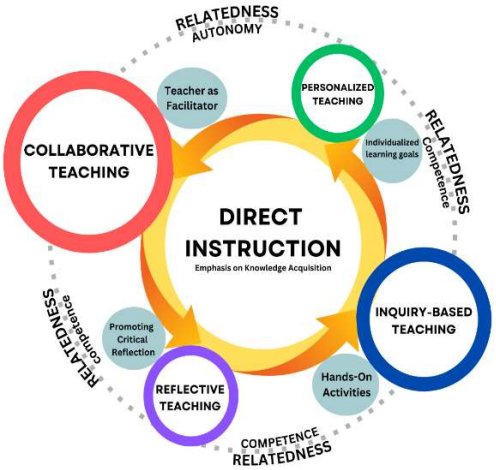
Dimensions	Sing Value	Inertia	Chi Square	Sig	Portion of Inertia	
					Accounted for	Cumulative
1	.212	.045			.463	.463
2	.176	.031			.318	.781
3	.128	.016			.169	.950
4	.056	.003			.033	.983
5	.041	.002			.017	1.000
Total		.097	21.944	.639	1.000	1.000

Table 1 shows the results of a Correspondence Analysis, which is a statistical technique used to explore the relationship between two categorical variables. In this case, the two variables are Teaching Approaches and Area of Motivation. Dimensions 1, 2, and 3, which are Direct Instruction, Inquiry-based Teaching, and Collaborative Teaching, respectively, have a relatively strong association with students' motivation. They explain a large proportion of the inertia (46.3%, 31.8%, and 16.9%, respectively, for a total of 95.0%). This suggests that certain teaching approaches may be more effective at promoting motivation.

Summary

Students reported high levels of motivation in relatedness which suggests that most students are highly motivated if they feel a sense of connection and belongingness. These findings contradict previous research suggesting that competence is the primary driver of student motivation in learning science. The results have implications for science education, emphasizing the need for teachers to adopt student-centered approaches that foster a sense of belonging and ownership.

This study proposes an enhanced model of learning plan that illustrates the complex interplay between the three psychological needs of students in learning and teaching approaches in science. It provides a framework for teachers to design learning experiences that cater to students' psychological needs, enhancing motivation and learning outcomes. The objective of the proposed model is the following:*1)To Enhance Student Motivation;2)To Contextualize Teaching Strategies; 3) To Foster Competence through Inquiry-Based Learning; 4)To Implement the Guided Discovery Model; 5) To Promote Reflective Teaching Practices; 6) To Equip Teachers with Flexible Teaching Tools; & 7) To Evaluate the Impact on Student Learning.*



Model for Enhanced Instructional Plan

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IMPROVING AND ENHANCING EDUCATION OF YUXI CITY

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Purpose and Background

This report investigates the current state of education in Yuxi City, Yunnan Province, China. Known for its agriculture, industry, and tourism, the city has made great strides in education, including the establishment of a comprehensive system from pre-school to higher education. Equity in education is emphasized, and bilingual education and education for ethnic minorities are specifically supported. In addition, reforms such as informatization and the integration of vocational education with local industries aim to align educational output with the needs of the regional economy. However, challenges such as the rural-urban education gap, limited higher education resources and outdated vocational training content remain, so there is a need for targeted innovation policies to improve the existing problems.

Figure1： Yuxi Normal university

Materials and Methods

This study uses a literature analysis and case study approach, which draws on an evaluation of the education system in Yuxi City, highlighting its strengths, limitations, and main challenges. The study also proposes three innovative policy recommendations – urban-rural education resource sharing, industry-education integration bases, and bilingual cultural curriculum plans – to address these challenges and further improve educational outcomes.

Results and Discussion

The implementation of the nine-year compulsory education policy has greatly improved equity, urban schools have provided students with superior educational facilities and resources, and adopted modern tools such as electronic whiteboards and distance education to improve the quality of teaching and vocational education is also getting better and better in schools and agriculture Cooperation with

local industries such as tobacco, employability enhancement through internships, bilingual curriculum and cultural inclusion provide education opportunities for ethnic minority students. Although Yuxi's education development has been getting better and better in recent years, Yuxi's education still faces many difficulties and challenges, such as better facilities in urban schools than rural schools, and insufficient infrastructure and teachers in rural schools In the process of teaching vocational courses, outdated content and limited practical opportunities hinder relevance to modern industry needs Yuxi City has a limited number of institutions and fields of study, prompting students to migrate to other regions, resulting in a brain drain The implementation of innovative policies helps to create more inclusiveness A more efficient and quality education system to support the city's economic and social development goals

Conclusion

Yuxi education has made remarkable achievements in the popularization of compulsory education and the development of vocational education, but it still needs to solve the problems of uneven distribution of resources and insufficient higher education.

Figure2：Multi-ethnic culture

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DiversID: AI-Powered E-KYC for the Visually Impaired

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Purpose and Background

According to the Financial Services Authority (OJK), there are 92 million adults in Indonesia who do not have access to financial services, making it the highest among ASEAN countries. Of this number, 80% or around 17 million are people with disabilities who have not yet received financial services. Although OJK Regulation No. 22 of 2023 on consumer and community protection requires financial service providers to provide access to financial inclusion for people with disabilities, the challenges are still great. In Indonesia, blind people are the most common type of disability (64%) that requires special attention in meeting financial inclusion needs. People with disabilities often have low financial literacy and face barriers to accessing financial services due to limited infrastructure and financial system rules. The National Strategy for Financial Inclusion (SNKI) also calls for the transformation of the social assistance payment system from cash to non-cash to improve financial inclusion.

Materials and Methods

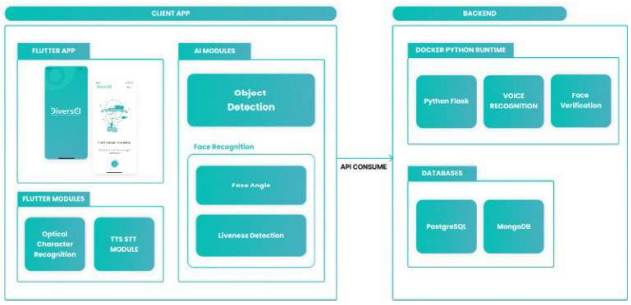

Figure 1. System Design

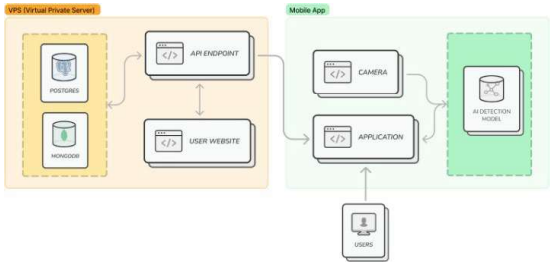

Figure 2. Deployment Diagram

DiversID's implementation architecture integrates multiple sophisticated technologies, carefully selected and optimized to create an accessible and secure financial inclusion platform. The system's technical foundation is built upon three primary components: voice recognition, computer vision, and user interface systems, all working in harmony to deliver a seamless experience for visually impaired users.

At the core of DiversID's authentication system lies the voice recognition module, powered by Resemblyzer technology. This advanced system enables secure biometric verification through unique voiceprint analysis, offering a natural and accessible method of user identification. The voice recognition system operates continuously throughout the user journey, from initial registration to transaction authorization, ensuring consistent security without compromising accessibility.

The computer vision component leverages YOLOv10 architecture for precise document analysis and verification. This module handles the critical task of processing Indonesian KTP documents, incorporating real-time position guidance and automated data extraction. The system has been specifically optimized to handle variations in lighting conditions and document positioning, essential features for visually impaired users who may struggle with traditional document capture methods.

Results and Discussion

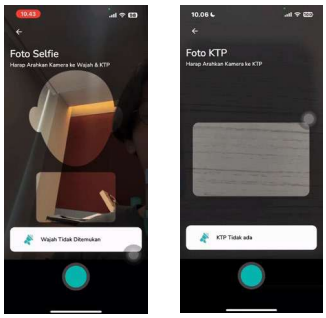

Figure 3. Final working system

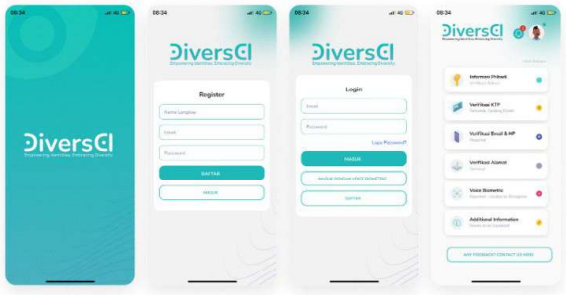

Figure 4. Final working system

The implementation of DiversID's core features has demonstrated significant effectiveness in enabling financial accessibility for visually impaired users. Through comprehensive testing and user trials, each key component has shown promising results in addressing financial inclusion challenges. The results and discussions can be categorized into several key areas:

1. *Advanced Accessibility Mode's*: The voice-guided interface has transformed how visually impaired users interact with financial services. The system successfully guides users through the KYC process with clear audio instructions and real-time feedback. User testing has shown that individuals can now complete their verification processes independently, marking a significant shift from traditional methods that required assistance from bank staff. The interface's support for screen readers and braille keyboards has further enhanced its accessibility across different user preferences.
2. *Smart Virtual Assistant*: It has proven particularly effective in document handling and verification. The system's object detection capabilities accurately guide users in positioning their KTP cards, while the OCR technology efficiently extracts relevant information from the documents. Real-time audio feedback during document capture has significantly improved the user experience, reducing failed attempts and streamlining the verification process. The assistant's ability to provide clear, step-by-step guidance has made complex verification procedures accessible to visually impaired users.
3. *Digital Voice Signature*: It has successfully combined security with accessibility. The voice biometric system accurately verifies user identities while maintaining ease of use. Testing has shown that users can confidently complete transactions using voice authentication, with the system performing reliably even in environments with moderate background noise. This feature has been particularly important in enabling secure, independent financial transactions for visually impaired users.

While these results are promising, implementation has revealed areas for future enhancement, particularly in handling regional accents and improving performance in areas with limited internet connectivity. Despite these challenges, DiversID's core features have proven effective in bridging the financial inclusion gap for visually impaired users while maintaining necessary security and regulatory compliance standards. The platform's success in combining accessibility with security demonstrates its potential as a transformative solution for financial inclusion.

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Role of Modern Educational Leadership: A Case Study on a Refugee School in Thailand

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Purpose and Background

Modern educational leadership approaches such as collective leadership and Agile leadership approaches have been increasingly adopted in educational management. As contemporary education systems encounter increasing complexity with technological advancement and other disruptions such as COVID-19 pandemic, modern leadership becomes more relevant and essential in education. Leadership is not the responsibility of a single individual, but a collective process involving teachers, administrators, and even students. Effective leadership and management play a critical role in quality education, particularly in refugee contexts where there are several limitations of resources and restrictions. The refugees in Thailand originally fled from Myanmar due to the civil war and they belong to the ethnic Karenni or red Karen. The refugee children have no access to Thai public schools and thus, they establish and administer their own school in the refugee camp to provide education to their children. They often face challenges with teacher retention issues due to low payment and limited resources. This research aims to examine the leadership approaches applied by refugee schools and how these approaches impact their sustainability and quality education.

Materials and Methods:

A qualitative method was employed in this research to examine the role of the leadership and human resources management approaches by focusing on a Karenni refugee school located in Thailand as a case study. The semi-structured interview was conducted with ten participants including school administrators, teachers, and parents to gain insights into the perceived benefits and challenges of educational leadership and human resources management approaches in the refugee school. Thematic analysis was used to identify recurring themes and patterns in the qualitative data.

Results and Discussion

The result of this study indicates that modern leadership approaches such as collective leadership and Agile leadership approaches have made a significant positive impact on the respective refugee school in Thailand. The interviewees responded that the modern leadership approaches foster collaboration, student-centric, continuous improvement decentralized or shared decision-making, and shared ownership. These modern approaches allow teachers and students involved in leadership roles and decision-making processes which increase teacher satisfaction, and commitment, reduce turnover rates, less dependency on principals or leaders, felt more empowered when they have a voice in shaping policies and curricula. They foster innovation, inclusivity, adaptability, and flexibility responding to changing educational requirements or unexpected disruptions. Teachers can take on leadership roles while teaching in the classroom, be involved in curriculum design, and improve instructional practices. Contribute to their professional growth. Agile leadership fosters student agency as they are more involved in decision-making processes. They feel more empowered in their learning and increase their motivation and engagement in learning.

The modern leadership approaches contribute to sustainability and quality education as they encourage creative problem-solving, adaptability, and collaboration among educators and students, and

leverage AI and machine learning to adapt to learners' needs. Despite the COVID-19 pandemic and conflict disruption and amid different challenges such as limited resources, the refugee school managed to sustain its educational services. Allowing teachers to participate in the decision-making process increased their motivation, capacity and ownership which contribute to school sustainability. Teachers collaborated with relevant stakeholders including parents to identify the needs and solutions to improve the quality of education. The modern educational leadership fosters collaboration and partnership between institutions, educators, and students globally which enhances the quality of education. However, in some situations, these modern leadership approaches caused delays in the decision-making process as it took more time to include all the relevant team members. Another challenge is ineffective implementation when the team resists change. Some staff or teachers were accustomed to traditional centralized approaches. Agile leadership principles can be challenging in large institutions and could increase the burden for staff as they have to take on more responsibilities or be involved more in the decision-making process.

All in all, the modern leadership approaches transforming education in refugee school in Thailand through fostering a culture of collaboration, decentralized decision-making, adaptability, and innovation. By applying modern leadership approaches, educators can empower students not only to improve their academics but also to navigate a rapid-changing world.

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Counselling room in faculty of Education for student at National university of Laos

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Propose and background

The world is rapidly evolving in areas like socio-economics, modern science, and technology, which have improved life's comfort and created new opportunities for personal growth. However, alongside these advancements, individuals must navigate various challenges to meet both personal and societal needs. For some, the inability to fulfill these needs can lead to obstacles, contributing to problematic behaviors such as crime, violence, and other social issues.

Counselling is regarded as an important and necessary work to help and encourage young students, college students, and staff to understand themselves and develop their full potential during the period of studying or working at the National University, including individuals who need counselling.

A counselling service is essential for supporting and encouraging young students, university students, and staff in understanding themselves and realizing their full potential throughout their time at the National University. It is also crucial for any individuals in need for a counselling service.

Material and method

Our counseling will vary depending on the client's specific problem situation, as each solution will be different, such as:

- friend, family or relationship issues
- low mood or are losing interest in things you enjoy
- stress or anxiety about your work or anything else

First, we need to find a way for the client to share their current problem. If the problem is within our ability to solve, we will provide principled and easy-to-understand advice to the client.

Result and discussion

- Can officially open for consultation services
- Successfully completed counseling for 52 people, 39 women and 13 men. The main problems were depression, panic, stress and anxiety.
- The main causes are being discriminated against and not daring to enter society (people with AIDS), family problems, being bullied, and sexually harassed in schools.
- (Services, 2024)Consulee : 55% students, 45% general teenagers

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Research on Gender Issues Arising from Media and SDGs

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Purpose and Background

This study examines the relationship between media-induced gender issues and the implementation of Sustainable Development Goals (SDGs), particularly Goal 5 (Gender Equality) and Goal 10 (Reduced Inequalities). Media significantly shapes societal perceptions through platforms such as social media, newspapers, and television. However, it often perpetuates harmful gender stereotypes, hindering progress toward achieving SDGs. In Vietnam, where internet usage is rapidly increasing, the media's growing influence on public perceptions and behaviors is evident. While media can serve as a platform for advocacy, it often reinforces outdated gender norms through advertisements, online content, and entertainment programs. This study aims to analyze the specific impacts of media on gender inequality and propose strategies such as media literacy education and improved content creation to align media practices with SDG objectives.

Materials and Methods

This research adopts a quantitative approach to analyze both the negative and positive impacts of media on gender issues and their relevance to SDGs. It focuses on two major activities: (1) analyzing media content, including advertisements, television programs, and social media, to identify gender stereotypes, and (2) conducting surveys among university students to understand how media influences gender perceptions and social inequalities.

The study surveyed 200 university students with 2 part. Part 1 is about background of using social media and part two is a 10-item, closed-ended questionnaire based on the works of Mohorjy et al. (2015), Wegs et al. (2016), and Baird et al. (2019). The questionnaire employed a 5-point Likert scale to measure perceptions across two key aspects: understanding of gender concepts and discrimination, recognition of psychological gender stereotyping by media. Additionally, two open-ended questions explored students' views on the relationship between media and SDGs, particularly Goals 5 and 10.

Results and Discussion

Students' Background on Internet and Social Media Usage

The results highlight the extensive use of internet and social media among students. Most respondents reported spending over 10 hours daily online, with Facebook, TikTok, and YouTube being the most frequently used platforms. This reflects a general trend among youth, where media consumption significantly shapes their perceptions. Furthermore, 60% of responses identified TV shows, movies, advertisements, and podcasts as the most influential sources of gender-highlighted content.

Table 1: The results of students' background in Internet and social media

		Gender (Count)	
		Male	Female
Hours using internet per day	Less than 5	6	9
	From 5 to 10	19	16
	From 10 to 15	27	29
	15 hours or more	19	25
Social media used the most	Facebook	72	83
	Instagram	53	98
	Twitter	30	43
	TikTok	98	132
	YouTube	67	99
	Others	21	13

Media Representation of Gender Roles

The study underscores the pivotal role of media in shaping gender roles, often reinforcing stereotypes that hinder gender equality. Advertisements frequently depict women in domestic roles, such as homemakers, while men are portrayed in professional or leadership positions, perpetuating outdated societal norms. Similarly, TV shows, movies, and podcasts contribute to these stereotypes, with male characters dominating as protagonists and female characters often relegated to supporting roles. However, exceptions like Wonder Woman highlight the potential for media to challenge and reshape these norms by presenting empowered female leads.

Through media analysis and student surveys, this study emphasizes the need for critical media consumption and strategies that promote gender-sensitive content, aligning media practices with the goals of reducing inequalities and fostering gender equality.

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IMPLEMENTING OPEN INNOVATION TO ADDRESS SMES CHALLENGES

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Purpose and Background

Small and Medium Enterprises (SMEs) are an important sector in the Indonesian economy, contributing 61,07% of GDP and 97% of total workforce in 2021 (Kementerian Koperasi dan Usaha Kecil Menengah [Kemenkop UKM], 2022). A significant proportion of Indonesian SMEs operate within the agro-industrial sector, which contributed 13,7% to GDP and provided employment for around 40 million people in 2023 (Badan Pusat Statistika [BPS], 2023). However, despite their substantial contribution, SMEs face numerous challenges, especially in a rapidly evolving global and digital economy. These challenges include market competition, infrastructure deficits, limited technological adoption, and regional economic integration pressures (Raji et al., 2024). Additional constraints such as limited resources, difficulty accessing markets, and stagnant product development further hinder their growth and competitiveness (Agrawal et al., 2024).

Given these challenges, innovation, particularly open innovation (OI), emerges as a critical enabler for SMEs to sustain their competitiveness. OI has become an effective solution for addressing various challenges faced by SMEs, particularly in product development, process efficiency, and competitiveness. This research explores the application of OI in SMEs involved in P4S Trikarsa Inti Rakyat in Depok and evaluates how OI can help overcome their challenges. The study also examines OI practices in Indonesian SMEs more broadly and proposes a comprehensive framework for effective OI implementation.

Materials and Methods

The research method includes in-depth interviews with SME owners and observations of OI practices at the research site. The population for this research consists of SMEs under the guidance of the Pusat Pelatihan Pertanian Pedesaan Swadaya (P4S) Trikarsa Inti Rakyat Depok. Interviews were conducted to uncover challenges faced by SMEs, their approaches to innovation, benefits and obstacles they experience. Data were also collected from comparative studies of OI practices in SMEs across Indonesia. This approach provides insight into the various methods that SMEs use to harness open innovation and their effectiveness.

The research employs the "Innovation Communities" model developed by Adamides & Karacapidibilis (2017). Table 1 summarizes the main operational capabilities and related structured questions used in the study

Table 1. Operational Capabilities (Adamides & Karacapidilis, 2017) and Structured Questions

Main Operational Capabilities	Structured Questions
Collaboration	Collaboration with other SMEs, suppliers, large companies, government
Knowledge exploration	Learning from other SMEs; seminar, workshop, communities
	Simple market research; online questionnaires, consumer interviews, observing social media trends
	Cooperation with universities; research and development of new products or services
	Keep up with technology
Knowledge exploitation	Development of new products or services
	Enhancing business processes with technology
	Improving market strategy
	Product standardization
	Creating a learning culture
Social integration	SMEs' engagement with the community
Decision making	Decision making process production, partners, sales
Intellectual property management	Identification of intellectual property
	Trade secrecy
Knowledge retention	Documentation
	Sharing session
	Cross training
	Lesson learned meeting

Results and Discussion

Based on a qualitative descriptive approach, this research explores the implementation of open innovation (OI) to address challenges faced by SMEs under the guidance of P4S Trikarsa Inti Rakyat Depok. The research investigates various aspects of OI practices, such as collaboration with external partners, knowledge exploration, and innovation-driven decision making, using data collected through in-depth interviews and observations. By examining these practices, the research aims to propose a comprehensive framework for OI implementation, enabling SMEs to overcome resource limitations, enhance product development, and improve their competitiveness in the dynamic agro-industrial sector.

- **Challenges Faced by SMEs**: SMEs at P4S Trikarsa Inti Rakyat face several challenges, including limited resources, restricted access to technology, and a lack of training and understanding about the significance of innovation. These issues significantly hinder their competitiveness and growth potential.
- **Benefits of Open Innovation**: Implementing OI allows SMEs to partner with suppliers, training institutions, and government agencies. For instance, Ibu Dwi from Bunatha Yoghurt developed innovative fruit-flavored yoghurt jam through collaboration with local farmers and training partners. This example underscores the importance of building partnerships and leveraging external knowledge.
- **OI Practices at the Research Site**: The SMEs in the research site exhibited improvements in product development and production efficiency through strategic partnerships. Ibu Evi from D'mpink, for example, collaborated with the Department of Trade for training and product development. These practices contributed to enhanced innovation and process improvements.
- **OI Practices in Indonesian SMEs**: Broadly, OI has been adopted by various sectors within Indonesian SMEs, with approaches ranging from university partnerships to collaboration with larger corporations. Despite this, the main challenges remain: insufficient understanding of OI concepts and a lack of resources to implement them effectively.
- **Framework for OI Implementation**: Based on the findings, a proposed framework for enhancing OI adoption among SMEs is presented. This framework includes steps such as providing targeted training programs, facilitating resource access, and creating strong networks between SMEs and external partners. The framework aims to help SMEs navigate the complexities of OI and leverage it to drive innovation and growth.

CONCLUSION

The research indicates that open innovation holds significant potential to address the challenges faced by SMEs, particularly in the context of limited resources and market competition. By fostering partnerships and incorporating external knowledge, SMEs can achieve better product development, improve operational efficiency, and strengthen their market position. The proposed framework provides a structured approach for implementing OI practices and serves as a guide for SMEs seeking to enhance their innovation capabilities.

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Improving and Enhancing Education of the Beibei District

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Purpose and Background

Beibei District is one of the nine main urban areas in Chongqing, China, known as the "landscape garden city". Under the high attention of the municipal government, education in Beibei District enjoys a great reputation and the study of Beibei District is of great reference significance (Luo & Lu, 2022). Beibei District is rich in educational resources, with relatively well-developed school infrastructures and strong teachers, providing talent and intellectual support for basic education in the district. However, there are still differences in the allocation of educational resources between urban and rural areas in Beibei District and the quality of education in some remote areas is relatively backward.

Beibei District has made some achievements in vocational education and teacher training. Local enterprises have cooperated with vocational schools to participate in the development of curricula and provide internships to promote students' employability. With the support of Southwest University and other educational organizations, Beibei district regularly organizes thematic trainings to improve teachers' professionalism.

At the same time, there are several educational problems. Because of the large gap between urban and rural educational resources, students' learning opportunities are severely unequal. It is necessary to study the capitalization of educational resources and the impact of the "school district zoning" policy on residential prices (Hu, 2023). The policy of selective school zoning has led to an increase in housing prices in urban areas and exacerbated the unequal distribution of educational resources. The persistent shortage of teachers in China's rural schools, the problem of instability in the teaching force, and the loss of rural teachers because of low pay and few opportunities for development have become important issues affecting the balanced development of basic education in rural areas (Liu, Liu, & Wang, 2022).

Taking the education system of Beibei District as an example, this paper aims to analyze the current situation of education in Beibei District, explore how to solve the problem of unequal distribution of education resources between urban and rural areas through policy innovations, and propose targeted strategies to improve the equity and quality of education. For example, narrowing the gap between urban and rural education resource distribution, improving the enrollment mechanism of compulsory education stage, and optimizing the teacher mobility mechanism are all important to promote education equity and improve teaching quality.

Materials and Methods

This paper employs the literature research method and case study method, taking the education system of Beibei District as a typical case, and analysing it from multiple perspectives of resource allocation, policy implementation and social feedback. By systematically sorting out and analysing existing studies, the strengths and weaknesses of education in Beibei District are summarized to lay a theoretical foundation for proposing policy innovations.

Results and Discussion

Analysis of the current problems revealed significant disparities in the allocation of educational resources between urban and rural areas in Beibei District. E-learning is considered a leading application of digital technologies in educational systems. Following the Suggestion of Rakic et al. (2020), the establishment of the Beibei District Digital Learning Platform would facilitate the sharing of learning

resources between urban and rural areas. Schools can use the platform to share learning materials, live stream classes, and apply for after-school exchanges. Students and teachers can anonymously suggest changes to the school or education department. Parents can also use the platform to learn about school teaching and further promote home-school contact.

Regarding the way to solve the aforementioned problems, it is recommended that the enrollment policy should be combined with lottery and registration, which can effectively avoid unfair regional allocation, which is similar to the Open Enrollment system in the United States and the Catchment Area system in the United Kingdom. A lottery is first conducted, and if parents and students disagree with the outcome of the lottery, they may apply to a school of their choice in the region. The school then organizes a written test and an interview to decide whether the application is successful or not. This increases students' autonomy in choosing schools in the context of equality in education. Students can apply not only to schools with better education resources, but also to schools with less competitive pressure, which provides more opportunity in choosing a school that suits their needs.

Concerning the strategies that can be adopted, this study proposes implementation of the policy of regular rotation of teachers between urban and rural areas could enable rural students to have access to high-level teaching while at the same time providing development opportunities for rural teachers. This would help to reduce the rate of teacher wastage in rural areas and improve the stability of teaching while giving excellent teachers from urban areas the opportunity to teach for short periods of time in rural schools. Rural teachers can have the opportunity to study and exchange ideas with their counterparts in urban schools. This implementation is not only beneficial to rural students receiving a high level of teaching, but also to rural teachers improving their teaching skills.

All in all, this study has presented a multi-dimensional approach to improving educational equity in Beibei District, these policies can alleviate some of the existing education problems, they may still face risks and challenges in the process of implementation, mainly in terms of implementation costs, social acceptance and long-term effects. While the compulsory school choice system has improved the education system, it is worth discussing how to strike a balance between fairness and transparency and avoid parental dissatisfaction with this new mechanism. Teacher rotation mechanisms need to make good arrangements for teacher rotation, improve teacher selection mechanisms, and take measures to increase the motivation of teachers to rotate, as well as placing high demands on administrative resources and financial support (Huang, C. 2023). Whichever policy is implemented, the short-term results are easy to observe, but whether it can promote equity in education in the long term needs to be tracked on an ongoing basis.

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Supplements

Enhancing Scientific Imagination of Thai Secondary School Students through Collaborative Thought Experiments

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Purpose and Background

Imagination is the essential key of discovering new knowledge about natural phenomena and supporting the work of scientists from the past to the present, especially in the field of Physics (Holton, 1996). For instance, Galileo introduced the imaginative situation of a rolling ball on a U-shape track. He adjusted the track in his mind and visualized what would happen by applying the law of equal height. He claimed that motion with constant velocity requires no external force. This laid the foundation of the well-known Newton's law of motion (Salis & Frigg, 2019; Sorensen, 1998). The imagining scenario to explore concepts or draw appropriate conclusions, as mentioned above, is called thought experiment. It is one of the tools scientists uses for imagination (Stuart, 2022).

Thought experiment has four pedagogical benefits when applied in the science classroom. First, it can promote scientific conceptual understanding. Based on its process, thought experiment helps students develop scientific concepts from basic to advance following the historical evolution of science (Galili, 2007; Kösem & Özdemir, 2013). Second, it can encourage students' engagement because thought experiments impress students with imaginative situations. Students are allowed to think beyond their past and daily experiences (Gilbert & Reiner, 2000; Velentzas & Halkia, 2013a, 2013b). Third, it can introduce the culture of science to students. They will gain experiences as a member of science society (Asikainen & Hirvonen, 2014). Lastly, it can be used to probe students thinking. Thought experiments can help students express their ideas, background, beliefs and self-concepts (Blown & Bryce, 2012).

According to the literature, thought experiment practices can be more effective when conducted in a collaborative group setting where students help each other solve the current problem (Reiner & Gilbert, 2006). Working with peers, sharing ideas and improving the concepts together are evidence that thought experiments do not occur only an individual's mind but can be influenced by group processes, corresponding to Vygotsky's theory of the social construction of knowledge (Bancong & Song, 2020).

In Thailand, many science teachers report problems with students' imagination based on their teaching experiences such as a lack of scientific skills, science fundamental knowledge and collaboration. (Pruekpramool et al., 2016). Therefore, the study aims to promote students' scientific imagination through collaborative thought experiments. The research findings will benefit science teacher and teacher educators in better understanding teaching strategies to support students' imagination.

Materials and Methods

The study group consists of eleventh grade students attending the Science-Mathematics program in public schools in Bangkok, Thailand. The study group was selected through purposive sampling. The design of this pre-experimental research was a one group pretest-posttest design. The research instruments include four lesson plans in wave optics in Physics based on collaborative thought experiments instruction of Bancong and Song (2020) as experimental tools, the scientific imagination test adopted from Leopold et al. (2019), the scientific imagination questionnaire adopted from Mun et al. (2015) and the semi-structured interview adopted from Stuart (2019) as data collection tools.

Results and Discussion

In progress

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SDGs Workshop

Purpose of the SDGs workshop

SDGs (Sustainable Development Goals) are important actions to improve and set up a sustainable world. All the seventeen goals raised in the SDGs are critical and urgent issues. We should collaborate to find 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 you, 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 2111 (Satoshi MATSUI, Chiba University)

Group A		Name	University / School	Country
1	Facilitator	CHATREE FAIKHAMTA	Kasetsart University	Thailand
2	Advisor	LELY ERSASTRI ZAINUDDIN	SMAN 9 Depok	Indonesia
3	Learner	DONG JIEJUN	Mahidol University	China
4	Learner	RICKY RANQUE SALEM	University of San Carlos	Philippines
5	Learner	MINE Rintaro	Chiba Prefectural Chiba Higashi High School	Japan
6	Learner	MATSUZAKI Sakurako	Chiba Municipal Chiba High School	Japan
7	Learner	NARITA Momoka	Chiba Prefectural Funabashi High School	Japan
8	Learner	SHINGU Yoichi	Chiba University	Japan

Group B		Name	University / School	Country
1	Facilitator	UDOMLUK KOOLSRIROJ	Kasetsart University	Thailand
2	Advisor	SANTOS, CHERRY CATHLEEN TOPINIO	Regents Secondary School	Philippines
3	Learner	PANDE MADE GIOPANY	Udayana University	Indonesia
4	Learner	PIYANUCH KIEWARAM	Kasetsart University	Thailand
5	Learner	SHIMAZAKI Riku	Chiba Prefectural Chiba Higashi High School	Japan
6	Learner	TERASHITA Keisyu	Chiba Municipal Chiba High School	Japan
7	Learner	TANAKA Natsumi	Chiba University	Japan
8	Learner	ISHII Yoshihiro	Chiba University	Japan

Group C		Name	University / School	Country
1	Facilitator	WANDEE KASEMSUKPIPAT	Kasetsart University	Thailand
2	Learner	TIPARADEE VARINTORN	King Mongkut's University of Technology Thonburi (KMUTT)	Thailand
3	Learner	KHUAT THI THANH HUYEN	University of Education, Vietnam National University, Hanoi	Vietnam
4	Learner	LI XUAN	Mahidol University	China
5	Learner	YAMAZAKI Taro	Chiba Prefectural Chiba Higashi High School	Japan
6	Learner	EGAMI Yuma	Chiba Municipal Chiba High School	Japan
7	Learner	MOTOKADO Nana	Chiba University	Japan
8	Learner	SUGIYAMA Taisei	Chiba University	Japan

Group D		Name	University / School	Country
1	Facilitator	CHAKVONSA DOKPHOUT	National University of Laos	Laos
2	Facilitator	Marvin Gilberto Escobar Leiva	Chiba University	El Salvador
3	Learner	RAFIE AMANDIO FAUZAN	Universitas Indonesia	Indonesia
4	Learner	PANRUI TAN	Mahidol University	China
5	Learner	SHIMAKI Miu	Chiba Prefectural Funabashi High School	Japan
6	Learner	KATO Yuna	Chiba Municipal Chiba High School	Japan
7	Learner	KANAMARU Shuhei	Chiba University	Japan
8	Learner	ANDA Hinami	Chiba Keiai Senior High School	Japan

Group E		Name	University / School	Country
1	Facilitator	ACHMAD SAMSUDIN	Universitas Pendidikan Indonesia	Indonesia
2	Facilitator	Savira Aristi	Chiba University	Indonesia
3	Learner	PARIKESIT NURIL AZMI	Bandung Institute of Technology (ITB)	Indonesia
4	Learner	SUN NIKA	Royal University of Phnom Penh	Cambodia
5	Learner	FENG XIN	Mahidol University	China
6	Learner	MURANUSHI Moeka	Chiba Prefectural Kisarazu High School	Japan
7	Learner	ODA Salia	Chiba Municipal Chiba High School	Japan
8	Learner	SHIMOI Hiromasa	Chiba University	Japan

SDGs Workshop

Room 2111 (Satoshi MATSUI, Chiba University)

Group F		Name	University / School	Country
1	Facilitator	SOVARITTHON CHANSAENGSEE	Mahidol University	Thailand
2	Advisor	PATCHARA NUALPAN	Kasetsart University Laboratory School, Center for Educational Research and Development	Thailand
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4	Learner	CHAN,YU-CHENG	National Taiwan Normal University	Republic of China (Taiwan)
5	Learner	YANRU LI	Mahidol University	China
6	Learner	MATSUMURA Takeshi	Chiba Prefectural Kisarazu High School	Japan
7	Learner	SUGIMOTO Chiaki	Chiba Municipal Chiba High School	Japan
8	Learner	KAWASE Noh	Chiba University	Japan

Group G		Name	University / School	Country
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2	Advisor	CHARUWAN PUPANEAD	Watraikhing wittaya school	Thailand
3	Learner	THERESIA ROSELINDA PERMATA DEWI	IPB University	Indonesia
4	Learner	CHEN, JIE-TONG	National Taiwan Normal University	Republic of China
5	Learner	XIONG YANGXIANGJUN	Mahidol University	China
6	Learner	OHKOHCHI Shunpei	Chiba Prefectural Kisarazu High School	Japan
7	Learner	ABE Mikoto	Chiba University	Japan

Group H		Name	University / School	Country
1	Facilitator	DODI SUDIANA	Universitas Indonesia	Indonesia
2	Advisor	LE THAI HUNG	University of Education, Vietnam National University, Hanoi	Vietnam
3	Learner	ADINDA MELINDA CERIA AJIE	Universitas Pendidikan Indonesia	Indonesia
4	Learner	TSAO, SHUO-CHENG	National Taiwan Normal University	Taiwan
5	Learner	CHARY LYN D. DE GUZMAN	Pangasinan State University	Philippines
6	Learner	SUZUKI Yuzu	Chiba Prefectural Kisarazu High School	Japan
7	Learner	TSUBOUCHI Amane	Chiba Municipal Chiba High School	Japan
8	Learner	TANAKA Nanami	Chiba University	Japan
9	Learner	NARITA Yukari	Chiba Keiai Senior High School	Japan

Group I		Name	University / School	Country
1	Facilitator	SURAPONG RATTANAKUL	King Mongkut's University of Technology Thonburi (KMUTT)	Thailand
2	Facilitator	Fajriah Sulaiman	Chiba University	Indonesia
3	Learner	KHANSA NITISARA RAMADHANI	Universitas Indonesia	Indonesia
4	Learner	ALOUNPHET KEOVONGSY	National University of Laos	Laos
5	Learner	HIRONAKA Aya	Chiba Prefectural Kisarazu High School	Japan
6	Learner	MIYAMOTO Haruta	Chiba Municipal Chiba High School	Japan
7	Learner	SUZUKI Seigo	Azabu High School	Japan
8	Learner	KOKUBO Hina	Chiba University	Japan

SDGs Workshop

Room 2208 (Shuji SHIMONAGATA, Chiba University)

Group J		Name	University / School	Country
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2	Advisor	SARI NARULITA	SMA Negeri 1 Bandung	Indonesia
3	Learner	SHOFIYA WARDAH MAULANA	Universitas Indonesia	Indonesia
4	Learner	SARAWAN POMSUK	Chiang Mai University	Thailand
5	Learner	SASE Kaisei	Chiba Prefectural Kisarazu High School	Japan
6	Learner	AKABA Kento	Tokyo Gakugei University International Secondary School	Japan
7	Learner	HIRA Shoji	Chiba Prefectural Chosei High School	Japan
8	Learner	WATANABE Hibari	Chiba University	Japan

Group K		Name	University / School	Country
1	Facilitator	SARMIENTO VENUS MAY HORTALEZA	Pangasinan State University	Philippines
2	Advisor	AKHMAD FATONI MARKUM	High School 6, Yogyakarta (SMA Negeri 6 Yogyakarta)	Indonesia
3	Learner	DEWINA NUR HUMAIRA	IPB University	Indonesia
4	Learner	NIEN, SHIH-YU	National Taiwan Normal University	Taiwan (R.O.C.)
5	Learner	KONNO Wataru	Chiba Prefectural Kisarazu High School	Japan
6	Learner	NAGANO Sae	Chiba Municipal Chiba High School	Japan
7	Learner	KAKINUMA Yuka	Chiba University	Japan

Group L		Name	University / School	Country
1	Facilitator	Patrick Onyelukachukwu Nwaokocha	Chiba University	Nigeria
2	Advisor	LIN CHUNHAO	Taipei First Girls High School	Taiwan (R.O.C)
3	Learner	ALICIA ZALFAA JATNIKA	Bandung Institute of Technology (ITB)	Indonesia
4	Learner	RALPH RELATOR MAGUMPARA	University of San Carlos	Philippines
5	Learner	MIYAZAKI Yusuke	Chiba Municipal Chiba High School	Japan
6	Learner	MAEDA Taichi	Chiba Prefectural Kisarazu High School	Japan
7	Learner	SAKAKURA Miyu	Showa Gakuin Shuei Junior High School	Japan
8	Learner	ABE Sara	Chiba University	Japan

Group M		Name	University / School	Country
1	Facilitator	TOCH PHEAKDEY	Royal University of Phnom Penh	Cambodia
2	Advisor	AMORNRAT BOOBPACHOTE	Chulalongkorn University Demonstration Secondary School	Thailand
3	Learner	AURORA BELVA CATALINA	Bandung Institute of Technology (ITB)	Indonesia
4	Learner	FERRER WEDNESDAY NABOR	Pangasinan State University	Philippines
5	Learner	HATAKEYAMA Yuku	Chiba Prefectural Kisarazu High School	Japan
6	Learner	KIMURA Hiroto	Chiba Municipal Chiba High School	Japan
7	Learner	TAKAHASHI Junpei	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	Japan
8	Learner	UTSUMI Marika	Chiba University	Japan

Group N		Name	University / School	Country
1	Facilitator	NUR MUHAMMAD FARDA	Universitas Gadjah Mada	Indonesia
2	Advisor	KITTAPORN PUAKANOKHIRUN	Chiang Mai University Demonstration School	Thailand
3	Learner	AYASTI TIARA NURACHMAN	Bandung Institute of Technology (ITB)	Indonesia
4	Learner	USHA PIA VENTAYEN DANAO	Pangasinan State University-Lingayen Campus	Philippines
5	Learner	TAKAOKA Yuri	Chiba Prefectural Chosei High School	Japan
6	Learner	HAYASHI Waka	Chiba Municipal Chiba High School	Japan
7	Learner	KUTSUMIZU Rion	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	Japan
8	Learner	HANDA Utano	Chiba University	Japan

SDGs Workshop

Room 2208 (Shuji SHIMONAGATA, Chiba University)

Group O		Name	University / School	Country
1	Facilitator	Julia Brottman	Chiba University	Sweden
2	Advisor	MONCHAI CHOTTIDAO	Mahidol University	Thailand
3	Learner	NAILA FARIDAH HUDA WASILAH	Bandung Institute of Technology (ITB)	Indonesia
4	Learner	KATRINA PAULA C. SISON	Pangasinan State University Lingayen Campus	Philippines
5	Learner	SHITAMORI Ayuto	Chiba Prefectural Chosei High School	Japan
6	Learner	MIYAJIMA Takeru	Chiba Municipal Chiba High School	Japan
7	Learner	TAKASUGI Kanna	Chiba Meitoku High School	Japan
8	Learner	TAKADA Nana	Chiba University	Japan

Group P		Name	University / School	Country
1	Facilitator	TZU-SHAN CHENG	National Taiwan Normal University	Taiwan
2	Advisor	AANG SUHENDAR	SMA Alfa Centauri	Indonesia
3	Learner	STELLA MARISKA HANAKO	Bandung Institute of Technology (ITB)	Indonesia
4	Learner	TARNPIAM PARAVEE	Mahidol University	Thailand
5	Learner	SAITO Hiyori	Chiba Prefectural Chosei High School	Japan
6	Learner	HAMANAKA Reo	Chiba Municipal Chiba High School	Japan
7	Learner	NAGATSUBO Taiyo	Tokyo Gakugei University International Secondary School	Japan
8	Learner	MATSUDA Sho	Chiba University	Japan

Group Q		Name	University / School	Country
1	Facilitator	Victor Ibrahim Mbeya	Chiba University	Kenya
2	Advisor	KAMELIA FIKRIAH	Kornita Senior High School	Indonesia
3	Learner	MUHAMMAD ADRIAN LUBIS	Bandung Institute of Technology (ITB)	Indonesia
4	Learner	KAMONTHIP JINDAWONG	Silpakorn University	Thailand
5	Learner	SAITO Takeru	Chiba Prefectural Chosei High School	Japan
6	Learner	NOJIRI Kotaro	Chiba Municipal Chiba High School	Japan
7	Learner	NAKAMURA Nico	Tokyo Gakugei University International Secondary School	Japan
8	Learner	OGASAWARA Fuuwa	Chiba University	Japan

Group R		Name	University / School	Country
1	Facilitator	IVONNE MILICHRISTI RADJAWANE	Institut Teknologi Bandung	Indonesia
2	Learner	RAFLI YUDHA ASDANA	Bandung Institute of Technology (ITB)	Indonesia
3	Learner	MEEMAE TANYARAT	Mahidol University	Thailand
4	Learner	JIANG JIANI	Mahidol University	China
5	Learner	NAGATA Riku	Chiba Prefectural Chosei High School	Japan
6	Learner	OKUNO Haruto	Chiba Municipal Chiba High School	Japan
7	Learner	MINAMI Hiroto	Tokyo Gakugei University International Secondary School	Japan
8	Learner	WATANABE Mizuki	Chiba University	Japan

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Room 2207 (Wang Qian・Hina MORISHIGE, Chiba University)

Group S		Name	University / School	Country
1	Facilitator	ARISARA LEKSANSERN	Mahidol University	Thailand
2	Advisor	ANDREW DY	University of San Carlos - Senior High School	Philippines
3	Learner	ASEP FIRMAN NUGRAHA	IPB University	Indonesia
4	Learner	PENG LITING	Mahidol University	China
5	Learner	WAKUNO Uta	Tokyo Metropolitan High School of Science and Technology	Japan
6	Learner	FUNAKOSHI Tsukasa	Chiba Prefectural Makuhari Sogo High School	Japan
7	Learner	NAMURA Mikika	Chiba University	Japan

Group T		Name	University / School	Country
1	Facilitator	ROLANDO VELARDE OBIEDO	University of San Carlos	Philippines
2	Learner	ALIF SHIDQIE AL BANI	Bandung Institute of Technology (ITB)	Indonesia
3	Learner	CHEN, FANG-CHI	National Taiwan Normal University	Taiwan (R.O.C.)
4	Learner	YANG JUAN QI	Mahidol University	China
5	Learner	GOTO Karin	Tokyo Metropolitan High School of Science and Technology	Japan
6	Learner	KAWASHIMA Gaku	Chiba Municipal Chiba High School	Japan
7	Learner	DEDACHI Seira	Ichihara Chuo High School	Japan
8	Learner	INAZAWA Sakura	Chiba University	Japan

Group U		Name	University / School	Country
1	Facilitator	PUTU AYU ASTY SENJA PRATIWI	Udayana University	Indonesia
2	Learner	RIYADI ZAKIA SYAHRULLOH	Bandung Institute of Technology (ITB)	Indonesia
3	Learner	HE,XINWEIWEI	Mahidol University	China
4	Learner	SUWANNAKET CHUTIPON	Chulalongkorn University	Thailand
5	Learner	SHIBAYAMA Himari	Tokyo Metropolitan High School of Science and Technology	Japan
6	Learner	ONOZAWA Miyu	Chiba Prefectural Sakura High School	Japan
7	Learner	TERADA Koharu	Ichihara Chuo High School	Japan
8	Learner	YOKOYAMA Nami	Chiba University	Japan

Group V		Name	University / School	Country
1	Facilitator	POSCHANAN NIRAMITCHAINONT	MahidolUniversity	Thailand
2	Learner	PHOOM THINKANWATTHANA	Kasetsart University	Thailand
3	Learner	ANNA FELICYA	Bandung Institute of Technology (ITB)	Indonesia
4	Learner	GUO ZHIWEI	Mahidol University	China
5	Learner	SUZUKI Anri	Tokyo Metropolitan High School of Science and Technology	Japan
6	Learner	SARUTA Mako	Chiba Prefectural Sakura High School	Japan
7	Learner	SAGIUCHI Mei	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	Japan
8	Learner	YOSHIDA Mimomo	Chiba University	Japan

Group W		Name	University / School	Country
1	Facilitator	JANEJIRA ARSARKIJ	Chiang Mai University	Thailand
2	Advisor	YUSLI WARDIATNO	IPB University	Indonesia
3	Learner	ATHAR ABDURRAHMAN BAYANUDDIN	Universitas Gadjah Mada	Indonesia
4	Learner	SHI JINGJING	Mahidol University	China
5	Learner	NAKANO Kaede	Shibaura Institute of Technology Kashiwa High School	Japan
6	Learner	MITSUOKA Chinatsu	Chiba Prefectural Sakura High School	Japan
7	Learner	YOSHIDA Sakura	Chiba Keiai Senior High School	Japan
8	Learner	MARUSAWA Kazuaki	Chiba University	Japan

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Room 2207 (Wang Qian・Hina MORISHIGE, Chiba University)

Group X		Name	University / School	Country
1	Facilitator	Charmaine Gugulethu Lunga	Chiba University	Zimbabwe
2	Advisor	TITI CANDRA SUNARTI	IPB University	Indonesia
3	Learner	KHUAT HA THU	VNU University of Education	Vietnam
4	Learner	SALSABILA ZAHRANI PUTRI	Bandung Institute of Technology (ITB)	Indonesia
5	Learner	UMEZONO Sara	Chiba Prefectural Funabashi High School	Japan
6	Learner	KARIYA Yusuke	Chiba Prefectural Sosa High School	Japan
7	Learner	SATO Hano	Chiba University	Japan
8	Learner	TATSUKO Mei	Chiba Keiai Senior High School	Japan

Group Y		Name	University / School	Country
1	Facilitator	SAMIPHAK, SARA	Chulalongkorn University	Thailand
2	Facilitator	Rizvon Suleimanov	Chiba University	Tajikistan
3	Learner	HISYAM ABDUL AZIZ	Universitas Pendidikan Indonesia	Indonesia
4	Learner	MIAO SHIYUQING	Mahidol University	China
5	Learner	YAMAGUCHI Daiki	Chiba Keiai Senior High School	Japan
6	Learner	FUJIKI Hiyo	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	Japan
7	Learner	KATO Hanon	Showa Gakuin Shuei Junior High School	Japan
8	Learner	OIKAWA Yuka	Chiba University	Japan

Group Z		Name	University / School	Country
1	Facilitator	Iago Carvalho Silva	Chiba University	Brazil
2	Advisor	TANAWAN SAWATDIPHAP	Mahidol University	Thailand
3	Learner	APRILIA SARAH KRISTINA	Universitas Indonesia	Indonesia
4	Learner	SUMIATI	Universitas Pendidikan Indonesia	Indonesia
5	Learner	NAKAMURA Haruka	Chiba Keiai Senior High School	Japan
6	Learner	FUKUMOTO Yuma	Chiba Prefectural Funabashi High School	Japan
7	Learner	SHIMA Botan	Seijo Gakuen Senior High School	Japan
8	Learner	NAKAMURA Hana	Chiba University	Japan

Group AA		Name	University / School	Country
1	Facilitator	HARRIS BUDILAKSONO	IPB University	Indonesia
2	Advisor	PANCHIT LONGPRADIT	Mahidol University	Thailand
3	Learner	NITTIYA ORNWARN	King Mongkut's University of Technology Thonburi	Thailand
4	Learner	LIU WANYUE	Mahidol University	China
5	Learner	MIKI Haruka	Shibaura Institute of Technology Kashiwa High School	Japan
6	Learner	ISHII Yoshiumi	Chiba Municipal Chiba High School	Japan
7	Learner	TERAOKA Urara	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	Japan
8	Learner	YAMAGUCHI Sakura	Chiba University	Japan

Poster

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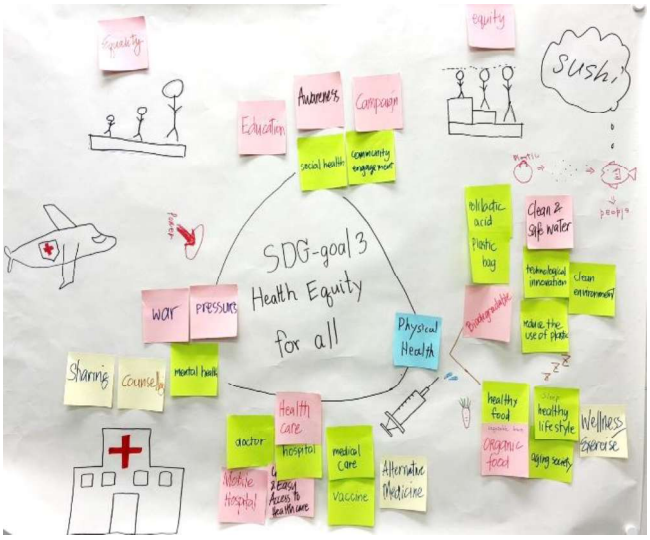

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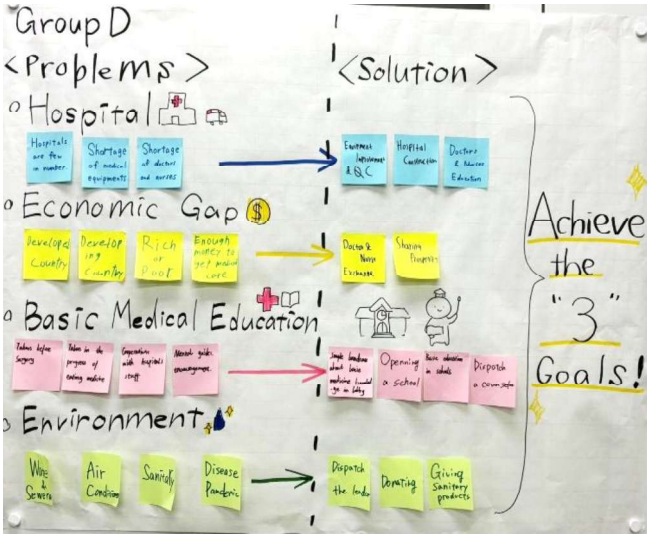

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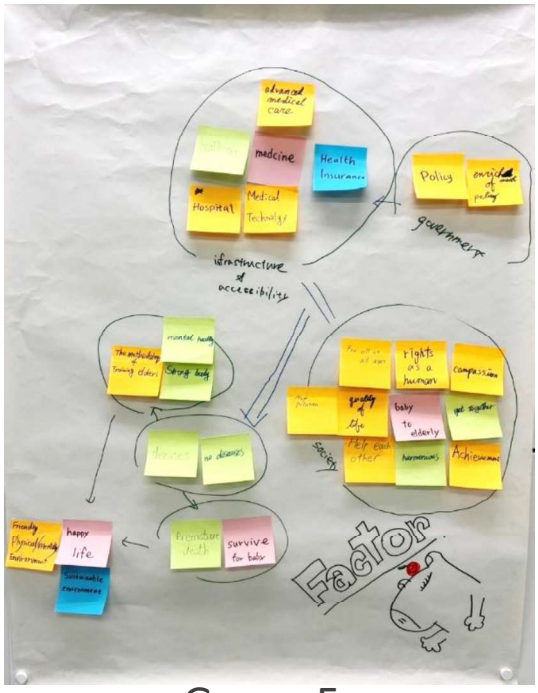

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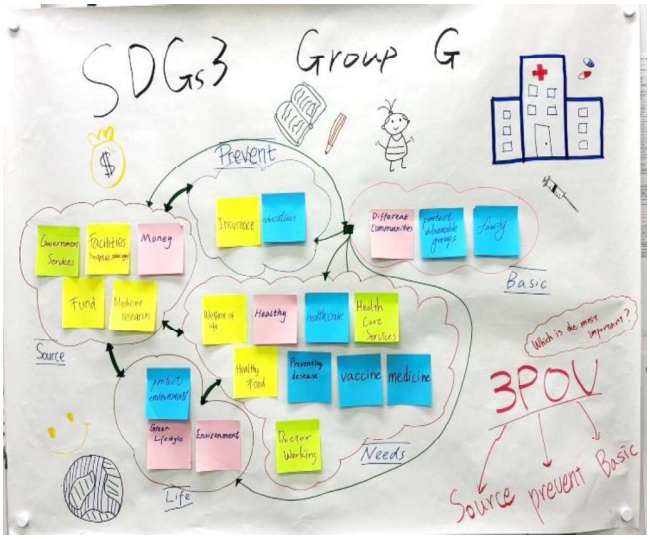

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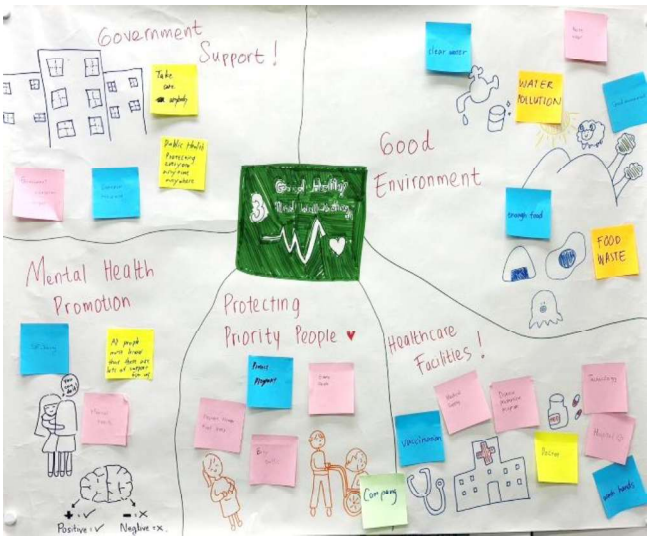

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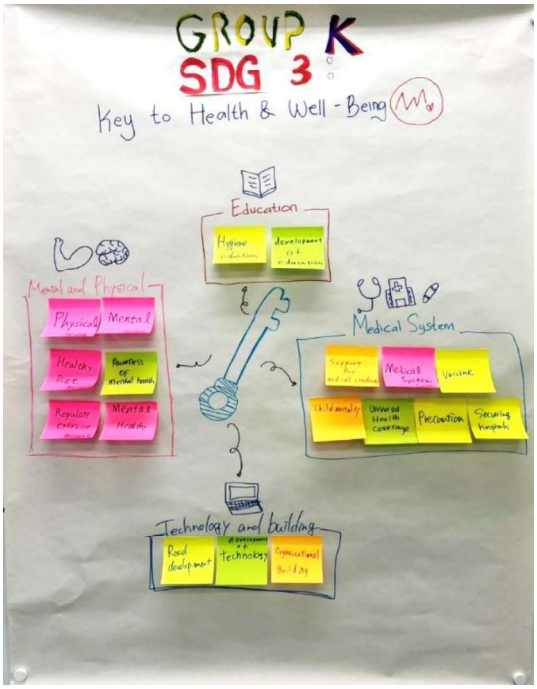

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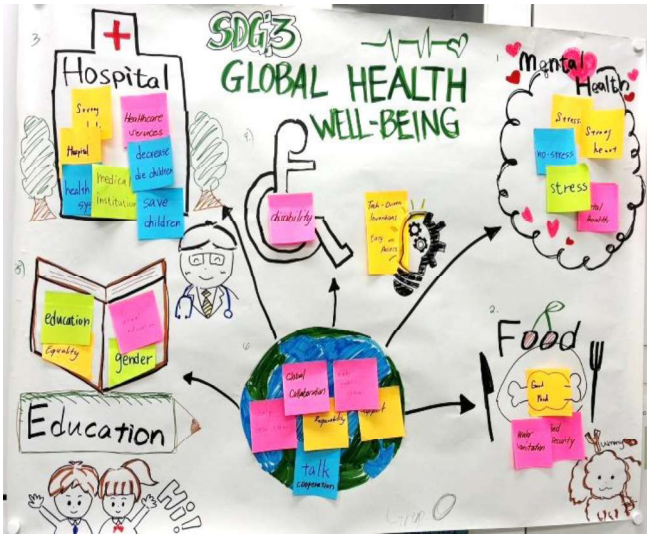

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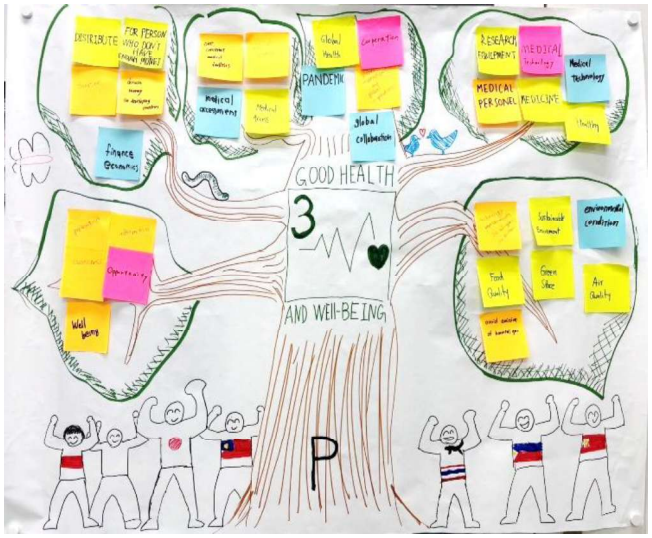

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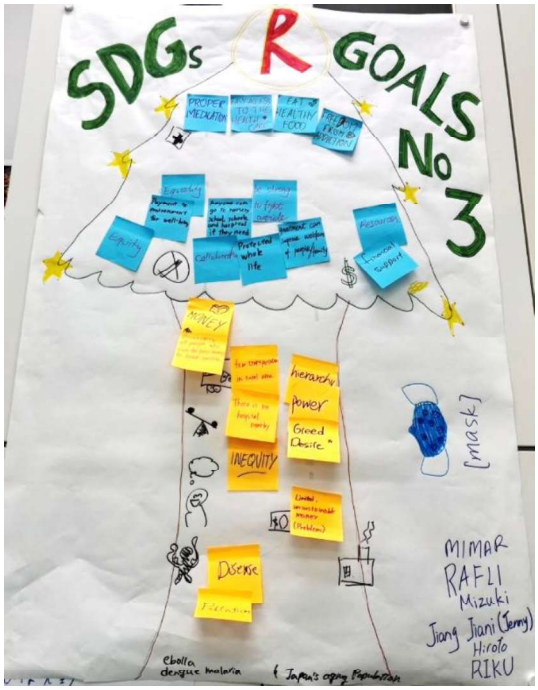

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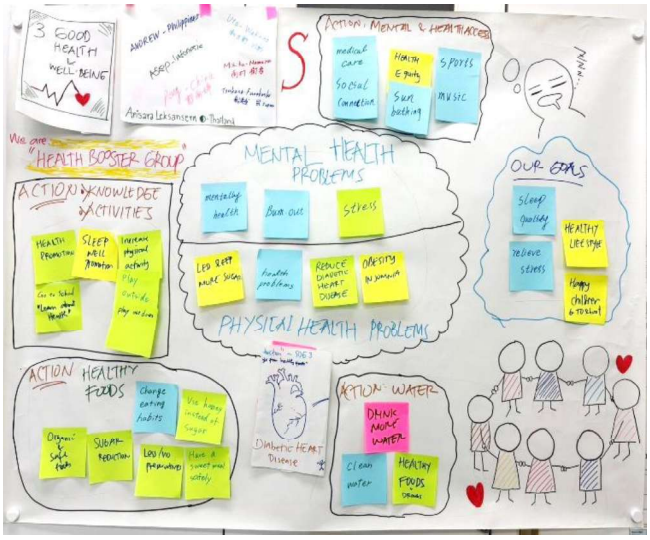

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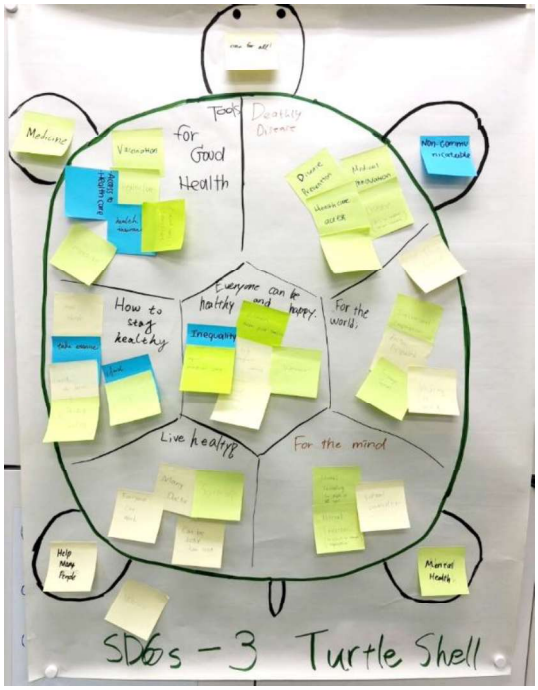

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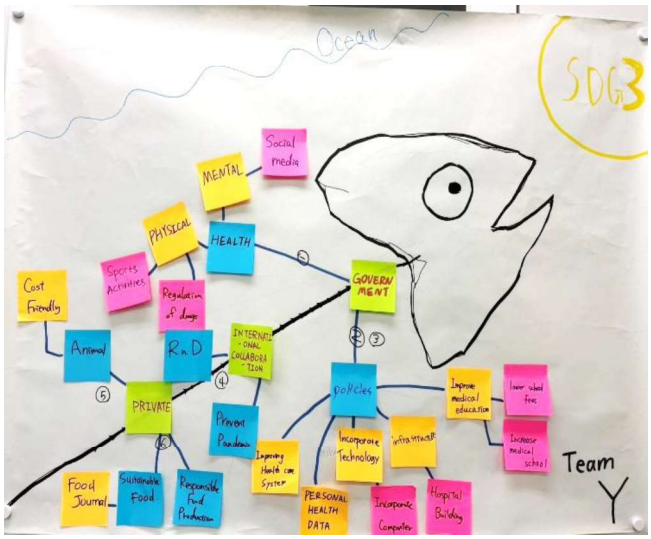

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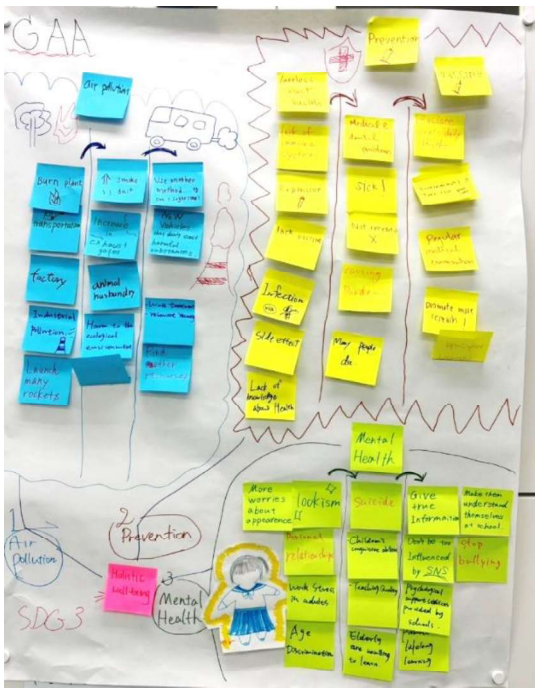

<Group AA>

Name & Room List

■ASEAN Faculty Members

Name	University	Research Session		Workshop	
ACHMAD SAMSUDIN	Universitas Pendidikan Indonesia	2202	Chairperson	2111-E	Facilitator
ARISARA LEKSANSERN	Mahidol University	2203	Panelist	2207-S	Facilitator
CHAKVONSA DOKPHOUT	National University of Laos	2208	Panelist	2111-D	Facilitator
CHATREE FAIKHAMTA	Kasetsart University	2109	Panelist	2111-A	Facilitator
CHITTABOUBPHA SOUPHAPHAK	National University of Laos	2108	Panelist	2208-J	Facilitator
DODI SUDIANA	Universitas Indonesia	2109	Chairperson	2111-H	Facilitator
HARRIS BUDILAKSONO	IPB University	2201	Panelist	2207-AA	Facilitator
IVONNE MILICHRISTI RADJAWANE	Bandung Institute of Technology (ITB)	2203	Chairperson	2208-R	Facilitator
JANEJIRA ARSARKIJ	Chiang Mai University	2208	Chairperson	2207-W	Facilitator
LE THAI HUNG	University of Education, Vietnam National University, Hanoi	2202	Panelist	2111-H	Advisor
MONCHAI CHOTTIDAO	Mahidol University	2208	Panelist	2208-O	Advisor
NUR MUHAMMAD FARDA	Universitas Gadjah Mada	2204	Panelist	2208-N	Facilitator
PANCHIT LONGPRADIT	Mahidol University	2201	Panelist	2207-AA	Advisor
POSCHANAN NIRAMITCHAINONT	Mahidol University	2204	Chairperson	2207-V	Facilitator
PUTU AYU ASTY SENJA PRATIWI	Udayana University	2112	Chairperson	2207-U	Facilitator
ROLANDO VELARDE OBIEDO	University of San Carlos	2207	Chairperson	2207-T	Facilitator
SAMIPHAK, SARA	Chulalongkorn University	2202	Panelist	2207-Y	Facilitator
SARMIENTO VENUS MAY HORTALEZA	Pangasinan State University	2207	Panelist	2208-K	Facilitator
SOVARITTHON CHANSAENGSEE	Mahidol University	2205	Chairperson	2111-F	Facilitator
SURAPONG RATTANAKUL	King Mongkut's University of Technology Thonburi (KMUTT)	2112	Panelist	2111-I	Facilitator
TANAWAN SAWATDIPHAP	Mahidol University	2202	Panelist	2207-Z	Advisor
THITI YANPRECHASET	Silpakorn University	2111	Panelist	2111-G	Facilitator
TITI CANDRA SUNARTI	IPB University	2108	Chairperson	2207-X	Advisor
TOCH PHEAKDEY	Royal University of Phnom Penh	2201	Chairperson	2208-M	Facilitator
TZU-SHAN CHENG	National Taiwan Normal University	2205	Panelist	2208-P	Facilitator
UDOMLUK KOOLSRIROJ	Kasetsart University	2111	Chairperson	2111-B	Facilitator
WANDEE KASEMSUKPIPAT	Kasetsart University	2204	Panelist	2111-C	Facilitator
YUSLI WARDIATNO	IPB University	2112	Panelist	2207-W	Advisor

■ASEAN High School Teacher Members

Name	University	Research Session		Workshop	
AANG SUHENDAR	SMA Alfa Centauri	2205	Panelist	2208-P	Advisor
AKHMAD FATONI MARKUM	High School 6, Yogyakarta (SMA Negeri 6 Yogyakarta)	2208	Panelist	2208-K	Advisor
AMORNRAT BOOBPACHOTE	Chulalongkorn University Demonstration Secondary School	2108	Panelist	2208-M	Advisor
ANDREW DY	University of San Carlos - Senior High School	2202	Panelist	2207-S	Advisor
CHARUWAN PUPANEAD	Watraikhing wittaya school	2111	Panelist	2111-G	Advisor
KAMELIA FIKRIAH	Kornita Senior High School	2203	Panelist	2208-Q	Advisor
KITTAPORN PUAKANOKHIRUN	Chiang Mai University Demonstration School	2201	Panelist	2208-N	Advisor
LELY ERSASTRI ZAINUDDIN	SMAN 9 Depok	2204	Panelist	2111-A	Advisor
LIN CHUNHAO	Taipei First Girls High School	2112	Panelist	2208-L	Advisor
PATCHARA NUALPAN	Kasetsart University Laboratory School, Center for Educational Research and Development	2109	Panelist	2111-F	Advisor
SANTOS, CHERRY CATHLEEN TOPINIO	Regents Secondary School	2207	Panelist	2111-B	Advisor
SARI NARULITA	SMA Negeri 1 Bandung	2203	Panelist	2208-J	Advisor

■ASEAN Students

Name	University	Research Session		Workshop	
ADINDA MELINDA CERIA AJIE	Universitas Pendidikan Indonesia	2205	Presenter	2111-H	Learner
ALICIA ZALFAA JATNIKA	Bandung Institute of Technology (ITB)	2109	Presenter	2208-L	Learner
ALIF SHIDQIE AL BANI	Bandung Institute of Technology (ITB)	2111	Presenter	2207-T	Learner
ALOUNPHET KEOVONGSY	National University of Laos	2208	Presenter	2111-I	Learner
ANNA FELICYA	Bandung Institute of Technology (ITB)	2108	Presenter	2207-V	Learner
APRILIA SARAH KRISTINA	Universitas Indonesia	2108	Presenter	2207-Z	Learner
ASEP FIRMAN NUGRAHA	IPB University	2111	Presenter	2207-S	Learner
ATHAR ABDURRAHMAN BAYANUDDIN	Universitas Gadjah Mada	2201	Presenter	2207-W	Learner
AURORA BELVA CATALINA	Bandung Institute of Technology (ITB)	2204	Presenter	2208-M	Learner
AYASTI TIARA NURACHMAN	Bandung Institute of Technology (ITB)	2204	Presenter	2208-N	Learner
CHAN,YU-CHENG	National Taiwan Normal University	2202	Presenter	2111-F	Learner
CHARY LYN D. DE GUZMAN	Pangasinan State University	2207	Presenter	2111-H	Learner
CHEN, FANG-CHI	National Taiwan Normal University	2207	Presenter	2207-T	Learner
CHEN, JIE-TONG	National Taiwan Normal University	2201	Presenter	2111-G	Learner
DEWINA NUR HUMAIRA	IPB University	2112	Presenter	2208-K	Learner
DINIYARTI	Universitas Gadjah Mada	2201	Presenter	2111-F	Learner
DONG JIEJUN	Mahidol University	2108	Presenter	2111-A	Learner
FENG XIN	Mahidol University	2207	Presenter	2111-E	Learner
FERRER WEDNESDAY NABOR	Pangasinan State University	2204	Presenter	2208-M	Learner
GUO ZHIWEI	Mahidol University	2207	Presenter	2207-V	Learner
HE,XINWEIWEI	Mahidol University	2203	Presenter	2207-U	Learner
HISYAM ABDUL AZIZ	Universitas Pendidikan Indonesia	2205	Presenter	2207-Y	Learner
JIANG JIANI	Mahidol University	2204	Presenter	2208-R	Learner
KAMONTHIP JINDAWONG	Silpakorn University	2111	Presenter	2208-Q	Learner
KATRINA PAULA C. SISON	Pangasinan State University Lingayen Campus	2207	Presenter	2208-O	Learner
KHANSA NITISARA RAMADHANI	Universitas Indonesia	2109	Presenter	2111-I	Learner
KHUAT HA THU	University of Education, Vietnam National University, Hanoi	2208	Presenter	2207-X	Learner
KHUAT THI THANH HUYEN	University of Education, Vietnam National University, Hanoi	2201	Presenter	2111-C	Learner
LI XUAN	Mahidol University	2109	Presenter	2111-C	Learner
LIU WANYUE	Mahidol University	2208	Presenter	2207-AA	Learner
MEEMAE TANYARAT	Mahidol University	2208	Presenter	2208-R	Learner
MIAO SHIYUQING	Mahidol University	2203	Presenter	2207-Y	Learner
MUHAMMAD ADRIAN LUBIS	Bandung Institute of Technology (ITB)	2112	Presenter	2208-Q	Learner
NAILA FARIDAH HUDA WASILAH	Bandung Institute of Technology (ITB)	2112	Presenter	2208-O	Learner
NIEN, SHIH-YU	National Taiwan Normal University	2203	Presenter	2208-K	Learner
NITTIYA ORNWARN	King Mongkut's University of Technology Thonburi	2112	Presenter	2207-AA	Learner
PANDE MADE GIOPANY	Udayana University	2112	Presenter	2111-B	Learner
PANRUI TAN	Mahidol University	2202	Presenter	2111-D	Learner
PARIKESIT NURIL AZMI	Bandung Institute of Technology (ITB)	2203	Presenter	2111-E	Learner
PENG LITING	Mahidol University	2108	Presenter	2207-S	Learner
PHOOM THINKANWATTHANA	Kasetsart University	2205	Presenter	2207-V	Learner
PIYANUCH KIEWARAM	Kasetsart University	2207	Presenter	2111-B	Learner
RAFIE AMANDIO FAUZAN	Universitas Indonesia	2208	Presenter	2111-D	Learner
RAFLI YUDHA ASDANA	Bandung Institute of Technology (ITB)	2111	Presenter	2208-R	Learner
RALPH RELATOR MAGUMPARA	University of San Carlos	2205	Presenter	2208-L	Learner
RICKY RANQUE SALEM	University of San Carlos	2204	Presenter	2111-A	Learner
RIYADI ZAKIA SYAHRULLOH	Bandung Institute of Technology (ITB)	2111	Presenter	2207-U	Learner
SALSABILA ZAHRANI PUTRI	Bandung Institute of Technology (ITB)	2109	Presenter	2207-X	Learner
SARAWAN POMSUK	Chiang Mai University	2205	Presenter	2208-J	Learner
SHI JINGJING	Mahidol University	2109	Presenter	2207-W	Learner
SHOFIYA WARDAH MAULANA	Universitas Indonesia	2108	Presenter	2208-J	Learner
STELLA MARISKA HANAKO	Bandung Institute of Technology (ITB)	2108	Presenter	2208-P	Learner
SUMIATI	Universitas Pendidikan Indonesia	2202	Presenter	2207-Z	Learner
SUN NIKA	Royal University of Phnom Penh	2202	Presenter	2111-E	Learner
SUWANNAKET CHUTIPON	Chulalongkorn University	2202	Presenter	2207-U	Learner
TARNPIAM PARAVEE	Mahidol University	2111	Presenter	2208-P	Learner
THERESIA ROSELINDA PERMATA DEWI	IPB University	2208	Presenter	2111-G	Learner
TIPARADEE VARINTORN	King Mongkut's University of Technology Thonburi (KMUTT)	2203	Presenter	2111-C	Learner
TSAO, SHUO-CHENG	National Taiwan Normal University	2201	Presenter	2111-H	Learner
USHA PIA VENTAYEN DANAO	Pangasinan State University Lingayen Campus	2203	Presenter	2208-N	Learner
XIONG YANGXIANGJUN	Mahidol University	2202	Presenter	2111-G	Learner
YANG JUANQI	Mahidol University	2205	Presenter	2207-T	Learner
YANRU LI	Mahidol University	2204	Presenter	2111-F	Learner

■ASCENT-6E Students

Name	University/School	Research Session		Workshop	
FUKUDA Kotaro	Chiba Prefectural Sakura High School	2111	Presenter	-	-
KARIYA Yusuke	Chiba Prefectural Sosa High School	-	Audience	2207-X	Learner
KATO Hanon	Showa Gakuin Shuei Junior High School	-	Audience	2207-Y	Learner
MATSUOKA Uina	Tokyo Metropolitan Koishikawa Secondary School	2109	Presenter	-	-
NARITA Momoka	Chiba Prefectural Funabashi High School	2111	Presenter	2111-A	Learner
SAKAKURA Miyu	Showa Gakuin Shuei Junior High School	-	Audience	2208-L	Learner
SHIMA Botan	Seijo Gakuen Senior High School	-	Audience	2207-Z	Learner
SUZUKI Seigo	Azabu High School	-	Audience	2111-I	Learner
TAKASUGI Kanna	Chiba Meitoku High School	-	Audience	2208-O	Learner
YODA Chihiro	Shibaura Institute of Technology Kashiwa High School	-	Audience	-	-

■High School Students

Name	University/School	Research Session		Workshop	
AKABA Kento	Tokyo Gakugei University International Secondary School	2201	Presenter	2208-J	Learner
ANDA Hinami	Chiba Keiai Senior High School	-	Audience	2111-D	Learner
ANDO Yusuke	Shibaura Institute of Technology Kashiwa High School	2208	Presenter	-	-
DEDACHI Seira	Ichihara Chuo High School	2207	Presenter	2207-T	Learner
EGAMI Yuma	Chiba Municipal Chiba High School	2201	Presenter	2111-C	Learner
FUJIKI Hiyo	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	2203	Presenter	2207-Y	Learner
FUKUMOTO Yuma	Chiba Prefectural Funabashi High School	2202	Presenter	2207-Z	Learner
FUNAKOSHI Tsukasa	Chiba Prefectural Makuhari Sogo High School	2201	Presenter	2207-S	Learner
GOTO Karin	Tokyo Metropolitan High School of Science and Technology	2204	Presenter	2207-T	Learner
HAMANAKA Reo	Chiba Municipal Chiba High School	2109	Presenter	2208-P	Learner
HATAKEYAMA Yuku	Chiba Prefectural Kisarazu High School	2108	Presenter	2208-M	Learner
HAYAKAWA Haruka	Hyogo Prefectural Kakogawa Higashi High School	2205	Presenter	-	Learner
HAYASHI Waka	Chiba Municipal Chiba High School	2203	Presenter	2208-N	Learner
HIRA Shoji	Chiba Prefectural Chosei High School	2202	Presenter	2208-J	Learner
HIRONAKA Aya	Chiba Prefectural Kisarazu High School	2111	Presenter	2111-I	Learner
IMAI Ayumi	Hyogo Prefectural Kakogawa Higashi High School	2205	Presenter	-	-
ISHII Yoshiumi	Chiba Municipal Chiba High School	2204	Presenter	2207-AA	Learner
KAKIUCHI Hikari	Hyogo Prefectural Kakogawa Higashi High School	2205	Presenter	-	-
KATO Yuna	Chiba Municipal Chiba High School	2112	Presenter	2111-D	Learner
KAWASHIMA Gaku	Chiba Municipal Chiba High School	2201	Presenter	2207-T	Learner
KIMURA Hiroto	Chiba Municipal Chiba High School	2203	Presenter	2208-M	Learner
KONNO Wataru	Chiba Prefectural Kisarazu High School	2111	Presenter	2208-K	Learner
KUTSUMIZU Rion	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	2208	Presenter	2208-N	Learner
MAEDA Taichi	Chiba Prefectural Kisarazu High School	2111	Presenter	2208-L	Learner
MAEDA Yuya	Chiba Prefectural Chosei High School	2207	Presenter	-	-
MATSUMOTO Kotaro	Hyogo Prefectural Kakogawa Higashi High School	2108	Presenter	-	-
MATSUMURA Takeshi	Chiba Prefectural Kisarazu High School	2108	Presenter	2111-F	Learner
MATSUZAKI Sakurako	Chiba Municipal Chiba High School	2112	Presenter	2111-A	Learner
MIKI Haruka	Shibaura Institute of Technology Kashiwa High School	2205	Presenter	2207-AA	Learner
MINAMI Hiroto	Tokyo Gakugei University International Secondary School	2201	Presenter	2208-R	Learner
MINE Rintaro	Chiba Prefectural Chiba Higashi High School	2112	Presenter	2111-A	Learner
MITSUOKA Chinatsu	Chiba Prefectural Sakura High School	2207	Presenter	2207-W	Learner
MIYAJIMA Takeru	Chiba Municipal Chiba High School	2109	Presenter	2208-O	Learner
MIYAMOTO Haruta	Chiba Municipal Chiba High School	2203	Presenter	2111-I	Learner
MIYAZAKI Yusuke	Chiba Municipal Chiba High School	2203	Presenter	2208-L	Learner
MURANUSHI Moeka	Chiba Prefectural Kisarazu High School	2108	Presenter	2111-E	Learner
NAGANO Sae	Chiba Municipal Chiba High School	2204	Presenter	2208-K	Learner
NAGATA Riku	Chiba Prefectural Chosei High School	-	Audience	2208-R	Learner
NAGATSUBO Taiyo	Tokyo Gakugei University International Secondary School	2201	Presenter	2208-P	Learner
NAKAMURA Haruka	Chiba Keiai Senior High School	-	Audience	2207-Z	Learner
NAKAMURA Nico	Tokyo Gakugei University International Secondary School	2201	Presenter	2208-Q	Learner
NAKANO Kaede	Shibaura Institute of Technology Kashiwa High School	2208	Presenter	2207-W	Learner
NARITA Yukari	Chiba Keiai Senior High School	-	Audience	2111-H	Learner
NOJIRI Kotaro	Chiba Municipal Chiba High School	2109	Presenter	2208-Q	Learner
ODA Salia	Chiba Municipal Chiba High School	2109	Presenter	2111-E	Learner
OHKOHCHI Shunpei	Chiba Prefectural Kisarazu High School	2108	Presenter	2111-G	Learner
OKUNO Haruto	Chiba Municipal Chiba High School	2201	Presenter	2208-R	Learner

■High School Students

Name	University/School	Research Session		Workshop	
ONOZAWA Miyu	Chiba Prefectural Sakura High School	2207	Presenter	2207-U	Learner
SAGIUCHI Mei	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	2208	Presenter	2207-V	Learner
SAITO Hiyori	Chiba Prefectural Chosei High School	2207	Presenter	2208-P	Learner
SAITO Takeru	Chiba Prefectural Chosei High School	-	Audience	2208-Q	Learner
SARUTA Mako	Chiba Prefectural Sakura High School	2207	Presenter	2207-V	Learner
SASE Kaisei	Chiba Prefectural Kisarazu High School	2111	Presenter	2208-J	Learner
SERIU Iori	Hyogo Prefectural Kakogawa Higashi High School	2205	Presenter	-	-
SHIBAYAMA Himari	Tokyo Metropolitan High School of Science and Technology	2112	Presenter	2207-U	Learner
SHIMAKI Miu	Chiba Prefectural Funabashi High School	-	Audience	2111-D	Learner
SHIMAZAKI Riku	Chiba Prefectural Chiba Higashi High School	2112	Presenter	2111-B	Learner
SHITAMORI Ayuto	Chiba Prefectural Chosei High School	2204	Presenter	2208-O	Learner
SUGIMOTO Chiaki	Chiba Municipal Chiba High School	2204	Presenter	2111-F	Learner
SUGIMURA Kanon	Shibaura Institute of Technology Kashiwa High School	2205	Presenter	-	-
SUZUKI Anri	Tokyo Metropolitan High School of Science and Technology	2108	Presenter	2207-V	Learner
SUZUKI Yuzu	Chiba Prefectural Kisarazu High School	2108	Presenter	2111-H	Learner
TAKAHASHI Hironobu	Chiba Prefectural Funabashi High School	2202	Presenter	-	-
TAKAHASHI Junpei	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	2203	Presenter	2208-M	Learner
TAKANASHI Hiro	Chiba Municipal Chiba High School	2203	Presenter	-	-
TAKAOKA Yuri	Chiba Prefectural Chosei High School	2204	Presenter	2208-N	Learner
TATSUKO Mei	Chiba Keiai Senior High School	-	Audience	2207-X	Learner
TERADA Koharu	Ichihara Chuo High School	2205	Presenter	2207-U	Learner
TERAOKA Urara	Shibuya Kyoiku Gakuen Makuhari Junior and Senior High School	2203	Presenter	2207-AA	Learner
TERASHITA Keisyu	Chiba Municipal Chiba High School	2202	Presenter	2111-B	Learner
TSUBOUCHI Amane	Chiba Municipal Chiba High School	2203	Presenter	2111-H	Learner
UMEZONO Sara	Chiba Prefectural Funabashi High School	-	Audience	2207-X	Learner
WAKUNO Uta	Tokyo Metropolitan High School of Science and Technology	2108	Presenter	2207-S	Learner
WATANABE Rua	Chiba Prefectural Sakura High School	2207	Presenter	-	-
YAMAGUCHI Daiki	Chiba Keiai Senior High School	-	Audience	2207-Y	Learner
YAMAZAKI Taro	Chiba Prefectural Chiba Higashi High School	2112	Presenter	2111-C	Learner
YOKOYAMA Yuma	Hyogo Prefectural Kakogawa Higashi High School	2205	Presenter	-	-
YONEMOTO Daisuke	Chiba Municipal Chiba High School	2201	Presenter	-	-
YOSHIDA Sakura	Chiba Keiai Senior High School	-	Audience	2207-W	Learner

■TWINCLE Students

Name	University	Research Session		Workshop	
ABE Mikoto	Chiba University	2108	PC Assistant	2111-G	Learner
ABE Sara	Chiba University	2109	Timekeeper	2208-L	Learner
ARAI Futo	Chiba University	2111	PC Assistant	-	-
HANDA Utano	Chiba University	2203	Timekeeper	2208-N	Learner
INAZAWA Sakura	Chiba University	2208	Timekeeper	2207-T	Learner
ISHII Yoshihiro	Chiba University	2207	PC Assistant	2111-B	Learner
KAKINUMA Yuka	Chiba University	2207	Timekeeper	2208-K	Learner
KANAMARU Shuhei	Chiba University	2203	PC Assistant	2111-D	Learner
KAWASE Noh	Chiba University	2112	PC Assistant	2111-F	Learner
KOKUBO Hina	Chiba University	2108	Audience	2111-I	Learner
MARUSAWA Kazuaki	Chiba University	2208	PC Assistant	2207-W	Learner
MATSUDA Sho	Chiba University	2202	PC Assistant	2208-P	Learner
MOTOKADO Nana	Chiba University	2111	Timekeeper	2111-C	Learner
NAKAMURA Hana	Chiba University	2109	Audience	2207-Z	Learner
NAMURA Mikika	Chiba University	2205	PC Assistant	2207-S	Learner
OGASAWARA Fuuwa	Chiba University	2108	Timekeeper	2208-Q	Learner
OIKAWA Yuka	Chiba University	2111	Audience	2207-Y	Learner
SATO Hano	Chiba University	2112	Audience	2207-X	Learner
SHIMOI Hiromasa	Chiba University	2201	Audience	2111-E	Learner
SHINGU Yoichi	Chiba University	2109	PC Assistant	2111-A	Learner
SUGIYAMA Taisei	Chiba University	2204	PC Assistant	2111-C	Learner
TAKADA Nana	Chiba University	2202	Audience	2208-O	Learner
TANAKA Nanami	Chiba University	2201	PC Assistant	2111-H	Learner
TANAKA Natsumi	Chiba University	2201	Timekeeper	2111-B	Learner
UTSUMI Marika	Chiba University	2202	Timekeeper	2208-M	Learner
WATANABE Hibari	Chiba University	2205	Timekeeper	2208-J	Learner
WATANABE Mizuki	Chiba University	2204	Timekeeper	2208-R	Learner
YAMAGUCHI Sakura	Chiba University	2112	Timekeeper	2207-AA	Learner
YOKOYAMA Nami	Chiba University	2203	Audience	2207-U	Learner
YOSHIDA Mimomo	Chiba University	2204	Audience	2207-V	Learner

■Board of Education

Name	Faculty	Research Session		Workshop	
IIDA Rie	Chiba Prefectural Board of Education	-	-	-	-
MAKI Nobuhiro	Chiba Municipal Board of Education	-	-	-	-

■Chiba University (International Students)

Name	Faculty	Research Session		Workshop	
Charmaine Gugulethu Lunga	Faculty of Education	2205	Panelist	2207-X	Facilitator
Fajriah Sulaiman	Faculty of Education	2204	Panelist	2111-I	Facilitator
Iago Carvalho Silva	Graduate School of Science and Engineering	2111	Panelist	2207-Z	Facilitator
Julia Brottman	Faculty of Education	2109	Panelist	2208-O	Facilitator
Marvin Gilberto Escobar Leiva	Faculty of Education	2207	Panelist	2111-D	Facilitator
Patrick Onyelukachukwu Nwaokocha	Faculty of Education	2112	Panelist	2208-L	Facilitator
Rizvon Suleimanov	Graduate School of Humanities and Studies on Public Affairs	2203	Panelist	2207-Y	Facilitator
Savira Aristi	Graduate School of Science and Engineering	2201	Panelist	2111-E	Facilitator
Victor Ibrahim Mbeya	Faculty of Education	2108	Panelist	2208-Q	Facilitator

■Chiba University

Name	Faculty	Research Session		Workshop	
OZAWA Hiroaki	Executive Vice President	-	-	-	-
FUJIKAWA Daisuke	Dean Faculty of Education	-	-	-	-
MANABE Yoshitsugu	Head of Next-generation Outstanding Learning Office	-	-	-	-
AKIMOTO Yukiharu	Section of Collaboration with High School	-	-	-	-
Beverley Horne	Faculty of Education	-	-	-	-
MATSUI Satoshi	Faculty of Education	-	-	2111	-
MATSUMOTO Ryoji	Digital Transformation Enhancement Council	-	-	-	-
MORISHIGE Hina	Institute for Excellence in Educational Innovation	-	-	2207	-
NOMURA Jun	Faculty of Education	-	-	-	-
SHIMONAGATA Shuji	Faculty of Education	-	-	2208	-
TSUJI Koji	Faculty of Education	-	-	-	-
Wang Qian	Institute for Excellence in Educational Innovation	-	-	2207	-