Annual Report of Asia & ASEAN Center
for Educational Research

Summer 2025,Vol.5 No.2

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

CHIBA UNIVERSITY

Chiba University

Summer Institute of Asia & ASEAN Center for Educational Research
Jul.2025

Summer Institute of Asia & ASEAN Center for Educational Research
2025.07

Contents

Summer Institute of Asia & ASEAN Center for Educational Research

2025.07.27
International Research Session followed by the SDGs Workshop

Place	Time	Detail
Faculty of Education Building 2	09:30-09:45 (15 min)	Reception
	10:00-10:15 (15 min)	Opening Ceremony
	10:30-12:10 (100 min)	Oral Presentation
	12:30-13:30 (60 min)	Lunch
	13:30-16:00 (150 min)	SDGs Workshop ・ Poster Presentation
	16:15-16:45 (30 min)	Closing Ceremony

2025.08.09
The 1st International Online Research Conference for High School Students in Asia

Place	Time	Detail
Online (Zoom) Main Venue: Chiba University, Japan	9:00-9:15 (15 min)	Welcome and Introduction (Main Room)
	9:15-12:15 (180 min)	Online Presentation Session (Breakout Rooms)
	12:15-12:45 (30 min)	Morning Wrap-up Session (Main Room)
	12:45-13:30 (45 min)	Lunch Break
	13:30-13:40 (10 min)	Introduction (Main Room)
	13:40-15:40 (120 min)	Online Workshop Session (Breakout Rooms)
	15:40-16:10 (30 min)	Afternoon Wrap-up Session (Main Room)
	16:10-16:30 (20 min)	Closing Ceremony (Main Room)

Greeting

Daisuke FUJIKAWA

Dean, Faculty of Education,
Chiba University

Dear distinguished guests, esteemed faculty members, respected researchers, and dedicated students,

It is my great honor and deep pleasure to warmly welcome you to the 27th International Research and Presentation Conference hosted by the Chiba University Faculty of Education and the Asia-ASEAN Center.

To our distinguished colleagues from partner institutions across Asia and the ASEAN region, we are deeply grateful for your valued presence and participation in this important academic forum. On behalf of the Faculty of Education, I offer my sincerest appreciation for your continued engagement and collaboration.

At Chiba University, we remain steadfast in our commitment to advancing a sustainable society through the enhancement of educational quality and the generation of new knowledge. In this endeavor, international collaboration and the transnational exchange of ideas are indispensable. Our enduring partnerships with universities in Asia and the ASEAN region significantly enrich our academic community, offering multifaceted perspectives rooted in diverse cultural and societal contexts.

Over the years, our collaborative efforts have yielded numerous valuable outcomes. However, as the challenges confronting our societies become increasingly intricate, the need to further fortify our partnerships and advance to the next stage of academic cooperation has never been more pressing. I am confident that the expertise, passion, and commitment demonstrated by all of you will give rise to deeper collaborations and innovative joint initiatives.

It is my sincere hope that today's gathering will serve as a fertile ground for the exchange of pioneering ideas, the cultivation of enduring friendships, and the opening of new pathways for future scholarly collaboration.

In conclusion, I wish all participants continued success in their academic endeavors, and I look forward with great anticipation to the meaningful outcomes that will emerge from this conference.

Greeting

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

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

We are proud to host the International Research Presentation Conference once again this year, and we sincerely appreciate your continued cooperation and support. On behalf of the organizing committee, I would like to offer a few words of welcome.

This conference is designed to provide a platform for high school students, university students, graduate students, and current educators to present their latest research findings and share knowledge with one another. It is truly a pleasure to witness the fruits of your dedication and academic effort being presented and discussed here today.

This year, we have placed an even greater emphasis on international perspectives by welcoming participants from various countries and regions. It is a rare and valuable opportunity for individuals from diverse cultural and academic backgrounds to come together, learn from each other, and broaden their horizons.

We are also very pleased to announce a new initiative this year: the creation of an online platform for high school students across Asia to participate and present their research. This exciting addition expands the reach of our conference and allows even more young scholars to engage in academic exchange beyond national borders. We believe this inclusive approach embodies the spirit of global learning and mutual understanding.

We hope that today's presentations and discussions will inspire new ideas, deepen your academic interests, and open doors to future research and educational opportunities. May the networks and insights you gain here lead to meaningful collaborations and lasting connections.

Finally, I would like to express my sincere gratitude to everyone who has contributed to the organization and the smooth running of this conference. To all participants, I wish you a stimulating, fruitful, and memorable experience.

Thank you very much.

Greeting

Navaporn Suranakapan

Vice Principal of Foreign Affairs and Outreach Projects
Chulalongkorn University Demonstration Secondary School

It is a true honor and privilege to be part of the 1st International Online Research Conference for High School Students in Asia, hosted by Chiba University. I am deeply grateful for the opportunity to join fellow students, educators, and researchers from across the region in this exciting and meaningful event.

This conference is a celebration of intellectual curiosity, cross-cultural dialogue, and the power of collaboration among future leaders and scholars. Each presentation, discussion, and connection made here contributes to a vibrant and supportive research community that transcends borders.

To all the students participating: your dedication, creativity, and hard work are what make this event meaningful. Whether you are presenting your own research or engaging with the work of others, your presence here reflects a commitment to learning and growth that deserves to be recognized.

I would like to extend my heartfelt thanks to Chiba University for making this conference possible, and to all the teachers, mentors, and supporters who guided students along the way. It has been a privilege to help coordinate this event, and I am confidently believe that it will leave a lasting impression on everyone involved.

Thank you very much.

Greeting

Korawan Saengtrakul, Ph.D.

Vice Principal of Chulalongkorn University
Demonstration Secondary School

On behalf of the faculty and students of Chulalongkorn University Demonstration Secondary School, I would like to extend my deepest gratitude to the organizers of the 1st International Online Research Conference for High School Students in Asia. Thank you for providing this invaluable opportunity for our students. This online academic conference is more than just a meeting; it's a gateway to a world of boundless learning. I believe this event will serve as a crucial starting point for the young researchers of tomorrow.

I commend the organizing team for recognizing the importance of creating a "stage" for high school students. The research they have dedicated so much time and effort to now has a chance to be presented on an international platform. Most importantly, they have the opportunity to receive feedback and guidance from experts, which is essential for further developing their work.

Furthermore, the online format has made it easier for students to participate, allowing for a broad exchange of knowledge and experience with peers from various Asian countries. This helps to build a strong network of new-generation researchers.

What is equally impressive is that the organizers did not limit the event to just presentations. The conference also featured various supplementary activities designed to develop students' potential in all aspects. These activities not only enhance their skills but also inspire and ignite their passion for research.

On behalf of all the students, I thank the organizers and the entire team once again for their dedication and hard work in creating such an excellent and valuable event. The 1st International Online Research Conference for High School Students in Asia is not just an academic conference; it is a memorable experience that will be a significant step for all students on their future research journeys. We look forward to participating in more great events like this in the future.

Thank you.

Greeting

Pattaraporn Jensuttiwetchakul,Ph.D.

Vice Principal of Educational Management
Chulalongkorn University Demonstration Secondary School

On behalf of Chulalongkorn University Demonstration Secondary School, it is my great honor and pleasure to warmly welcome all participants, presenters, organizers, and honored guests to the 1st International Online Research Conference for High School Students in Asia. We are very proud to be a partner of this important event, which recognizes the hard work and achievements of young students across the region. This conference is not only showcases the talents and creativity of these young scholars, but also provides a valuable platform to encourage academic growth and global connections.

Due to my work focusing on research and innovation, I strongly believe that these areas have the power to bring progress and positive changes to society. I always encourage my students to engage actively in research and to think creatively to develop new ideas. The process of doing research helps them build critical thinking and problem-solving skills, which are essential in today's world. Moreover, their work can lead to useful inventions and discoveries that improve the lives of many people. By nurturing these qualities, we all contribute to creating a better and more sustainable future for everyone.

This conference is an excellent opportunity to promote a culture of research and innovation among young students. It gives them a chance to present their ideas with confidence, to learn from the experiences of others, and to improve their projects through useful feedback from experts and peers. Such interactions expand their understanding and help shape their ideas into practical solutions that can address real challenges faced by our communities and the world.

To all the students and presenters, I encourage you to participate fully, to collaborate closely with your fellow students and mentors, and to remain open to new ways of thinking. I hope this conference will inspire you to generate fresh ideas and creative solutions to the many challenges we face today. May this event serve as a valuable starting point for your future studies, career paths, and personal growth.

Finally, I would like to express my sincere thanks to the organizing committee and everyone involved in making this event a reality. Your hard work and dedication are truly appreciated and play a crucial role in its success.

I wish everyone a successful, inspiring, and memorable conference experience.

Thank you.

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 2201 (Chemistry, Biology, Education, Others)	
Chairperson	NOMURA Jun	Professor, Chiba University
Panelist	Joceline Theda Kadarman	Chiba University
Panelist	Punnat Changsalak	Chiba University
Panelist	Rabiatul Hazirah binti Idris	Chiba University
Presenter 1	GILANG RAMDHAN HUDA Universitas Pendidikan Indonesia **Identification of Simple Carbohydrates Using Iodine Test and the Role of Lemongrass Extract as an α-Amylase Enzyme Inhibitor**	
Presenter 2	YAMAMOTO Yuto Shibaura Institute of Technology Kashiwa High School **Synthesis of Large Aragonite Crystals Using the Gel Method**	
Presenter 3	CINDY KEZIA RIKKA MARBUN Bandung Institute of Technology **CURRENT DISTRIBUTION IN THE WATERS OF LAMPUNG BAY**	
Presenter 4	TATESAKA Tamaki Chiba University **Elucidation of fluconazole resistance in the emerging fungal pathogen *Candida auris***	
Presenter 5	JAKKAPHONG PIEWNAUN Kasetsart University **A Needs Assessment for Developing Learning Activities to Enhance Problem Solving and Mathematical Reasoning Abilities of Secondary School Mathematics Teachers**	
Presenter 6	MARICON DELA VEGA LAPLANA University of San Carlos **A LESSON STUDY IN TEACHING NATURE AND SOURCES OF LIGHT**	
Presenter 7	ADELLYA ANDARISTA Bandung Institute of Technology **SEA SURFACE TEMPERATURE MONITORING IN THE NORTHERN WATERS OF SULAWESI ISLAND USING MODIS AQUA SATELLITE DATA IN 2024 WITH SEADAS SOFTWARE**	

International Research Session

	Room 2202 (Remote Sensing, Physics, Life Science, Education)	
Chairperson	MORISHIGE Hina	Project Assistant Professor, Chiba University
Panelist	Roxana Mayhin Del Rocio Quispe Cuadros	Chiba University
Panelist	Regmi Loknath	Chiba University
Panelist	Huixin Wang	Chiba University
Presenter 1	RAHMA IZZATUN NABIHA Universitas Gadjah Mada **Analysis of Land Cover Classification in Northern Sumatra 2024**	
Presenter 2	DUANGHATHAI SITSUEA Kasetsart University **Fostering Mastery of the Pythagorean Theorem through Active Learning approach**	
Presenter 3	DINI RACHMADHANI Universitas Gadjah Mada **Multitemporal Analysis of the Urban Thermal Field Variance Index in DI Yogyakarta**	
Presenter 4	THENG NARY Royal University of Phnom Penh **High Voltage Mosquito Zapper**	
Presenter 5	KUNLANAT THANYAJAROEN Kasetsart University **The Effects of Using Real-World Problem Tasks in a Grade 4 Mathematics Classroom**	
Presenter 6	THARATHIP PHUETPHOL King Mongkut's University of Technology Thonburi **Microstructural and Elemental Analysis of Xiaomi Smart Band 9 using Optical Microscopy, SEM, and EDX Techniques**	
Presenter 7	MENG SOPHORN Royal University of phnom penh **Creating and Controlling an Electromagnet Using DC Power**	
Presenter 8	SELLA LESTARI NURMAULIA Bandung Institute of Technology **Spatial Distribution and Mapping Strategy of Flood Inundation in Pekalongan City using the SCS-CN Hydrological Model**	

International Research Session

	Room 2203 (Information, Mathematics, Education)	
Chair Person	MATSUI Satoshi	Professor, Chiba University
Panelist	Savira Salsabila	Chiba University
Panelist	Yuhui Liao	Chiba University
Panelist	Fakih Irsyadi	Chiba University
Presenter 1	MIKAEL KEVIN Universitas Indonesia **Stamp Duty Detection using YOLO11**	
Presenter 2	SRETTAWUT VANNAVISUTE King Mongkut's University of Technology Thonburi **HOW TO MAKE ENEMIES LOOK SMART IN GAMES: SIMPLE DESIGN BUT EFFECTIVE AI BEHAVIOR**	
Presenter 3	ANDRI RIFKY ADITAMA Universitas Indonesia **TRENDS IN FEDERATED LEARNING FOR BIG DATA: A BIBLIOMETRIC ANALYSIS (2022-2025)**	
Presenter 4	ABDULLAH Attariq Alhadi Tokyo Metropolitan High School of Science and Technology **Development of a Weather Forecasting System & Device**	
Presenter 5	SOMCHAI PHOTHIJATHOOM Kasetsart University **Developing Mathematical Fluency and Flexibility of Grade 6 Students through Collaborative Game-Based Learning**	
Presenter 6	WEERIS STITMAN King Mongkut's University of Technology Thonburi **Will you survive the Titanic? An Introduction to prediction in statistics using Logistic Regression model**	
Presenter 7	NGUYEN THI HONG LINH University of Education -Vietnam National University **DEVELOPING A MULTI-SENSORY INTEGRATED TEACHING KIT ON THE THEME OF PLANTS AND ANIMALS FOR NATURAL AND SOCIAL, SCIENCE IN PRIMARY SCHOOLS**	
Presenter 8	SRI UTAMI Universitas Gadjah Mada **Application of Disaster Education through the Interactive Game Concept "TRUWELU"**	

International Research Session

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(Social Science, Education, Others)</td>
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<tr>
<td>Chairperson</td>
<td>Wang Qian</td>
<td>Project Assistant Professor, Chiba University</td>
</tr>
<tr>
<td>Panelist</td>
<td>Savira Aristi</td>
<td>Chiba University</td>
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<tr>
<td>Panelist</td>
<td>Sihan Zhang</td>
<td>Chiba University</td>
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<tr>
<td>Panelist</td>
<td>Margaret Bro</td>
<td>Chiba University</td>
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<tr>
<td>Presenter 1</td>
<td colspan="2">FAKSI RANA AL KAHFI
Universitas Pendidikan Indonesia
Digital Literacy in English Language Teaching: A Bibliometric Analysis</td>
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<td>Presenter 2</td>
<td colspan="2">ARGIE ANTHONY CATACIO INCISO
University of San Carlos
DEVELOPMENT AND VALIDATION OF A FRAMEWORK FOR MULTIDISCIPLINARY CURRICULUM INTEGRATION</td>
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<td>Presenter 3</td>
<td colspan="2">VU THU AN
University of Education -Vietnam National University
REDUCING URBAN AIR POLLUTION: LESSONS FROM TOKYO FOR HANOI IN MANAGING FINE PARTICULATE MATTER (PM$_{2.5}$)</td>
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<tr>
<td>Presenter 4</td>
<td colspan="2">NANTHIDA SITHISANE
National university of Laos
An Impact of wage and Education on Labor productivity in ASEAN countries</td>
</tr>
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<td>Presenter 5</td>
<td colspan="2">NI MADE NIA BUNGA SURYA DEWI
Udayana University
ASSESSMENT OF ABOVE-GROUND CARBON AND SPATIAL DISTRIBUTION OF MANGROVES IN GILI LAWANG & GILI SULAT USING CLOUD-BASED GEOSPATIAL ANALYSIS</td>
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<tr>
<td>Presenter 6</td>
<td colspan="2">RIFDA AMARA AULIA
Bandung Institute of Technology
FUTURE PROJECTION OF FOREST FIRE HAZARD IN BORNEO DURING DRY SEASON USING CMIP6 CLIMATE SCENARIOS</td>
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International Research Session

	Room 2205 (Sports Science, Humanities, Social Science, Education)	
Chairperson	WANNEE JERMSURAVONG	Professor, Silpakorn University
Panelist	Rizvon Suleimanov	Chiba University
Panelist	Zai Qurratu' Ainie Zainal Abbidin	Chiba University
Panelist	Yunchen Xu	Chiba University
Presenter 1	THONGDEELERT NATNARONG Mahidol University **BIOMECHANICAL AND NEUROMUSCULAR EFFECTS OF CLUBBELL WEIGHTS AND LENGTHS IN OVERHEAD ATHLETES**	
Presenter 2	KAWASUMI Takuma Chiba Municipal Inage High School **What Japanese People Need To Improve Their English Skills**	
Presenter 3	THANAPAT SUKITPANEENIT, ANUPAT LENGYINDEE Silpakorn University **Effects of Listening Favorite and Selected Music on Muscle Strength and Muscle Endurance Exercise Weight Training Performance**	
Presenter 4	NI KADEK TEJA ARINI Udayana University **LINGUISTIC ACCOMMODATION AND TOURIST EXPERIENCE: THE IMPACT OF BALISH USE BY THE ACUNG TRADERS IN UBUD, BALI**	
Presenter 5	TAKAHASHI Yoshiaki Chiba Municipal Inage High School **The Tesla Revolution : What Japanese Companies Can Learn from Tesla**	
Presenter 6	THANYATHEP SANGKAPONG Silpakorn University **Effects of The Musical Ladder Agility Training on Agility and Response Time in Female Futsal Athletes**	
Presenter 7	CRISTOBAL JR ARANETA RABUYA University of San Carlos **VIEWS OF TEACHER EDUCATION STUDENTS ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE: A QUALITATIVE STUDY**	
Presenter 8	I PUTU EDWIN WAHYU SAPUTRA Udayana University **INTEGRATING JAPANESE MORAL EDUCATION (DOUTOKU KYOUIKU) INTO KAMPUS MENGAJAR: SUPPORTING INDONESIA'S MERDEKA BELAJAR FLAGSHIP PROGRAM**	

Online Presentation Session

Online Presentation Session

Room 1-1 – Chair: IPB University
(Biology)

Chairperson	Muhammad Irfan Afif	IPB University
Session Assistant	Savira Aristi	Chiba University
Presenter 1	WORAKAMOL CHARERNSOM Kasetsart University Kasetsart University Laboratory School, Center for Educational Research and Development **Using Precipitation with Soy Protein and Electrocoagulation Technique in Palm Oil Wastewater for Development of Eco-Friendly Film Product**	
Presenter 2	ADINDA MAHARANI AZLIARITA NARISWARI Universitas Indonesia SMA Negeri 9 Depok **Critical Sea Issue, Care Life on The Sea, Create Better Life for The Sea Ecosystem**	
Presenter 3	CHUTIKAN PHACHONGSIN Mahidol University Wat Rai Khing Wittaya School **Sweat-based Emotion Detector**	
Presenter 4	AKANE KUBOTA Chiba University Chiba Meitoku High School **Cultivation Experiments of Difficult-to-culture Fungi**	

Room 1-2 – Chair: Mahidol University
(Chemistry)

Chairperson	Poschanan Niramitchainont	Mahidol University
Session Assistant	Jiaxin Li Jiejun Dong	Mahidol University
Presenter 1	DHAMMAWIT HAEMANWICHIAN WEERAT KANCHANARATCHATAPHONG Chiang Mai University Chiang Mai University Demonstration School **Compositional Analysis of PM Bound Polycyclic aromatic hydrocarbon (PAHs) and Bioaerosols During Haze Episodes : Implications for urban Air Quality in Chiang Mai**	
Presenter 2	ADIL ATHARY ARIFIN IPB University Kornita High School **Hybrid Ink : A Biodegradable Eco-Marker from Carbonized Biomass**	
Presenter 3	DARLENE BERNICE DANO BRIELLE CAGASAN WYN HANNAH THERESE MONTERA JIBERLEN MAE MORALES VINCEBERG RENALDE PALAMOS University of San Carlos San Carlos School of Cebu Inc. **Analyzing Calcium Chloride cross-linked Sodium Alginate Hydrogel as a Potential Thermal Insulator**	
Presenter 4	ADRIEL RIANDRA DHIAURRAHMAN Institut Teknologi Bandung SMA Negeri 1 Bandung **Synthesis and Characterization of Bioplastics from Banana Peel Starch as an Alternative Environmentally Friendly Material**	

Online Presentation Session

Room 1-3 – Chair: National Taiwan Normal University
(Social Sciences, Others)

Chairperson	Yi-Fen Yeh	National Taiwan Normal University
Presenter 1	HIZKIA NARATYAGA SUWANTO Universitas Indonesia SMA Negeri 9 Depok **The Impact of Physical Activity on Health and Well-being of Adolescents in Depok City**	
Presenter 2	Alia Shibaa Fathia Abidin Institut Teknologi Bandung SMA Negeri 1 Bandung **Digital Strategies for Waste and Food Surplus Management to Mitigate Health Risks and Climate Change**	
Presenter 3	YU, YU-CHI SHEN, LING-YI HSU, I-EN National Taiwan Normal University Taipei First Girls High School **Mitigating Urban Heat through Enhancing Soil Water Retention in Cities**	
Presenter 4	ATSUKI NARAHASHI Chiba University Yokohama Soei Senior High School **Pursuing the Relationship Between the Stability of Social Groups and Other Factors, and Developing Methods to Improve the Stability of Social Groups**	

Room 1-4 – Chair: University of San Carlos
(Physics, Others)

Chairpersons	Rolando V. Obiedo Rhey L. Dizon	University of San Carlos
Session Assistants	Jerwina Mariel Arnejo Emmanuel Cañares	University of San Carlos
Presenter 1	PUTU ANINDHITA INDIVARA DISTY DANANJAYA Universitas Udayana Regents Secondary School Bali **Converting CO2 into Electricity**	
Presenter 2	BONTILAO, JEALLY BELLE CHUA, AARON JEFFERSON YAP, DOMINIC JOHN University of San Carlos San Carlos School of Cebu Inc. **Ultrasonic Sensor-Based Fill Level Detection for a Smart Marine Waste Collection System**	
Presenter 3	NGUYEN HA LINH DANG BA THANH University of Education, Vietnam National University, Hanoi High School of Education and Sciences **Study of Thermodynamic and Melting Properties of Rhodium Metal for Improving High Temperature Thermocouples**	
Presenter 4	WANG, ATHENA PEK, YU-XI YANG, CHING-LAN National Taiwan Normal University Taipei First Girls High School **Discussion on Earthquake-resistant Design of Buildings Based on the Results of Geological Activity Analysis**	

Online Presentation Session

	Room 2-1 – Chair: Kasetsart University (Chemistry)	
Chairperson	Chatree Faikhamta	Kasetsart University
Session Assistants	Methin Intaraprasit Patcharaporn Boonkitti	Kasetsart University
Presenter 1	WIRADA RITHIKUPT PAPICHAYA NAKPON Chiang Mai University Chiang Mai University Demonstration School **Comparing Anti-oxidant Property of Petals, Stament, Root and Stem from Nelumbo Nucifera Gaertn for Development of High Functionalized Synbiotic Drinks from Nelumbo Nucifera Gaertn**	
Presenter 2	HARUN ZAYYAN NASUTION IPB University Kornita High School **Utilization of Salak Seed Waste as Activated Carbon Material for Water Filter Media**	
Presenter 3	FATIH AHMAD AZADIPRASYA Universitas Gadjah Mada SMA Negeri 6 Yogyakarta **Identification of Bioactive Compounds of Siam Weed (Chromolaena odorata) Leaf Extract by LC-HRMS and Their Potential as COX-2 Inhibitors Through an In Silico Analysis**	
Presenter 4	CYZA DENISSE POLIDO JHANNA MAIKA ODRON CHLOE PACOTILLA HANNAH GEZYL SANGCAP ATHENA GRACE VEÑAS University of San Carlos San Carlos School of Cebu Inc. **Evaluation of The Water Resistance Properties of Cassava (Manihot Esculenta)-based Bioplastic**	

	Room 2-2 – Chair: Universitas Udayana (Biology)	
Chairperson	Putu Ayu Asty Senja Pratiwi	Universitas Udayana
Session Assistants	I Gusti Ngurah Bagus Pramana Putra I Putu Oka Pradnyana	Universitas Udayana
Presenter 1	SHIMBUN KITTITAWEESIN Kasetsart University Kasetsart University Laboratory School, Center for Educational Research and Development **A Study on the Environment Factors Affecting the Growth of Isopods**	
Presenter 2	WORASIKARN WARUTAMA Chulalongkorn University Chulalongkorn University Demonstration Secondary School **Effect of Gibberellic Acid on Growing Sunflower Spouts and the Antioxidant Levels Sunflower Spouts**	
Presenter 3	DANISHA 'AFRANOVIA Institut Teknologi Bandung SMA Negeri 1 Bandung **Innovation in Processing Chicken Bone Waste into High Calcium Organic Fertilizer: An Environmentally Friendly Solution at SMA Negeri 1 Bandung**	

Online Presentation Session

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<td>Chairperson</td>
<td>Nguyen Chi Thanh   Vietnam National University</td>
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<tr>
<td>Session Assistant</td>
<td>Nguyen Thi Hoa   Vietnam National University</td>
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<td>Presenter 1</td>
<td>NADHRATANNAIM
IPB University
Kornita High School
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<td>Presenter 2</td>
<td>JUN KANG
Chiba University
Hiroo Gakuen Senior High School
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<td>Presenter 3</td>
<td>ALYAA AQILA ZEN
AMEERA NADHIFAH SALAM
Universitas Pendidikan Indonesia
SMA Alfa Centauri
Exploring the Medicinal Potentials of Zingiber Cassumunar</td>
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<td>Presenter 4</td>
<td>TEERATEP LIWLUK
Mahidol University
Wat Rai Khing Wittaya School
Automatic Garbage</td>
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(Biology)</td>
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<td>Chairperson</td>
<td>Janejira Arsarkij   Chiang Mai University</td>
</tr>
<tr>
<td>Session Assistant</td>
<td>Changju Wu   Chiang Mai University</td>
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Mahidol University
Wat Rai Khing Wittaya School
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<td>Presenter 2</td>
<td>DELYNN MARCELLA DINESSYA
Universitas Udayana
Regents Secondary School Bali
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<td>Presenter 3</td>
<td>KOTARO INUI
Chiba University
Hiroo Gakuen Senior High School
How Animals Act Before Earthquakes？Can Animals Predict the Future?</td>
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<tr><td colspan="3" align="center">Room 3-2 – Chair: Institut Teknologi Bandung
(Chemistry)</td></tr>
<tr><td>Chairperson</td><td>Saat Mubarrok</td><td>Institut Teknologi Bandung</td></tr>
<tr><td>Session Assistant</td><td>Daffa Zettira Mazdhania</td><td>Institut Teknologi Bandung</td></tr>
<tr><td>Presenter 1</td><td colspan="2">PANISARA LIMPAPAWICH
Kasetsart University
Ongkharak Demonstration School
Detection of Ascorbic Acid by using Anthocyanin from Butterfly Pea Flowers on Paper-based Sensor</td></tr>
<tr><td>Presenter 2</td><td colspan="2">PONPOMKWAN CHANHOM
PONGKHWAN SOUNNO
Chiang Mai University
Chiang Mai University Demonstration School
Comparing Sodium Reduction in Food by Using Chitosan and Ground Brown Rice</td></tr>
<tr><td>Presenter 3</td><td colspan="2">MADE INDIRA SARASWATI DEVI
Universitas Udayana
Regents Secondary School Bali
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<tr><td>Presenter 4</td><td colspan="2">KARNSINEE JAKSEMASATITKUL
Chulalongkorn University
Chulalongkorn University Demonstration Secondary School
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Proceedings
- High School Students -

Development of a Weather Forecasting System & Device

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Tokyo Metropolitan High School of Science & Technology, Japan

Purpose and Background

Weather forecast apps and websites (e.g., Weather NEWS, iOS Weather) generally provide six features: current weather, future predictions, location-specific forecasts, alerts, maps, and extra data (e.g., humidity, wind). Despite this, they have notable limitations: (1) minimal personalization, accessibility, and customization; (2) complex interfaces; (3) information overload; (4) limited actionable advice (e.g., "High UV → wear sunscreen"); and (5) low accuracy at pinpoint locations[1] due to reliance on global models (ECMWF, NOAA). To investigate how weather apps can be made more practical, user-friendly, customizable, and provide more accurate pinpoint forecasts.

Materials and Methods
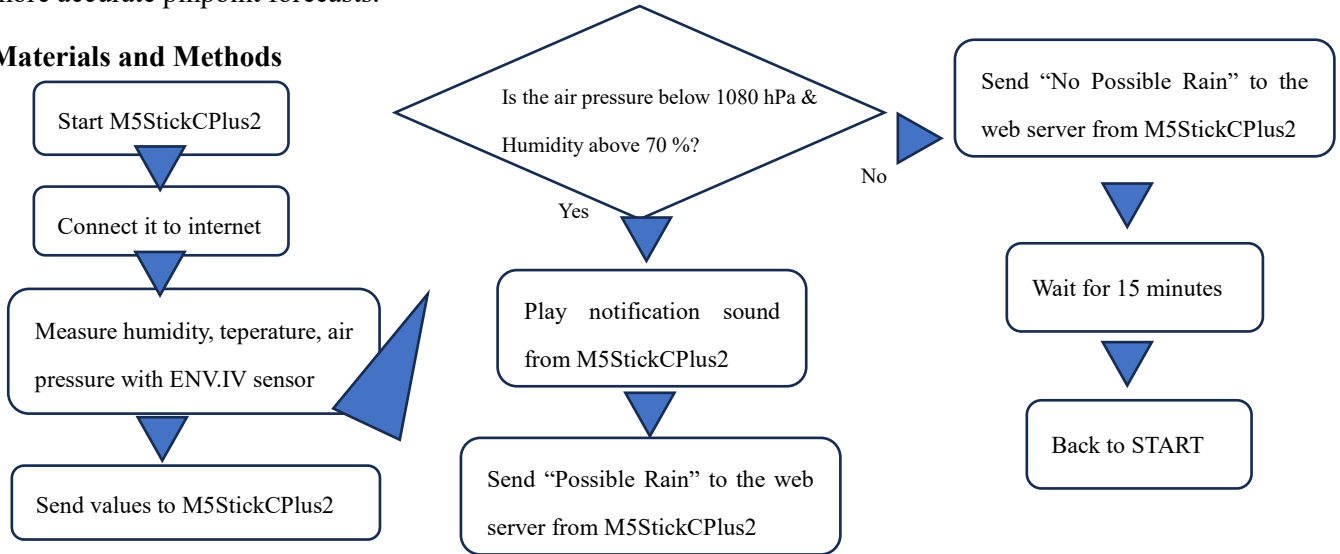
Fig.1 the diagram of how the weather forecast device works

Results and Discussion

The experiment was done on the balcony of my house which may have influenced sensor readings. Preliminary results suggest that my system may provide higher accuracy, but this cannot be determined due to the small amount of data and the experiment is ongoing and additional data collection is required. I have not yet created an app that meets my objective. In the future, I will obtain more data so that my forecast accuracy will improve and can be further used in machine learning to learn the patterns of weather change. I plan to use a different computer, specifically a Raspberry Pi 5, to handle sensor control and machine learning using meteorological data from both the API and sensor more effectively, and to develop an app using Flutter or a programming language for web development.

	10/17		10/18		1/19		1/20		1/29		Mine	App
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	90%	81%
Weather NEWS	O	O	X	O	O	O	O	O	O	O		
My system	X	X	X	O	X	X	X	O	X	X		
Actual Weather	X	X	O	O	X	X	O	O	X	X		

Table 1. Preliminary rain occurance data which was done using the proposed device, extracted exclusively from 5 out of 21 days that showed a weather change, along with forecast accuracy percentage for both the commercial app and my system. [Rained – O, Didn't Rained – X, accuracy(%) = (Number of correct no rain predictions + Number of correct rain predictions) / 21]

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Proceedings
- High School Students – Online

Using Precipitation with Soy Protein and Electrocoagulation Technique in Palm Oil Wastewater for Development of Eco-Friendly Film Product

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Introduction

The palm oil industry is an important industry to the national economy. The production process may contain large amounts of impurities in the form of fat and organic contaminants that affect to water pollution. A promising approach is extracting organics from wastewater to develop biodegradable films.

This research aims to explore innovative methods for extracting, processing, and developing films from palm oil wastewater-derived resources, thereby turning pollution into a sustainable product and contributing to waste utilization.

Research Method

Palm oil wastewater was characterized by using physicochemical analysis. The samples were filtered and adjusted pH and soy protein was then added in wastewater with different ratios for tannin extraction. The current density of electrocoagulation was varied. Glycerol was added in solution as a plasticizer with extracted tannin at different concentrations for film-forming solution. The solution was homogenized using a magnetic stirrer until uniform and was then poured onto petri dishes. Eco-friendly film products were obtained and characterized chemical functional groups.

Findings

The results showed that the wastewater precipitated with soy protein had good tannin removal efficiency. The film could prepare from wastewater to eco-friendly film product. This improvement can be attributed to the ability of proteins, particularly soy protein, to interact with tannins through hydrogen bonding and hydrophobic interactions, leading to the formation of insoluble protein–tannin complexes.

Table 1. Chemical bonding of biobased-film

Wave number (cm^{-1})	Bonding
3270	O–H
1700	C=O
3600-3000	phenolic hydroxyl groups.
1500	N-H
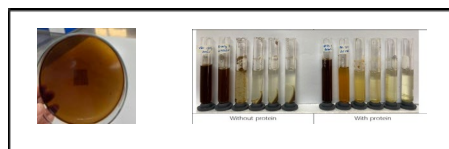
Figure 1. Eco-friendly film development from extracted tannin utilization

Discussion and Conclusion

The recovered tannins from soy protein precipitation and purification were successfully utilized in the preparation of thin films. The integration of soy protein precipitation not only improves tannin recovery but also provides additional functionality to the film matrix. Protein residues can act as natural binders, enhancing film flexibility and mechanical stability. The complexation not only facilitates the efficient recovery of tannins but also reduces the residual tannin content in wastewater, thereby lowering its toxicity and improving water quality.

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Critical Sea Issue, Care Life on the Sea, Create Better Life for the Sea Ecosystem

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2. *Universitas Indonesia*

Introduction

A sperm whale was found dead in Wakatobi, Southeast Sulawesi. Its stomach contained 115 plastic cups, flip-flops, and other plastic debris [1]. Marine debris is not only a threat for the animals but the whole ecosystem below the water. The previous case represents only one example of the worsening condition of the ocean, as the volume of marine debris has consistently increased over the years, globally, the annual production of plastics has doubled, soaring from 234 million tonnes (Mt) in 2000 to 460 Mt in 2019 [2]. The continuous increase in marine debris indicates that public's bad habits, awareness and basic understanding of its impact on marine ecosystems are still insufficient.

Research Method

This is a literature-based study or also known as secondary data analysis, by analizing online published journals, scientific articles and credible reports that are relevant with the topic. This approach allows for the identification of patterns, theoretical insights, and existing findings from previous studies, without the need for primary data collection. A literature review is a discussion of the literature (aka. the "research" or "scholarship") surrounding a certain topic. A good literature review doesn't simply summarize the existing material, but provides thoughtful synthesis and analysis [3].

Findings

The finding of this study indicates that public awareness, especially among the younger generation, regarding the urgency of marine waste issues remains limited. This shows that the curriculum needs to be improved by adding environmental education, with a special subject that helps students understand the serious problems of marine pollution and the importance of protecting nature.

Discussion and Conclusion

Improving curriculum by adding environmental education. Therefore, instilling knowledge about caring and understanding the sea ecosystem for the ocean from an early age has the potential to change human culture and harmful habits in treating the ocean in the future. This can also be understood as a hope for the emergence of a generation that is more concerned with the sustainability of marine ecosystems. The growth in innovation and technological capability [5] and the volume of plastic waste [2] entering marine environments has similarly surged—doubling globally over the same period. This parallel increase underscores that advanced technology alone is insufficient without addressing underlying issues such as public awareness, effective policy, and behavioral change.

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Sweat-based Emotion Detector

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Introduction

Human beings are highly social creatures, and our interactions are deeply influenced by non-verbal cues. We primarily rely on facial expressions, body language, and tone of voice to infer the emotional state of others. However, a growing body of research suggests that the sense of smell, or olfaction, also plays a crucial, albeit often subconscious, role. Human chemo signaling refers to the process by which a person's body odors convey information about their psychological and physiological state to others. This phenomenon has been observed in various contexts, from a mother recognizing her infant's smell to the synchronization of menstrual cycles. The field has expanded to explore the transmission of emotional states, such as fear, disgust, and happiness, through sweat.

Research Method

1. Sweat Data Collection and Analysis

The system begins by detecting and collecting sweat samples using specialized sensors, specifically Electronic Noses (E-noses) for volatile compounds and Microfluidic Systems for precise sample handling.

2. Signal Processing from Sensors

The signals from our sensors undergo preliminary processing through filtering, converting chemical signals into electrical signals, and then into digital data ready for machine processing.

3. Machine Learning

Our AI system will be trained using a dataset where 'sweat biomarkers' are precisely paired with 'ground truth emotional states.' This comprehensive data will then be used to train Machine Learning or Deep Learning models, such as Support Vector Machines, for classification purposes.

4. Software Development & Real-time Visualization

Upon receiving real-time sweat data, our system will analyze the user's emotional state and provide preliminary health insights. These findings will then be displayed instantly through a user-friendly UI.

Findings

Our research confirms that human emotions have a unique chemical signature in sweat, which can clearly distinguish between positive (happiness) and negative (fear) states. This discovery opens up new opportunities for application in the healthcare sector.

Discussion and Conclusion

Our findings provide strong evidence that human emotions, specifically fear and happiness, are associated with a unique and detectable chemical signature in sweat. The successful classification of sweat samples by the raters confirms the existence of emotional chemo signals, while the GC-MS analysis identifies the potential molecular culprits. These results align with previous studies that showed a behavioral and neurological response to emotional sweat, but they go a step further by offering a concrete link between a specific emotion and its corresponding chemical profile.

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Compositional Analysis of PM bound Volatile Organic Compounds (VOCs) and Bioaerosols During Haze Episodes: Implications for Urban Air Quality in Chiang Mai

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Introduction

Chiang Mai frequently experiences severe air pollution during haze episodes, with particulate matter (PM) posing major health risks. These fine particles can carry hazardous substances such as volatile organic compounds (VOCs) and bioaerosols, including fungal spores. In this study, PM samples were collected and analyzed to characterize their VOCs and bioaerosol components. Identifying these pollutants provides insight into their potential health effects, including respiratory and allergic diseases. The presence of specific toxic VOCs and allergenic fungal spores highlights the need for improved monitoring and control measures targeting both chemical and biological air pollutants.

Research Method

This study employed a quantitative research approach. Airborne PM samples were collected using a Nanosampler II, which separates PM into five size stages. VOCs were extracted with chloroform and analyzed via GC-MS. The collected samples were used for fungal isolation and analysis. Bioaerosols were sub-cultured on PDA (Potato Dextrose Agar) and incubated at 30°C to obtain pure fungal colonies. Morphological characteristics were observed under a microscope.

Findings

Figure 1 illustrates the VOCs composition, Health risk assessment indicates that 2,6-Di-tert-butylphenol poses a significant non-carcinogenic risk, with a hazard quotient (HQ) of 1.189, well above the safety threshold (HQ > 1). Benzene exhibits a cancer risk (CR) of 0.185, substantially exceeding the U.S. EPA's acceptable range (1×10^{-6} to 1×10^{-4}). In addition, pathogenic and allergenic fungal genera, including *Aspergillus*, *Fusarium*, *Curvularia*, and *Alternaria*, were detected in the $PM_{2.5}$ samples.
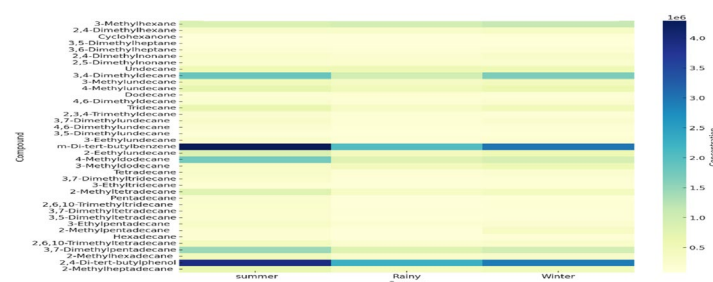
Figure 1. VOCs concentration

Discussion and Conclusion

Chiang Mai's $PM_{2.5}$ contains 40 VOCs, mostly hydrocarbons from combustion and evaporation, with the highest levels in summer and winter. Some compounds, like benzene, pose serious health risks due to their carcinogenicity. DTBP also requires attention to reduce long-term exposure. Additionally, fungal concerns respiratory diseases, allergies, and mycotoxins. These findings highlight significant air quality and public health concerns.

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Hybrid Ink: A Biodegradable Eco-Marker from Carbonized Biomass

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2. IPB University, Indonesia

Introduction

Indonesia faces waste management challenges, especially from underused organic waste like dried leaves. Meanwhile, conventional marker inks contain harmful VOCs [1]. This study introduces biodegradable hybrid inks from carbonized biomass, with rust and recycled battery graphite variations, aiming to create eco-friendly ink and compare formulations for density, absorption, and stability

Research Method

This study (June–July 2025, Kornita High School) used waste-based materials including dried leaves, gum arabic, ethanol, corroded nails, and used batteries. Leaves were carbonized into black carbon as the main pigment, four formulas (2–8 g) were tested mixed with 3 g gum arabic, 20 mL water, and 2 mL ethanol. The 2 g formula showed the best stability, and deep black color, further improved with rust extract and battery graphite. Tests included density, absorption, stability, and color intensity.

Findings

Results showed carbon variation significantly affected ink quality. The 2 g carbon formula was most stable with uniform dispersion. The basic ink (1.11 g/mL, 0.26 cm/min) had weak color, rust ink (1.10 g/mL, 0.30 cm/min) improved absorption but remained less intense, while graphite ink performed best (1.13 g/mL, 0.20 cm/min) with the deepest black**.**

Table 1. Physical and Visual Properties

Ink Type	Density (gr/ml)	Absorption rate (cm/min)	Intensity
Basic Formula Ink	1.11	0.26	Less
Ink + Iron Rust Extract	1.1	0.3	Less
Ink + Battery Graphite	1.13	0.2	Intense
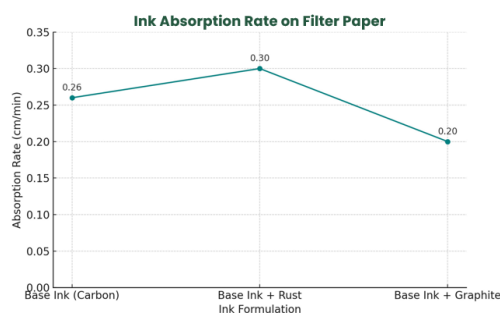
Figure 1. Ink Absorption Rate

Discussion and Conclusion

Experimental results show biomass-derived carbon is a viable pigment for whiteboard ink, reducing dependence on synthetic chemicals. Since conventional markers release VOCs that harm indoor air quality [2], replacing petroleum-based pigments with carbonized leaves, iron oxide, and recycled graphite offers a safer, more sustainable alternative.

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Synthesis and Characterization of Bioplastics from Banana Peel Starch as an Alternative Environmentally Friendly Material Using Phosphorus-Based Additives

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Introduction

Conventional plastics from fossil fuels persist in the environment for centuries, causing severe ecological damage. Bioplastics from renewable resources offer sustainable alternatives, and banana peel—a waste product with 45–55% starch—has strong potential. However, native starch films are brittle, absorb water, and have poor thermal stability. Sodium tripolyphosphate (STPP) can improve these properties via phosphate ester cross-linking, enhancing mechanical strength and water resistance while maintaining biodegradability. This study examines the synthesis and characterization of STPP-modified banana peel starch bioplastics, addressing property enhancement and environmental benefits.

Research Method

Banana peels (Musa paradisiaca) were processed to extract starch, which was gelatinized with water at 80°C, plasticized with 15% glycerol, and combined with STPP at 1% and 7%. Films were cast and characterized using FTIR, tensile testing (ASTM D638), water absorption, TGA/DSC, SEM, and soil burial biodegradation tests.

Findings

1. Mechanical Properties: 1% STPP improved rigidity moderately; 7% STPP significantly increased stiffness and water resistance.
2. Biodegradability: Both degraded in soil within 4–6 weeks; higher STPP slightly slowed breakdown. Environmental Impact: Phosphorus released during degradation can fertilize soil, enhancing agroecological value.

Figure 1. Residue banana peel

Discussion and Conclusion

STPP effectively enhances banana peel starch bioplastics, balancing performance and environmental compatibility. Films with 1% STPP are flexible and degrade quickly, ideal for short-term use. Films with 7% STPP offer greater durability for packaging, still decomposing within weeks and enriching soil with phosphorus. This dual function supports circular economy goals, positioning phosphorus-modified banana peel starch bioplastics as a sustainable alternative to conventional plastics.

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The Impact of Physical Activity on Health and Well-being of Adolescents in Depok City

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2. Universitas Indonesia

Introduction

Senam Anak Indonesia Sehat (SAIH) is an exercise program implemented by The Ministry of Primary and Secondary Education on the 6th of January 2025 to every school in Indonesia[1], with goals to make students fit and concentrate during class.[2] This program then was initiated in Depok City, but currently the program was reduced to only a day and some students still took 11a nap in the class. The purpose of this observation is to analyze if the impact it made on adolescents' physical and mental stability have been stable over the past few months, while having the potential it could have to make a healthy education system.

Research Method

The method that was used to determine the impact by using mixed-methods research, which includes qualitative and quantitative methods, the steps are as follow :
1. First, a survey was made to reach the target audience
2. Content analysis and case study are used to give supportive evidences

For quantitative methods, the estimated number of respondents are 100.000 students. For qualitative methods, the estimated number of informants are 100 students through online meetings.

Findings

The age of respondents ranging from 14 to 18 years old. Based on the responses, the program couldn't able to give most students good quality sleep, which affects the concentration in class.[3]
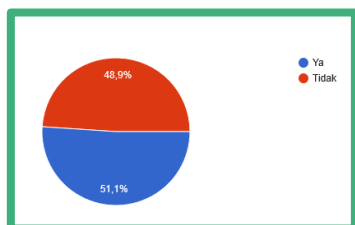
Figure 1. Diagram of Quality Sleep
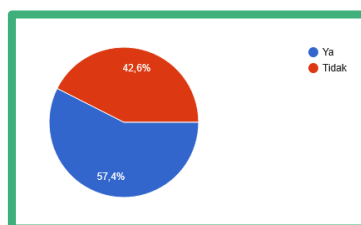
Figure 2. Diagram of Concentration in Class

Discussion and Conclusion

Not all schools have run the program effectively[4], which has a risk to slow down the impact of physical activities that are trying to be implemented. On the other hand, the problem is subtle enough to be avoided. It only needs to be reinforced to every school in Depok, which means each would also be supervised routinely. To stay longer and appeal to students, the program can have a variety of ways to do so, for example a competition between schools or make different variants of songs with different moves. If this study were to be continued, it could be applied to different regions so every adolescents can get the health benefits physically and mentally.

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Digital Strategies for Waste and Food Surplus Management to Mitigate Health Risks and Climate Change

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Introduction

The Bandung Metropolitan Area (BMA) comprises five cities, faces severe infrastructure and financial shortages in its waste management.   The daily waste generation of 3,950 tons (60% of which is food waste) exceeds its 2,950-ton collection capacity, and the only final disposal site (*TPA Sarimukti*) is already operating at 1,000% of 2-million-ton capacity. Financially, their annual waste management budget can only cover 71% of its costs, mainly due to low public awareness, as reflected by 30% compliance with waste collection retribution.

Previous studies suggest that poor waste management is among the significant sources of environmental pollution, contributing to greenhouse gas emissions (Abubakar et al., 2022; Siddiqua et al., 2022). Accumulated waste is also dangerous, as it becomes a source of disease vectors (Juvakoski et al., 2023), leading to an increasing burden of healthcare costs and productivity losses due to illness (Gebrekidan et al., 2024; Triassi et al., 2015).

Given that food waste is one of the largest contributors to unmanaged waste, initiatives to promote waste sorting within a circular economy framework and food rescue groups are not widely implemented in BMA, particularly in Kabupaten Bandung Barat (KBB). Despite this lack of initiative, digital platforms offer significant potential to address this challenge. Even in the lagging area in BMA, i.e. Kabupaten Bandung, the use of phones among residents aged five and older reaches 82%   (BPS Kabupaten Bandung, 2025).

Therefore, this study aims to: (1) encourage household segregation of inorganic waste and almost-expired food through a mobile-friendly platform; (2) improve the economic value of inorganic waste via local waste banks' cooperation; and (3) strengthen community participation through a food distribution initiative.

Research Method

This study is located in Ciwaruga Village, KBB. Our method combines Implementation Research (IR) and Community-Based Participatory Research (CBPR), comprising three phases of the development plan with a one-year timeline.

The 1st phase will be initiated by a needs analysis to identify the socioeconomic background of the Ciwaruga community and to assess the best-suited platform for implementation. This stage involves a stakeholder engagement with village officials (for plan communication ethics approval), the chief of the sub-village or RW (for coordinating and monitoring), the Waste Bank (for waste collection and money value management), and the community empowerment unit or PKK (for food collection management and distribution). Following this, a workflow algorithm will be designed using *draw.io*, focusing on simplicity and efficiency to accommodate non-tech-savvy users. It enables households to choose the type of participation, whether inorganic waste or almost-expired foods. Additionally, a file to monitor donation amounts and expiry dates will be developed using MS Excel. This phase will conclude a pilot project in RW 11.

The next phase will prioritise scaling up to 4 out of the 21 RWs, open recruitment for volunteers, and distribute food to selected poor households. Finally, the 3rd phase will focus on broadening the expansion to 15 out of 21 RWs and distributing the benefit through savings generated from the water bank and the food fair.

Findings

Ciwaruga Village is inhabited by 13,679 residents, with a density of 2,148 people/km2, and is a well-connected area supported by 12 BTS units and strong 5G/LTE. The pilot project location is in the RW11, comprising three neighbourhood associations (RT), with a total of 410 households. The characteristics of the RW 11 inhabitants are similar to the average Ciwaruga Village population.

 During this 1st phase of the timeline, stakeholder engagements have been conducted with the chief of RW 11, the PKK, and the Waste Bank, namely *Bank Sampah KABUT Cigugur Girang*. Both parties welcome and show interest in being involved in this project. Furthermore, the Waste Bank has set the price of inorganic waste and has committed to managing trash and collection.

A website named ResQCycle was developed, featuring TrashResQ for inorganic waste, and FoodResQ for surplus food. Both run on simple Google Forms and MS Excel tracking. Collection occurs twice in a week,

coordinated by RW volunteers, waste banks, and PKK, with benefits distributed to households and poor families. Our next step is socialisation to the community and implementation of the platform, which is scheduled for early September 2025. The website can be accessed through this link: https://sites.google.com/sma.belajar.id/resqcycle/home. The main features of the platform are shown in Table 1, while the user interface of the platform appears in Figure 1 below.

Table 1. ResQCycle – Website for Food Waste & Inorganic Waste Management

Feature	TrashResQ	FoodResQ
Participants	HHs & Business	HHs & Business
Object	Inorganic waste	Food waste
Type of commodity	Metal, plastic, paper, glass,	Edible surplus canned foods/ snacks
Managed by	Volunteer at RW	Volunteer at RW
Picked by	Trash men	PKK
Collection	Twice a week	Twice a week
Pooled at	Waste Bank	PKK
Benefit type	Money & In-kind (necessities)	In-kind (Food)
Beneficiary	Participants & Trash men	Poor households & Trash men
Distributed by	PKK	PKK
Distribution	Every 3 months	Every month
Reported to	Village office	Village office

Figure 1. Main page of ResQCycle Website

Figure 2. TrashResQ google form

Discussion and Conclusion

ResQCycle is designed to improve community awareness and participation in managing inorganic waste and food waste through connecting waste banks and village administrations. Besides monetary and food benefits, the initiative is expected to help minimise health risks caused by waste accumulation. Currently, the pilot platform is embedded in the school account, which restricts access to students & teachers who have an *akun belajar ID* (Indonesian student/teacher account). The plan to further develop the website to enable it for public access is underway. Despite its limitations, the initial phase of this project has secured support from the community organisations and relevant stakeholders. However, subsequent measures are imperative for full implementation and successful scaling up of this project at the village level.

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Mitigating Urban Heat through Enhancing Soil Water Retention in Cities

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Introduction

Urban Heat Island (UHI) effects raise city temperatures, but Taipei's green spaces, which make up over 16% of the city, are key to combating this. This study focuses on improving soil water retention in these green spaces to enhance their cooling capacity. By helping the soil store and release water, these areas can act as natural air conditioners, lowering temperatures and reducing urban flooding. This approach is a sustainable, low-cost, and accessible solution for urban climate challenges.

Research Method

The study employed an experimental design to test soil amendments that improve water retention. Equipment included transparent acrylic tubes (30 cm length, 3.2 cm diameter), filter paper, an empty cup, water with a dropper, and an electronic scale (Figure 1).

Procedure:

1. The device was set up with filter paper at the bottom of the tube.
2. Water was added using a dropper (2.5 ml every 30 seconds).
3. The process continued until water leakage began, with time recorded.
4. Tests were conducted for soil, rice husk biochar, lightweight expanded clay aggregate (LECA), and mixtures.
5. Absorption rate was calculated as water weight divided by material weight.

Figure 1.

Findings

The experiment revealed significant differences in water absorption rates among materials:

Table 1. Water Absorption Rate of Materials

Material	Material Weight (g)	Water Weight (g)	Absorption rate (%)
Soil	198.0	29.5	14.9%
Rice husk biochar	17.9	9.2	52.9%
LECA	31.1	17.5	56.8%
Soil + Rice husk biochar	26.7	15.0	56.2%

Results indicate that natural soil absorbs water slowly, leading to surface water accumulation, while biochar and LECA enhance absorption and retention.

Discussion and Conclusion

Soil amendments like rice husk biochar and LECA were found to significantly improve water retention in urban soils. This approach can reduce runoff, prevent flooding, and boost the cooling effect of green spaces. Future strategies could involve layering these materials to prevent accumulation while maximizing water retention. This research presents a low-cost, sustainable solution for urban climate resilience and mitigating Urban Heat Island effects.

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Converting CO2 into Electricity

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Introduction

This experiment demonstrates how CO_2, when injected into an electrolyte solution, can react to produce a small electric current, mimicking a simplified version of a CO_2-based electrochemical cell.

Research Method

Materials used : Zn & Cu strip, electrolyte solution(dissolving baking soda in distilled water), CO_2 (generated from vinegar + baking soda).

Equipment : Beaker, flask, wires with alligator clips, small LED, multimeters, gas delivery tube.

Findings

Experiment I (Adding baking soda into vinegar)				Experiment II (Pouring vinegar into baking soda)			
Vinegar (ml)	Baking Soda (g)	Voltage (V)	CO_2 (g)	Vinegar (ml)	Baking Soda (g)	Voltage (V)	CO_2 (g)
100	5	0.02	2.6	20	40	0.04	0.77
100	10	0.035	3.4	50	80	0.055	1.935

Discussion and Conclusion

A minimum of 0.035g of CO_2 is feasible to produce a noticeable increase in LED brightness. However, a constant CO_2 flow of at least 3g is ideal to maintain the consistent brightness. Unfortunately due to the limited apparatus available in school, maintaining a constant flow of CO_2 was not possible. It is assumed that the LED's brightness correlates with the CO_2's concentration, and after 5s the voltage will start to decrease as the concentration of CO_2 reduces. During Experiment II, an overflow occurred when 50ml of vinegar reacted with 80g of baking soda in a flask that was too small to contain the reaction, which results in partial loss of CO_2 leading to only a small amount of voltage being produced.

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Special mention : Agatha Valencia Indrajaya

Fill Levels in the Kraken River Trash-Collecting Robot: Measuring HCSR04 Accuracy and Response Time

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Introduction

Plastic pollution in Philippine rivers such as the Guadalupe River continues to worsen due to poor waste management (Gregorio, 2020; Rona, 2018). Autonomous devices like *Kraken*, a solar-powered, floating trash collector, present sustainable solutions. To improve efficiency, this study tested the HC-SR04 ultrasonic sensor for real-time monitoring of the bin's fill level.

Research Method

A quantitative, experimental design was applied. The HC-SR04's accuracy and response time were measured under controlled conditions simulating the Kraken's waste bin environment.

Findings

The sensor showed high accuracy at 25%–75% fill levels, with slight errors at 10% and 100% due to beam spread and surface irregularities. Response time remained below 0.2 seconds across waste types.

Table 1. Sensor Accuracy at Fill Levels

% Full	Actual (cm)	Avg Sensor (cm)	SD (cm)	Abs. Error (cm)	% Error
10%	45.0	46.2	0.8	1.2	2.67
25%	37.5	37.8	0.5	0.3	0.80
50%	25.0	25.1	0.3	0.1	0.40
75%	12.5	12.6	0.2	0.1	0.80
90%	5.0	5.3	0.4	0.3	6.00
100%	0.0		0.3	0.5	N/A

Discussion and Conclusion

The HC-SR04 proved accurate, fast, and low-cost, making it suitable for Kraken's real-time fill detection. These results support optimized collection cycles and improved waste management. Limitations include lab-only testing and sensitivity to irregular surfaces. Field validation and durability studies are recommended.

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Analyzing Geological Activity to Study Earthquake-Resistant Design

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Introduction

As residents living in an earthquake-prone region, we recognize the importance of acquiring knowledge related to seismic safety. Therefore, we began by researching and compiling information about the tectonic plates, fault lines, and causes of earthquakes specific to Taipei, the capital city of Taiwan, in order to develop a fundamental understanding of our local geological environment. This investigation was conducted using geological data and disaster potential maps provided by official government agencies.

Building upon this foundation, and integrating concepts from our school curriculum and daily life experiences, we utilized materials available in the laboratory to construct model buildings and dampers. These models were then tested using a simulated earthquake platform to analyze and calculate the seismic mitigation effectiveness of dampers with varying masses. Relevant literature on damping principles and damper structures was referenced throughout the process.

This research aligns with the goals of the conference under the framework of the United Nations Sustainable Development Goals (SDGs), particularly Goal 9 (Industry, Innovation and Infrastructure), Goal 11 (Sustainable Cities and Communities), and Goal 13 (Climate Action).

Research Method

1. Experimental Materials and Instruments

Bamboo chopsticks, wooden blocks, extension springs, compression springs, 20 g hanger weight, 10 g and 20 g masses, pulleys, cotton string, polystyrene glue, foam glue, AB glue, adhesive tape, scissors, PP boards, rulers, and an earthquake simulator.

2. Experimental Apparatus

"Simulated Earthquake Model":

The apparatus was constructed with wooden blocks bonded by AB glue to form a model house. Bamboo chopsticks were fixed at the four corners, with four springs suspending a 20 g mass to act as a damper. Pulleys were added at the base to reduce friction, and compression springs on both sides provided basic damping while restricting oscillation. The base was made of a 25 × 25 cm PP board to secure the model to the earthquake simulator. Rulers were attached to the sides to measure spring compression and quantify the damping effect.
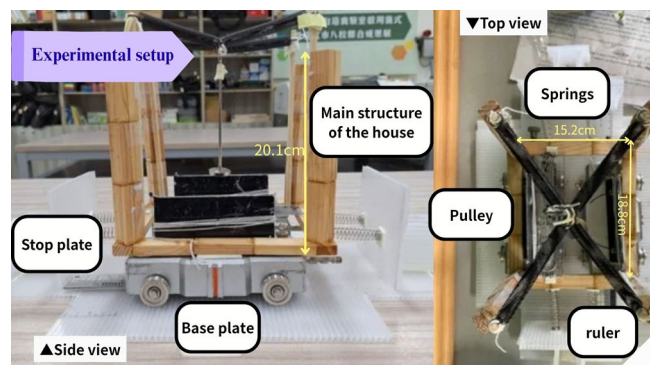
3. Experimental Variables

Different weights were suspended, with masses of 20 g, 40 g, 60 g, and 80 g.

4. Experimental Procedure
   (1) Suspend the test mass.
   (2) Place the apparatus on the earthquake simulator.
   (3) Activate the simulator and use slow-motion video recording to observe the deformation of the springs.

5. Data Collection and Analysis Methods

Slow-motion video recordings were analyzed to measure the maximum displacement approximately every four seconds. Each trial was repeated five times, and the data were tabulated. The displacement values were multiplied by the spring constant of the compression springs to obtain the corresponding elastic force. The variation in elastic potential energy was then calculated, and the results were plotted into graphs for comparison.

Findings
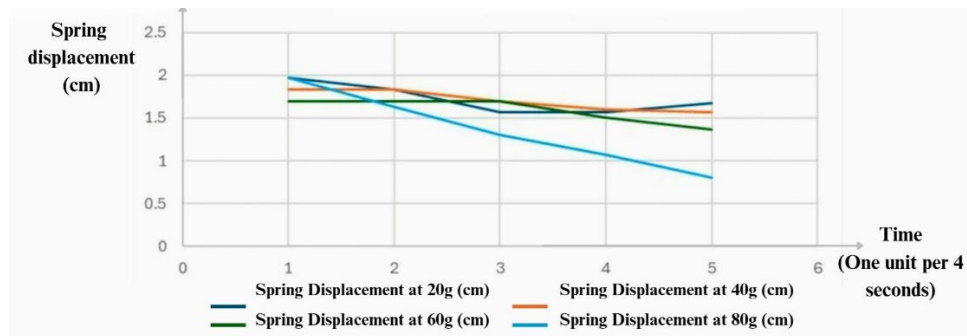
Figure.1 Variation in the average displacement data of springs connecting a simulated building caused by weights of different masses

From the above figure and the video analysis, as the hanging weight increases, the spring displacement decreases.

Displacement is larger during the initial stage (0–8 seconds), with significant shaking.
From the mid to late stage (12–20 seconds), displacement gradually decreases.

Discussion and Conclusion

This study combines data collection and analysis of geological activity in Taiwan with a simplified earthquake simulation experiment to examine the effect of damper mass on the seismic performance of buildings. Based on the experiments, the following conclusions can be drawn:

(1) Causes of Earthquakes

In addition to the commonly known cause of tectonic plate movements, earthquakes can also result from the fracturing of rock layers due to the presence of magma chambers.

(2) Effect of Different Damper Weights on Average Maximum Displacement

Under fixed vibration conditions, the greater the mass of the suspended weight, the smaller the average maximum amplitude of the building structure, indicating better seismic reduction performance.

(3) Damping Behavior: Reduction of Vibration Amplitude Over Time

All experimental trials demonstrated that vibration amplitude decreased progressively over time. This indicates that the simulated dampers possess the fundamental functions of energy dissipation and structural stabilization. Although the experiment was subject to limitations, such as uncontrolled overall building mass, the preliminary trend of "heavier damper masses leading to better seismic performance" was still clearly observed.

(4) Experimental Limitations and Reflections

Since the total mass of the simulated building could not be fully controlled, the addition of weights may have simultaneously altered the overall structural inertia, thereby influencing the vibration response. Moreover, the springs connected to the model to quantify vibration reduction may have interfered with the damping effect. Therefore, while the observed trend suggested "greater mass leads to smaller vibration amplitude," further experiments are required to verify whether this trend originates solely from the damper itself.

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Comparing the antioxidant properties of petals, stamens, root, and stem from Nelumbo nucifera Gaertn. for the development of high functionalized synbiotic drinks from Nelumbo nucifera Gaertn

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Introduction

Nelumbo nucifera Gaertn. (sacred lotus) is an aquatic plant traditionally valued for both culinary and medicinal purposes due to its rich phytochemical composition, particularly flavonoids, phenolics, and antioxidants. Comparative analysis of its petals, stamens, roots, and stems provides insights into their distinct bioactivities and identifies the most suitable parts for functional applications. This study focuses on evaluating antioxidant compounds in different plant parts to assess their potential for development into synbiotic beverages.

Research Method

In this study, four parts of Pink and White Nelumbo nucifera Gaertn.—petals, stamens, roots, and stems— were analyzed for their total phenolic, anthocyanin, and flavonoid contents, along with their antioxidant activities using DPPH, ABTS, and FRAP assays. High-performance liquid chromatography (HPLC) was employed to identify and quantify selected phenolic and flavonoid compounds by comparison with three reference standards. The phytochemical profiles were further discussed about their potential health benefits. The findings provide valuable insights for guiding future research and for supporting the development of functional foods and pharmaceutical applications.

Findings

The total anthocyanin content was expressed as milligrams of cyanidin-3-glucoside equivalent per gram of crude extract (Figure 1). The Pink Lotus petals contained 13.15 ± 0.59 µg/g extract, which was significantly higher than that observed in the other samples. The total phenolic content was determined as milligrams of gallic acid equivalent (GAE) per gram of crude extract (Figure 2). The Pink Lotus petals exhibited 101.88 ± 1.68 µg/g extract, representing a comparatively higher phenolic content than the other samples. The total flavonoid content was reported as milligrams of quercetin equivalent (QE) per gram of crude extract (Figure 3). The Pink Lotus petals showed 97.57 ± 1.59 µg/g extract, which was considerably higher compared to the other samples.
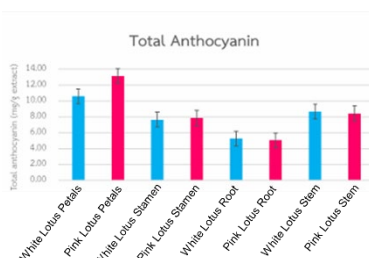
Figure 1. Total Anthocyanin   **Figure 2. Total Phenolic Compounds**   **Figure 3. Total Flavonoid Contents**
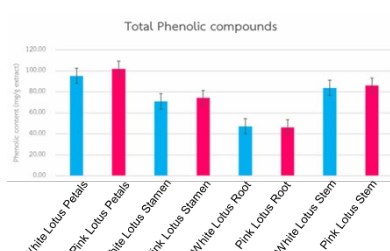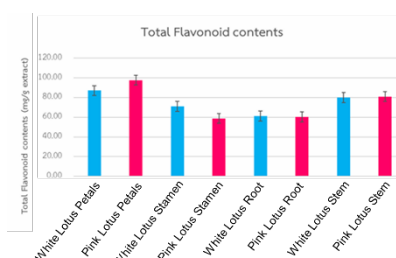
Discussion and Conclusion

The results indicate that the petals of Nelumbo nucifera Gaertn. contain significantly higher levels of anthocyanins, phenolics, and flavonoids than the stamens, roots, and stems, which account for their superior antioxidant activity. These findings align with previous reports emphasizing the role of phenolic and flavonoid compounds in radical-scavenging capacity. Overall, the phytochemical richness and strong antioxidant potential of the petals suggest their suitability as promising ingredients for the development of functional beverages with enhanced health benefits.

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Utilization of Salak Seeds as Activated Carbon Material for Water Filter Media

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Introduction

Indonesia produces large amounts of salak fruit waste, particularly seeds (roughly 1 million tons annually) [1]. This biomass has potential as an alternative raw material for activated carbon, supporting sustainable waste management and water purification efforts. The seeds were carbonized through pyrolysis and chemically activated with acetate, citric sulfate acids to enhance surface area and porosity. Characterization results showed that salak seed-based carbon had high adsorption capacity, making it suitable for alternative water filtration applications.

Research Method

Salak seeds need to be made into granules, be pH neutral and dry in order to maximize the absorption process, not significantly alter the pH, and not hinder the absorption process. In order to achieve that, Salak seeds were washed, dried, and carbonized at 400°C-800°C. The chemical activation was conducted using vinegar (5%-10% acetate acid), lemon extract (±5% citric acid), and 98% sulfate acid solution, rested for 24 hours and followed by washing with distilled water and drying. Thereafter, activated carbon performance in water pH and colour change were tested.

Findings

The testing process begins by wrapping the activated charcoal from the three samples in filter paper, then the contaminated water is passed through the charcoal and filter paper. After the testing, the results show: Sulfate activated carbon efficiently changes the visual appearance of the solution, Citric activated carbon shows the most neutral pH, Acetate activated carbon shows highest pH in pH test

Figure 1. Iodine solution test, for visual changes
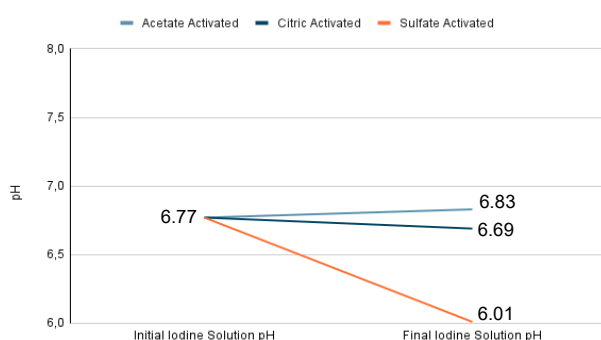
Figure 2. Pond water test, for pH changes
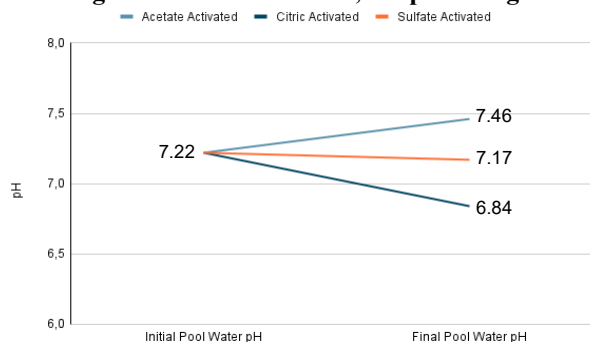
Discussion and Conclusion

This study confirms that salak seed waste can be effectively transformed into activated carbon with high adsorption capacity, and also this study confirms that easily accessible items such as vinegar and lemon extract can be used effectively as chemical activator. With the lemon shows the most neutral filtrate and citric shows the cleanest visual one.

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Identification of Bioactive Compounds of Siam Weed *(Chromolaena odorata)* Leaf Extract by LC-HRMS and Their Potential as COX-2 Inhibitors Through an In Silico Analysis

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Introduction

Inflammation is a fundamental biological response that, when chronic, can contribute to various diseases, including cancer, cardiovascular diseases, and autoimmune disorders [1]. A key enzyme in the inflammatory pathway is Cyclooxygenase-2 (COX-2) [2]. *Chromolaena odorata*, commonly known as Siam weed, is often considered a weed that is easy to find and grows everywhere in Indonesia. However, previous research has shown that Siam weed contains bioactive compounds such as tannins, phenols, saponins, steroids, and flavonoids, which suggest its potential in treating chronic inflammatory diseases [3].

Research Method

This research utilized Siam weed (*Chromolaena odorata*) leaves obtained from Sleman, Yogyakarta. Analytical chemicals were obtained from Sigma Aldrich and Merck. The research methods included the extraction of Siam weed leaves, followed by DPPH, TPC, and TFC assays to determine antioxidant activity. The identification of metabolite compounds was performed using LC-HRMS (Liquid Chromatography-High Resolution Mass Spectrometry). Subsequently, in silico analysis (molecular docking) was conducted to predict the interaction between the identified compounds and the COX-2 receptor. The receptor was prepared by removing water molecules, adding hydrogen atoms, and Kollman charges. The validity of the docking method was confirmed by an RMSD value of 0.58Å for the COX-2 receptor.

Findings

The results showed that the non-blanching process yielded a higher extract percentage (24.00%) compared to the blanching process (16.10%). The non-blanching process also demonstrated higher antioxidant activity, TPC, and TFC, with an IC50 value of 284.51 ± 0.23 ppm, TPC of 78.06 ± 3.03 mg GAE/g, and TFC of 75.23 ± 0.21 mg QE/g. LC-HRMS analysis successfully identified various bioactive compounds, including 9S,13R-12-Oxophytodienoic acid, 2-(2,6-dimethoxyphenyl)-5,6-dimethoxy-4H-chromen-4-one, and Deoxyelephantopin. Flavonoid compounds like Kaempferol and Genistein were also identified which is used as a ligand.

Table 1. Docking Result

No	Ligand	Energy binding value (ΔG) kkal/mol	Inhibition Constant (μM)
1	Ibuprofen (native ligand)	-8.43	661.94×10^{-3}
2	Genistein	-7.89	1.63
3	Kaempferol	-8.36	740.17×10^{-3}

Discussion and Conclusion

The non-blanching process yielded higher antioxidant activity, TPC, and TFC. LC-HRMS analysis successfully identified various bioactive compounds, including Kaempferol and Genistein that widely known for their anti-inflammatory agent. The in silico analysis via molecular docking was performed to test the potential of these compounds as COX-2 inhibitors. The simulation results showed that Kaempferol had a binding energy of -7.89 kcal/mol and Genistein had -8.36 kcal/mol. Both values indicate a promising binding affinity to the COX-2 receptor. This affinity suggests that these two compounds have the potential to inhibit the activity of the COX-2 enzyme, similarly to Ibuprofen, which has a binding energy of -8.43 kcal/mol. This interaction is supported by conventional hydrogen bonds and other interactions. This research aligns with the Sustainable Development Goals (SDGs), specifically points 3 (Good Health and Well-being), 9 (Industry, Innovation, and Infrastructure), and 15 (Life on Land).
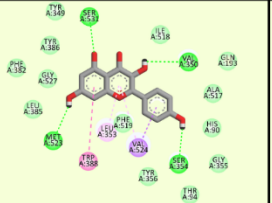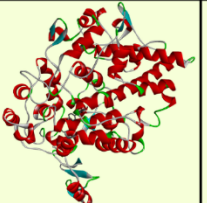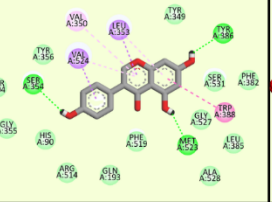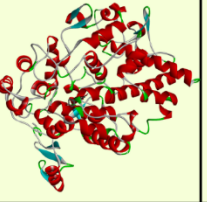
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APPENDICES

1. Siam Weed Bioactive Compound Identification using LC-HRMS

Siam Weed Bioactive Compound Identification using LC-HRMS

No.	RT (min)	Compound Name	Molecul Formula	M/W	Area (Max.)	Compound Classification
1	11,716	9S,13R-12-Oxophytodienoic acid	C18 H28 O3	292,2031	12073307718	Fatty acid derivative
2	10,181	2-(2,6-dimethoxyphenyl)-5,6-dimethoxy-4H-chromen-4-one	C19 H18 O6	342,1094	11615992255	Flavonoid
3	11,377	ML-236C	C18 H26 O3	290,1875	10754344840	Statin
4	11,653	Estriol	C18 H24 O3	288,1722	10354813194	Steroid hormone
5	10,641	Deoxyelephantopin	C19 H20 O6	344,125	9167852800	Sesquiterpene lactone
6	8,341	Kaempferol	C15 H10 O6	286,0476	203345718	Flavonoid
7	8,779	2-(2,4-Dimethoxyphenyl)-7-hydroxy-5-methoxy-2,3-dihydro-4H-chromen-4-one	C18 H18 O6	330,1095	5180161177	Flavonoid
8	9,598	Tangeritin	C20 H20 O7	372,12	4180217806	Flavonoid
9	10,479	Genestein	C16 H14 O5	286,08373	1130326139	Flavonoid
10	11,31	Estriol	C18 H24 O3	288,1722	4019031140	Steroid hormone
11	10,36	Byakangelicol	C17 H16 O6	316,094	3584110284	Coumarin
12	0,776	2-morpholinoacetic acid	C6 H11 N O3	145,0737	2538286821	Organic acid
13	12,562	Deoxyelephantopin	C19 H20 O6	344,12496	1703628271	Sesquiterpene lactone
14	1,027	2-morpholinoacetic acid	C6 H11 N O3	145,07367	1284894128	Organic acid
15	8,544	Isorhamnetin	C16 H12 O7	316,05796	1190731973	Flavonoid

2. Molecular Docking Analysis Visualitation

Molecular Docking Analysis Visualitation

No	Ligand	2D structure	3D Structure	Hydrogen Interactions	Binding energy value	Inhibition Constant
1	Kaempferol			SER A:531, VAL A:350, SER A:354, dan MET A:523	-7.89	1.63×10^{-6} M
2	Genestein			SER A:354, TYR A:386, dan MET A:523	-8.36	740.17×10^{-9} M

A Study on the Environmental Factors Affecting the Growth of Isopod

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2. Kasetsart University, *Bangkok, Thailand*

Introduction

The study's purpose is to analyze different environments effecting the growth and reproduction of isopodsand to find out the best conditions for an isopod's environment. The experiment are shown to have different results and proves that isopods have different behaviors when they live in different environments.

Research Method

The experiment was started by a three-tank set up with each tank having a different environment, different temperature, and different humidity. Fifteen isopods were put into each tank. The isopod's growth and population were observed for twenty weeks and the data that was collected from the experiment focused on the isopods' sizes and the isopods' population.

Findings

The findings of the experiment suggests that each culture of isopods behave differently in each environment. This include the growth and the number of the isopods' population. The isopods are shown to adapt to their new environment just to increase their population. We also found out which of the environments were the best for the isopods to live in.

Figure 1. Isopods' population
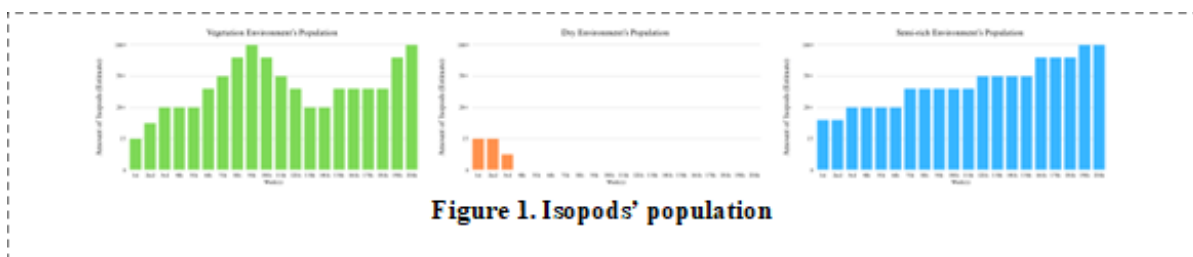
Discussion and Conclusion

The best environment for isopods is a vegetation environment resulting from high humidity and additional resources from decaying plants. Research that relates to my experiment suggests that moisture levels being too low is another cause of death for isopods, which means isopods can be found scurrying around any backyard in moist, dark conditions. Some implications were found such as the isopods overcrowding the tank due to the limit of space, or plants not thriving in a proper habitat.

Further research may potentially bring up how soil pH effects isopod behavior. Important factors for the best isopod environment are balanced humidity and habitats that are covered in vegetation. This shows how environmental conditions strongly affect isopod survival and behavior. These findings can expand our understanding of the ecological role of isopods and how they respond to different environments.

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Effect of Gibberellic Acid on the Growth of Sunflower Sprouts and Their Antioxidant Levels

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Introduction

Antioxidants are vital bioactive compounds that protect the human body from oxidative damage caused by free radicals. They play a crucial role in delaying the aging process, enhancing immune function, and reducing the risk of chronic diseases, including cancer and cardiovascular disorders. Naturally, antioxidants are abundant in fruits, vegetables, and young plant sprouts. This study was designed to investigate the potential of using plant growth regulators, specifically gibberellic acid (GA_3), to enhance antioxidant levels in sunflower sprouts without increasing the amount of plant material required.

Research Method

The experiment was divided into five treatment groups according to gibberellic acid concentrations: 0% (control), 5%, 10%, 15%, and 20%, corresponding to 0, 75, 150, 225, and 300 ppm, respectively. Each treatment group consisted of 150 sunflower sprouts. After optimising the growth conditions, the average stem and root lengths of the sprouts were measured. The samples were homogenised using a blender and subsequently extracted with ethanol in an ultrasonic bath at a ratio of 1 g of plant material to 3 mL of ethanol. The obtained extracts were concentrated using a rotary evaporator and further dried through freeze-drying. The ethanol extracts were then subjected to analyses including TPC, TFC, DPPH radical scavenging assay, TLC and NMR.

Findings
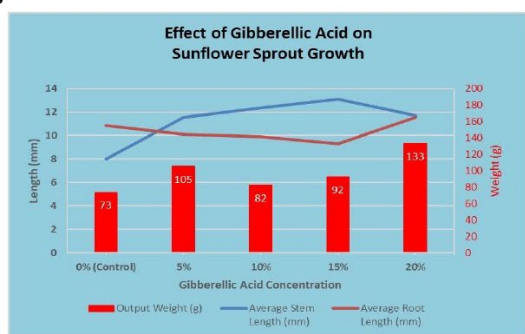
Effect of Gibberellic Acid on Sunflower Sprout Growth

Gibberellic acid concentration (ppm)	Total phenolic content* (mgGE/g)	Total flavonoid content* (mgQE/g)	Antioxidant activity	
			IC_{50}	Trolox/g of ethanol extract
0	5.80 ± 0.05	4.79 ± 0.94	0.69	12.72
75	6.06 ± 0.12	5.52 ± 2.65	0.62	14.16
150	5.34 ± 0.09	2.11 ± 0.28	1.31	6.70
225	8.85 ± 0.60	1.92 ± 0.70	0.57	15.40
300	8.51 ± 0.29	2.07 ± 0.80	0.86	10.21
Standard trolox	-	-	8.78	-

*The sample was examined at a concentration of 2.50 mg/mL.

Gibberellic acid significantly promoted stem elongation, with the most pronounced increase observed between 0% and 5%, and a maximum effect at 15% (225 ppm). Root growth was slightly inhibited with increasing GA_3 concentrations up to 15%, but showed recovery at 20% (300 ppm). Nuclear Magnetic Resonance (NMR) spectroscopy was performed to further characterise the biochemical composition of the samples. Fatty acyl compounds were consistently detected across all treatments. When comparing fatty acyl compounds with sugars, the levels of glucose and fructose increased significantly in samples treated with GA_3 concentrations above 10% (150 ppm). Total Phenolic Content (TPC) exhibited a general upward trend with increasing GA_3 concentrations, except at 10% (150 ppm), where a minor decline was observed. In terms of antioxidant activity, evaluated using the DPPH assay, the sprouts from 225 ppm Gibberellic acid treatment gave antioxidant capacity with IC50 volume of 0.57 mg/ml and TEAC volume of 15.40 mg   Trolox/g of ethanol extracts.

Discussion and Conclusion

The concentration of gibberellic acid exerts a significant influence GA_3 on both growth parameters and metabolite profiles in sunflower sprouts. The highest antioxidant activity was achieved at 15% (225 ppm), accompanied by elevated levels of sugars and phenolic compounds. These results underscore the potential application of GA_3 in enhancing nutritional and biomedical value.

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Innovative Processing of Chicken Bone Waste into High-Calcium Organic Fertilizer at SMA Negeri 1 Bandung

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Introduction

Chicken bone waste contributes to environmental pollution at SMA Negeri 1 Bandung because it is difficult to decompose and rarely utilized or recycled. However, chicken bones can be processed into organic fertilizer as they contain approximately 12,7% calcium (Fynnisa et al., 2019) which can help maintain the plant's fertility at SMA Negeri 1 Bandung.

Research Method

This study focused on comparing two drying techniques and their impact on the quality of the final product, experimental results, and the feasibility of processing the product within the school environment. The research was experimental, using 12 grams of chicken bones: 3 grams were sun-dried and 9 grams were air-fried. Data were collected through one-day observations and analyzed using a mixed-methods approach, combining qualitative and quantitative analysis. The process involved boiling the bones at 100°C for 10 minutes, soaking them in cold water to remove joints and remaining meat, then drying them using two different methods: sun-drying for 5 hours or air-frying at 200°C for 20 minutes. Finally, the dried bones were ground into powder using a mortar and pestle and sifted to produce bone meal which was sprinkled around plants.

Findings

1. The visibility and compactness of the sponge-like bone structure, observed in the epiphysis, represent the bone's density and are inversely proportional
2. The temperature and duration of desiccation affect the bone's density, color, smell, mass, and texture of the bone meal
3. The bone meal-to-residual ratios for sun-dried and air-fried bones are inversely related with ratios of 2:1 and 1:2, respectively

Figure 1. Residual (above) and bone meal (below) of air-fried (left) and sun-dried (right)

Discussion and Conclusion

Several variables affect the amount of calcium present in bone meal (First et al., 2019). The use of certain chemicals may yield different results (Triviana et al., 2021).

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The Effectiveness of Eggshell Waste as a Fabric Bleaching Agent

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Introduction

The production of chicken eggs in Indonesia continues to increase significantly. Once the eggs are used, the shells become waste. Currently, eggshell waste is not utilized optimally and is often discarded. Each eggshell is 89,7-97% calcium carbonat[1]. Calcium carbonate in Eggshells has abrasive properties, if egg shells have been processed into detergent, there will be many benefits [2]. Therefore, eggshells have the potential to be useful active ingredients in the natural fabric bleaching process.

Research Method

This experiment tests the effectiveness of eggshells as a fabric bleaching agent. Using tools like blenders and measuring cups, dried eggshells are crushed into powder and mixed with 50 ml of water at concentrations of 5% (2.5 g), 10% (5 g), and 15% (7.5 g). A control sample uses only water. Cotton fabrics stained with ink, lipstick, soy sauce, soda, fat, and markers are soaked in each solution for one hour.

Findings

Soaking fabric samples in an eggshell powder solution showed that eggshell effectively transformed the stained fabric, making it appear cleaner than the control sample (0% eggshell). This suggests that the calcium carbonate ($CaCO_3$) in eggshell acts as an active ingredient in the fabric bleaching process, naturally binding the dye to the fabric fibers and preventing color fading during washing.
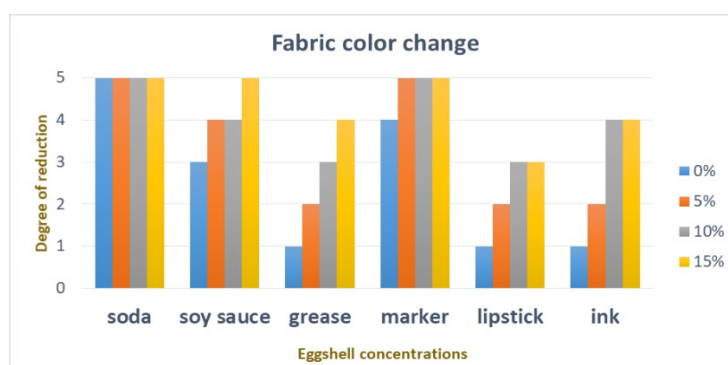
Figure 1. Fabric color changes scale
Note: 1 = stain not reduced; 2 = stain slightly reduced; 3 = stain reduced by half; 4 = stain almost gone; 5 = stain completely gone

Discussion and Conclusion

Use of eggshell powder as a natural bleaching agent is an effective and eco-friendly approach. The calcium carbonate (CaCO3) in the eggshells appears to be the active component responsible for binding dye molecules to the fabric, which prevents color loss and ultimately results in a "cleaner" or less stained appearance compared to the untreated control sample. This demonstrates the potential for repurposing a common waste material into a useful substance for textile treatment.

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Automatic Garbage

Mister. Teeratep Liwluk [1,2]

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2. Mahidol University, Thailand

Introduction

This project created an automated, no-contact trash bin using an ultrasonic sensor to improve public health and hygiene by addressing improper waste management.

Method

This project used a four-step experimental and developmental approach to create a functional prototype. The process included:

1. Research: We studied the health risks associated with waste and identified the necessary technologies, such as Arduino, an ultrasonic sensor, and a servo motor.
2. Development: We built and coded the automatic trash bin prototype.
3. Testing: We directly observed the prototype to assess its accuracy and stability.
4. Conclusion: We analyzed the results to determine the prototype's strengths, weaknesses, and key findings.

Findings

The developed automatic trash bin prototype is a functional and hygienic solution for waste management, featuring an accurate, no-contact lid mechanism.

Figure 1. The developed automatic trash bin prototype.

Discussion and Conclusion

The automated trash bin prototype proves that simple technology can effectively improve public hygiene by using an accurate, no-contact sensor to reduce health risks.

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Development of a Portable AI-Based Smart Patch for Skin Cancer Risk Assessment

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Introduction

Skin cancer is one of the most common cancers worldwide, and its early detection significantly improves treatment outcomes. However, many elderly individuals face barriers to timely dermatological screening due to mobility limitations, financial constraints, or lack of access to specialists. This study proposes the conceptual design of a portable, non-invasive AI-based smart patch to empower elderly users to conduct preliminary risk assessments from home, enhancing early detection and accessibility.

Research Method

This project is currently in the conceptual design phase. The system integrates Epiluminescence Microscopy (ELM) for high-resolution skin imaging, wireless connectivity for data transmission, and artificial intelligence (AI) for risk analysis. The workflow consists of five steps: applying the patch, capturing skin images, transmitting data via Bluetooth or Wi-Fi, analyzing images with AI algorithms, and displaying the risk assessment through a user-friendly mobile application. The design emphasizes portability, thin and flexible materials, and intuitive interfaces to suit elderly users.

Findings

The conceptual prototype demonstrates a feasible workflow for a portable, user-friendly device and app combination. This design highlights the potential to provide rapid, accessible, and affordable risk assessments for elderly individuals.

Table 1. Current Challenges vs Proposed Smart Patch Solution

Current Challenges	Proposed Smart Patch Solution
Limited access for elderly	Portable at-home patch
High cost & travel burden	Affordable mobile app screening
Delay in early detection	Real-time AI analysis

Figure 1. Workflow of the AI-Based Smart Patch System
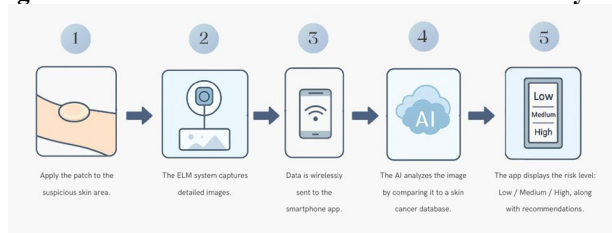
Discussion and Conclusion

This innovation is expected to reduce healthcare inequalities, increase awareness of early skin cancer detection, and help reduce the burden on healthcare systems by avoiding unnecessary hospital visits. Future work includes collaboration with biomedical engineers to build a functional prototype, AI training using large-scale dermatological image datasets, and clinical testing to validate accuracy and usability.

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The Effect of Different Concentration of Waste Cooking Oil and Commercial Soap as Pollutant to the Growth of Mung Bean (Vigna Radiata)

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2. Universitas Udayana, Bali, Indonesia

Introduction

Waste cooking oil (WCO) is a bi-product of frying food in cooking oil; in 2019 alone, Indonesia consumed 16.2 million kilo litres of palm oil. This study aims to explore another method of keeping WCO from contaminating the environment by using saponification to turn WCO into functional soap. This experiment investigates the effect of different concentrations of diluted WCO-based soap and commercial soap, as comparison, on the growth of Vigna Radiata. The objective for this study matches the Sustainable Development Goals (SDGs), particularly Goal 3, 6, and 15.

Research Method

WCO-based soap materials: Waste cooking oil, Water, NaOH (s). Apparatus: Fine Sieve, Digital Scale, Thermometer, Graduated Beakers, Glass stirring rod, Magnetic stirrer, Paper Cups, Gloves.

Investigation on Vigna Radiata materials: Paper cups (22), Graduated Syringes, Tweezers, Cotton pads, Mung beans (1 pack >110), Dilution plastic cups (10), Plastic stirring rod, Wooden skewer (poke drainage holes), tray (organizing).

Mung beans are submerged in water for 15 hours to swell and assist germination, then placed in paper cups (5 beans each cup) with equal amounts of cotton lined on the base of the cup. Each cup watered with 3ml solution/watering, twice a day; and solutions range from 0% to 20% of soap dilution (WCO-based soap and Commercial soap). Placed in indirect bright sunlight, same location for all cups. Heights for each individual mung bean plant recorded on day 6,7,8,10,12. Recorded heights (in cm) analysed to produce t-test values without outliers.

Findings

Table 1. T-test result summary

Dilution Conc.	t test	Critical Value 0.5% (2.11 and 2.10)	H0	Conclusion	Frequency of H0 Rejection (out of 5)
20%	3.19	Significant	H0 Rejected	There are significant differencess between the mean growth of plant treated with WCO and Commercial soap.The differencess is not due to chance.	4
10%	4.15	Significant	H0 Rejected	There are significant differencess between the mean growth of plant treated with WCO and Commercial soap.The differencess is not due to chance.	4
5%	0.28	Not Significant	H0 Accepted	There are no significant differences between the mean growth of plant treated with WCO and Commercial soap.The differencess is due to chance.	0
1%	0.50	Not Significant	H0 Accepted	There are no significant differences between the mean growth of plant treated with WCO and Commercial soap.The differencess is due to chance.	1
0.50%	2.53	Significant	H0 Rejected	There are significant differencess between the mean growth of plant treated with WCO and Commercial soap.The differencess is not due to chance.	5

Discussion and Conclusion

At 20%, 10%, and 0.5% concentration of soaps, the differences in mean plant growth between the WCO and commercial soap groups were significant ($t > 2.11$). This suggests that high concentrations of WCO soap and commercial soap have different impacts on plants' growth, and the differences are not due to random chance. The mung beans were in observation for only 7 days, hence the longer term effects of soap exposure remains unknown.

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Detection of Ascorbic Acid by Using Anthocyanin from Butterfly Pea Flowers on Paper-based Sensor

Amarawadee Temwut[1,2], Naphat kanotai[1,2], Panisara Limpapawich[1,2], Yanadee Boonma[1,2], Yomi Lee[1,2], Natthapat Satsuphap[1,2]

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2. Kasetsart University, Thailand

Introduction

Ascorbic acid, also known as vitamin C, supports antioxidant activity, immunity, and collagen synthesis However, it easily degrades under environmental factors such as light, high temperature etc., affecting on the food quality. Over two decades, there are various techniques, including HPLC and capillary electrophoresis, to determine the amount of ascorbic acid in food or beverage sample. Nevertheless, those methods have some drawbacks due to high cost, technical specialist requirement and expensive instrument. Herein, this work aimed to fablicate the anthocyanin paper-based analytical device (PAD) extracted from butterfly pea flower (*Clitoria ternatea L.*) to detect and determine the concentration of ascorbic acid by naked-eye.

Research Method

Firstly, the anthocyanin was extracted from 150 g of butterfly pea flower in water at 4°C for 30 minutes and quantified using the pH-differential method. It was then used to prepare paper-based sensor by varying filter paper immersion time. After drying, the paper was tested in ascorbic acid solutions in different concentrations in a range of 0.0001-1 M to observe the color changes by naked-eye. The relationship between ascorbic acid concentration and anthocyanin absorbance changes was also studied. After that, the interference effect for ascorbic detection was investigated using citric acid which commonly found in juice. Lastly, the sensor was applied on real samples which are two brands of vitamin C drinks.

Findings

The concentration of anthocyanin is 0.952 M which was determined by pH-differential method. The sensors which was immersed in anthocyanin solution for three times showed the clearest color change in the presence of ascorbic acid. Under 16 different concentrations of ascorbic acid, the probe exhibited different color change as shown in **Figure 1**. The reults indicated that the detection limit is 0.1 mM. According to the **Figure 2**, the absorbance of anthocyanin was increased as the concentration of ascorbic acid increased. However, the linear relationship was found only in low concentration. The citric acid showed no effect on the detection of ascorbic acid. This sensor can be utilized for determing ascorbic acid in two brands of beverage. It showed the same color compared to the standard solution as shown in **Figure 3.**

Figure 1. The color change on paper-based in different concentrations of ascorbic acid.

Figure 2. The absorbance of anthocyanin in different ascorbic acid concentrations

Figure 3. The color change of the sensor in real sample

Discussion and Conclusion:

Anthocyanin extracted from butterfly pea flowers can serve as a sensor for ascorbic acid. The concentration of anthocyanin obtained was nearly the same as the previous study. Dipping anthocyanin 3 times gave the strongest color change due to increased hydrogen bonding with cellulose. Sixteen colors were obtained for detecting ascorbic acid. The color turned to red as the concentration of ascorbic acid increased. However, the anthocyanin paper-based sensor gave a limit of detection of 1 mM for ascorbic acid detection. Although, the relationship between the absorbance and concentration of ascorbic acid was not linear, the sensor can estimate the concentration level which can be applied to test in real sample.

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Comparing Sodium Reduction in Food by Using Chitosan and Brown Ground Rice

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Introduction

Excess sodium intake is a major health concern worldwide. While sodium is necessary in small amounts, high consumption is linked to noncommunicable diseases (NCDs). This experiment investigates whether chitosan and rice can reduce sodium from food solutions. Chitosan, with its amino ($-NH_2$) and hydroxyl (-OH) groups, interacts with sodium ions (Na^+) through ion exchange and electrostatic attraction. Rice, which contains starch and cellulose, may also adsorb sodium, though less efficiently.

Research Method

Our goal is to determine the optimal conditions for sodium content detection in food using the Chem Meter. To be percise, it is divided focusing on 4 factors consisting of amount, time, temperature and other seasonings by put the absorbent in a paper tea bags and left it to absorb sodium in food. First, a fixed 0.2 M NaCl solution is mixed with varying amounts of chitosan or ground rice. Next, measuring sodium levels at multiple intervals (0, 5, 10, 30, and 60 minutes). The influence of temperature on sodium detection is then assessed by conducting the experiment at different temperatures (32°C, 46°C, and 64°C). Finally, the impact of common seasoning ingredients such as lime, sugar, and instant noodle seasoning powder.

Findings

This study found that chitosan and rice powder effectively reduce sodium in food, especially when used in 5-gram amounts, at low temperatures (32°C), and within the first 10 minutes. Chitosan showed a higher sodium absorption capacity than rice. And, sodium reduction was affected just a little mixing with seasonings.
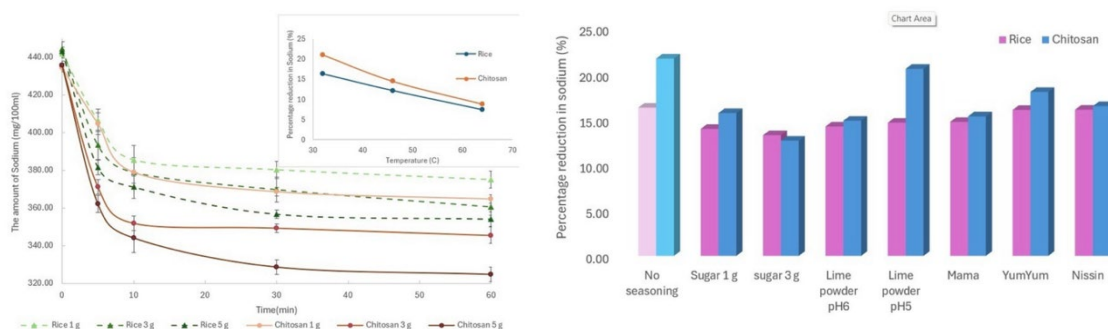
Discussion and Conclusion

The best sodium reduction is when use chitosan 5 gram at 32°C with no seasoning in 10 minutes. This project shows that using natural materials like chitosan and rice to reduce sodium in food is practical, effective, and eco-friendly. By placing them in a tea bag and soaking them in food, sodium levels can be significantly lowered. This simple method could help prevent non-communicable diseases (NCDs) and improve public health.

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The Effect of Packaging Material and Storage Temperature on the Stability of Natural Beetroot Lip Balm

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Introduction

Recent studies have explored the formulation of natural lip balms using beetroot extract, addressing concerns regarding synthetic additives in cosmetics. Beetroot provides natural pigmentation and moisturizing properties, offering a safe alternative to chemical dyes (Grace et al., 2024; Pawar et al., 2021). However, limited research has addressed how packaging and storage temperature affect the long-term stability of natural formulations. This study aimed to examine the impact of packaging material (compostable cardboard vs. aluminum) and storage temperature (room temperature vs. refrigeration) on the stability and physical characteristics of beetroot lip balm over a two-week period.

Research Method

The study followed an experimental design using two independent variables: packaging and storage temperature. A natural lip balm was first prepared using coconut oil, beeswax, and beetroot extract. Four sample groups were created: (1) cardboard container at room temperature, (2) cardboard container in the refrigerator, (3) aluminum container at room temperature, and (4) aluminum container in the refrigerator. Each sample was observed for 14 days. Data collection focused on physical changes, including texture, appearance, and smell.

Findings

The lip balm stored in aluminum containers under refrigeration showed the best stability, maintaining its texture and color with no signs of separation or odor change. In contrast, samples in compostable containers at room temperature exhibited oil separation and a sour odor. The table below summarizes the key findings.

Table 1.

Sample Group	Texture Change	Color Fading	Odor Change
Cardboard, Room Temp	Lip balm has uneven texture with some mushy while other part greasy yet firm	Maroon color becomes darker and muddy	Hints of sour odor
Cardboard, Refrigerate	Lip balm slightly hardens, lumps and cracks are visible	Maroon color turns pale, dull, and waxy	No significant odor change
Aluminum, Room Temp	Lip balm softens with oily surface	Retain maroon color	Smell of beetroot and wax intensifies
Aluminum, Refrigerated	Lip balm slightly hardens	Maroon color turns slightly paler	No significant odor change

Discussion and Conclusion

This study advances the field of science education as it applies basic chemistry principles in observing how packaging and storage temperature affect natural cosmetic long-term stability. A limitation of this study is the short observation period; future research should explore longer-term storage. Additionally, expanding the use of different natural additives could provide broader insights into sustainable cosmetics.

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The Second Life of Food: Exploring Low-Cost Innovation to Transform Bio Waste into Sustainable Product - SONOPEEL (Biodegradable Acoustic Panel)

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Introduction

Noise pollution is a critical environmental challenge, contributing to stress, sleep disorders, and reduced cognitive performance. In Jakarta, urban noise avareges 70–80 dB, exceeding WHO safe limits (European Environment Agency, 2024). Meanwhile, Indonesia generates over 19 million tons of biowaste annually, much of which is discarded or incinerated, releasing methane and worsening climate change (UNEP, 2021). This study introduces SONOPEEL, a biodegradable acoustic panel derived from citrus peel, corn husk, tobacco stalk, and coconut coir.

Research Method

This study applied a literature review method to identify potential bio-waste materials for acoustic panel development. Various studies were analyzed to explore the acoustic performance of bio waste, such as coconut coir, corn husk, and citrus peel, highlighting their ability to function as sound absorbers. The context of this research lies in transforming organic waste into sustainable products, with SONOPEEL proposed as a prototype concept.

Findings
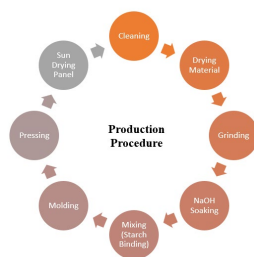
Figure 1. Production Procedure.

Based on literature, some bio-waste had shown promising acoustic performance. Coconut coir panels showed sound absorption coefficient ranging from 0.69 to 0.84 (Bhingare & Prakash, 2021), corn husk fibers achieved NRC values of 0.36–0.60 (Fattahi et al., 2023), and orange peel based materials reported absorption up to 0.886 at specific frequencies (Nath & Singh, 2021). These results confirm that natural fibers can serve as effective sound absorbers.

Building on this theoretical basis, the SONOPEEL production process is illustrated in **Figure 1**. The procedure involved cleaning, drying, and grinding materials (citrus peel, corn husk, tobacco stalk, and coconut coir). Fibers were soaked in a 1–2% NaOH solution for 2–4 hours to enhance cellulose exposure, then mixed with 10–15% tapioca starch as natural binder. The mixture was molded, manually pressed, and sun-dried for 2–3 days. Acoustic evaluation was conducted using a small reverberation chamber, with expected performance comparable to previous studies.

Discussion and Conclusion

This section includes discussion of your study, conclusion and suggestions for future studies. Please write in a concise, clear, and compact manner based on the results of the research.

SONOPEEL addresses three key issues: noise pollution, organic waste mismanagement, and dependence on synthetic insulation materials. This product enables community-scale production while reducing waste and environmental impact by applying low-cost innovation and circular economy principles. The present findings are based on literature evidence, and further laboratory testing is required to support SONOPEEL's application in real settings.

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Impacts of Environmental Factors on the Urban Heat Island Effect in Northern Taiwan

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Introduction

Global warming is a serious issue that affects all over the world, and urban heat island effect is one of the relevant problems of the industrialized era. By searching data and paper, we recorded the temperature data of Taiwan Central Weather Administration to observe the change of temperature in northern Taiwan. With the data collected, we transformed our data into UHI data, and created an isotherm map to show how urban heat island effect affects northern Taiwan.

Research Method

Temperature records at 00:00 and 12:00 were collected from June 27 to July 7 from 92 stations:19 in Taipei city, 61 in New Taipei city, and 12 in Keelung city. Boundaries of the three cities were delineated on Google Maps, and station locations were plotted. According to the proportion of the temperature gap between two stations, we draw down the isotherm of the area, presenting temperature data from different times of the day. Besides,we transformed our data into UHI data by calculating the gap between urban and rural temperature.

Findings

Rural benchmarks included the Fushan Botanical Garden and Saddle station, while urban references included National Taiwan University and the National Taiwan Science Education Center.

The result of UHI calculation would be clear that the UHI data of high urban heat affected areas will often be negative, while those in suburban areas will often be positive.As for the isotherm maps, the darker color was used to mark the higher temperature. We found that it is hotter in the center of Taipei, which is exactly the area that has high human activities and a high density of buildings.
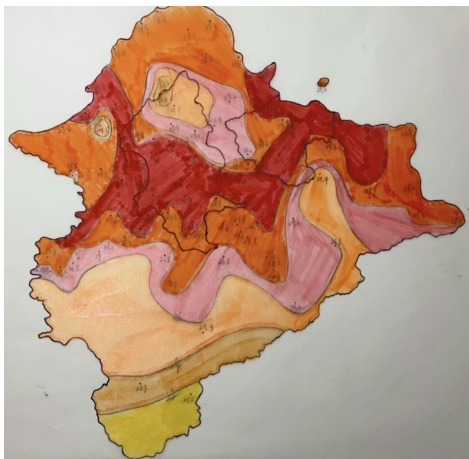
Figure 1. Isotherm map, 00:00 July 1 (UTC+8).
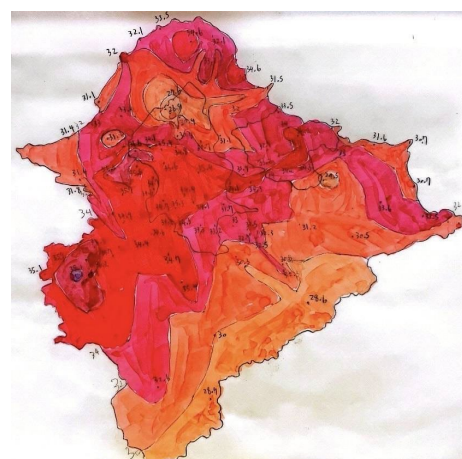
Figure 1. Isotherm map, 12:00 July 1 (UTC+8).

Discussion and Conclusion

The previous research shows that there are some different features in high and low urban heat island effect areas. Features of high urban heat effect areas include the widespread use of impermeable asphalt or concrete road surfaces and high building density that intensifies the urban canyon effect. While those in low urban heat effect areas include extensive green coverage, rivers, and lakes that enhance vertical convection, as well as improved air circulation that promotes better ventilation.

According to the result, we see that heat dissipation is more critical in the heat island effect. In Northern Taiwan, Taipei city is situated in a basin, surrounded by the mountainous areas of New Taipei city, which leads to heat accumulation. If we could increase the efficiency of heat dissipation, we can mitigate the impact of the urban heat island. We suggest that changing the materials of the construction and the road surface, carrying out the wind corridors, and leaving some space to allow wind to flow through smoothly is critical, since the

study has shown that 1 m/s increase in wind speed can reduce temperature by ~3°C.

According to the study, we should improve the regulations of the city to retard the urban heat island effect, such as planning for wind corridors in major cities provides an opportunity to institutionalize such measures. Enhancing ventilation and modifying construction practices are essential to alleviating UHI impacts in northern Taiwan.

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Proceedings
- Undergraduate Students / Postgraduate Students -

Identification of Simple Carbohydrates Using Iodine Test and the Role of Lemongrass Extract as an α-Amylase Enzyme Inhibitor

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Purpose and Background

Diabetes Mellitus (DM) is a persistent health condition that is becoming more common throughout the world. The International Diabetes Federation (IDF) estimates that by 2030, over 643 million adults will be living with diabetes. This increase is largely due to factors such as the growth of cities, aging populations, and shifts in eating habits (Pramana, 2025).

Individuals living in urban environments are generally more likely to develop diabetes because they often adopt unhealthy habits. These include insufficient physical activity, smoking, drinking alcohol, and eating too many carbohydrates (Oktora, 2022). While carbohydrates are essential for health, excessive consumption—especially of simple sugars—can contribute to insulin resistance, a key factor in diabetes (Takeuchi, 2023).

Within the body, the enzyme amylase plays a critical role by breaking down starches into glucose. Managing diabetes effectively requires ongoing education and support for children and adolescents diagnosed with the condition, as well as for their parents and caregivers. Therefore, it is highly important to develop engaging activities for young people that teach them about different types of carbohydrates, their sources, how they affect health, and how to prevent it.

Materials and Methods

This study conducted a simple, kitchen-based experimental method using readily available household tools and materials. The equipment and materials included plastic cups, a pot, a stove, a spoon, a strainer, iodine solution (Betadine), grapes, granulated sugar, cereal porridge, lemongrass, water, and amylase (saliva). The samples consisted of grape juice (representing monosaccharides), sugar solution (disaccharides), and starch solution from cereal porridge (polysaccharides). Lemongrass extract was prepared by boiling lemongrass stalks and then filtering the solution. The starch test was conducted using iodine. To investigate the effects of amylase and lemongrass extract, saliva and lemongrass extract were added to each sample. After adding iodine, any color changes were observed and recorded to determine the reactions that occurred.

Results and Discussion

This study was conducted in three experimental stages: testing for starch using iodine, adding amylase to observe starch breakdown, and evaluating lemongrass extract's inhibitory effect on amylase. Three different samples were used: grape juice (monosaccharide), sugar solution (disaccharide), and superbubur starch solution (polysaccharide). The basic principle is that iodine reacts with starch to form a blue-black color. This color appears because iodine molecules (I_2) enter the helical structure of amylose, forming a supramolecular complex between iodine and starch (Pesek, 2022). The reaction is as follows:

$$I_2 + I^- \xrightarrow{\text{fast}} I_3^- + \text{Starch} \xrightarrow{\text{fast}} \text{Dark blue complex}$$
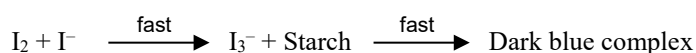
When amylase is added, it transforming complex carbohydrates into simpler sugars. Amylase catalyzes the hydrolysis of starch's α-1,4-glycosidic bonds. As the starch is digested, the intensity of the blue-black color diminishes, reflecting the reduction in starch concentration.
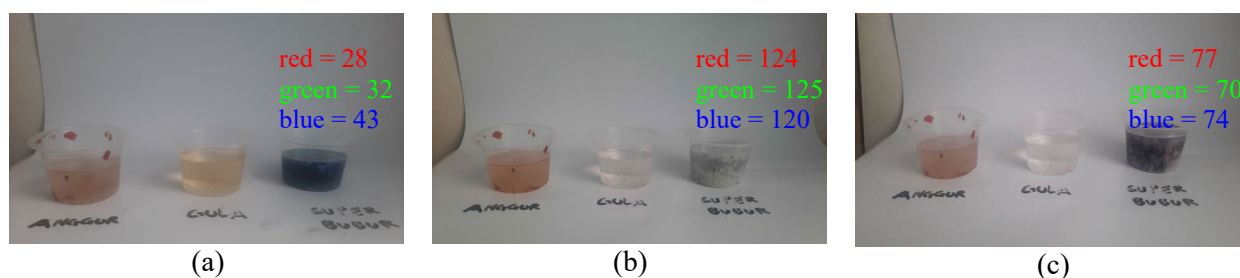
figure 1. The iodine test results for the three carbohydrate samples conducted over after 240 seconds show clear distinctions in starch content across all three experiments.

In the first experiment (a), only the superbubur starch solution turned blue-black with iodine, proving it contained starch, while grape juice and sugar solution did not change color, showing they had no starch. In the second experiment (b), adding amylase to the starch solution made the blue color from the iodine-starch reaction turn reddish-purple and then fade, showing that amylase breaks down starch into simpler sugars; this did not happen with grape juice or sugar solution because they do not contain starch. In the third experiment (c), adding lemongrass extract to the starch-amylase mixture slowed the fading of the blue-black color, suggesting that compounds in lemongrass can inhibit amylase activity and may help control carbohydrate digestion. Studies have shown that lemongrass essential oil exhibits high antioxidant activity and can suppress enzymes involved in carbohydrate digestion, supporting its potential as a natural antidiabetic agent (Tawakal, 2024)

Conclusion

Based on the experimental results, it can be concluded that the iodine test is specifically used to detect the presence of starch in samples, which is indicated by a blue-black color change. The enzyme amylase works specifically to break down starch into glucose. However, the addition of lemongrass extract can inhibit the activity of amylase in breaking down starch into glucose. This is evident from the difference in the time it takes for the purple color to fade in samples with lemongrass extract compared to those without. Because lemongrass extract inhibits amylase, the digestion of starch into glucose is slowed down, helping to stabilize blood glucose levels. Therefore, lemongrass extract has the potential to be developed as an alternative antidiabetic agent.

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CURRENT DISTRIBUTION IN THE WATERS OF LAMPUNG BAY

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Purpose and Background

Lampung Bay, a coastal area in southern Sumatra, faces significant vulnerability to oceanographic dynamics due to its dense population and extensive maritime activities. A comprehensive understanding of current characteristics is crucial, as these water mass movements fundamentally influence the physical conditions of the waters that directly interact with coastal settlements. Current observations in Lampung Bay can be supported by tidal data and monsoon winds, which influence current generation in the bay (Milasari et al., 2021). This study specifically aims to examine sea current patterns in the BBPBL (*Balai Besar Perikanan Budidaya Laut* or Large-Scale Marine Aquaculture Center) Lampung waters of Lampung Bay through surface and vertical measurements, supplemented by tidal and wind data.

Figure 1. Lampung Bay in the waters of the Large-Scale Marine Aquaculture Center (BBPBL)

Materials and Methods

The research data includes direct current measurements conducted on 2 November 2024. In addition, tidal assimilation data were used, combining observations and tidal models from the Geospatial Information Agency (BIG), covering the period from 26 October to 9 November 2024. Current measurements were carried out using a current meter, and the results were then compared with reanalysis current data from CMEMS NOAA.

Subsequently, the current data were analyzed using ArcGIS software, while tidal data were processed using the T-Tide software in MATLAB with the Least Squares method. This approach enabled the calculation of tidal harmonic components and the accurate visualization of tidal prediction time series.

$$\mu^2 = \sum_{t_n=-n}^{n} \left\{ n(t_n) - \eta_{t_n} \right\}^2 = minimum \qquad (1)$$
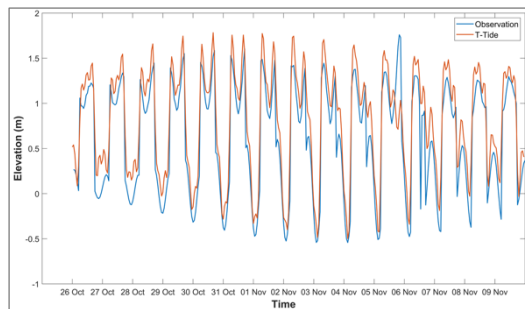
Figure 2. Tidal elevation overlay

Results and Discussion

Lampung Bay exhibits a mixed semidiurnal tide type, characterized by a Formzahl value of 1.392 and the dominance of the M2 harmonic component. However, tidal elevation predictions using T-Tide showed higher values compared to BIG observational data. This discrepancy is attributed to T-Tide's use of the Least Squares method, which does not account for meteorological factors influencing tidal elevation in the waters (Purna et al., 2021).
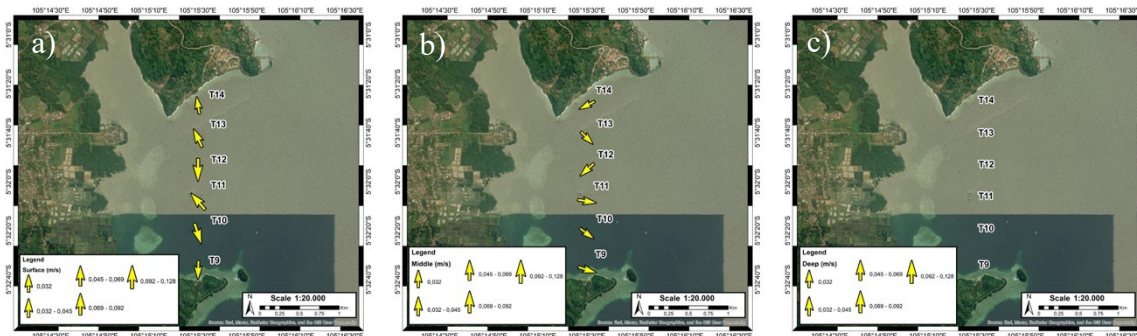
Figure 3. Spatial plot of currents: (a) surface, (b) mid-depth, and (c) deep

Spatial observations (Figure 3) indicate that surface currents are stronger than those in the middle and bottom layers, primarily due to wind influence. The surface current direction is ebbing at stations T14–T13, fully ebb at stations T12–T11, and flooding at stations T10–T9. The average surface current velocity is 0.075 m/s, while the average velocity in the middle layer is 0.03 m/s. Bottom-layer currents were not visualized due to velocities approaching zero at all stations.
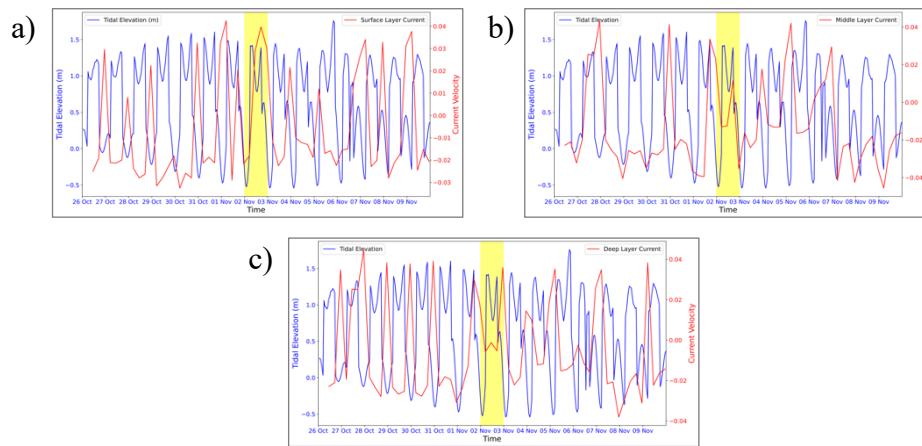
Figure 4. Overlay of tidal elevation and current speed: (a) surface, (b) mid-depth, and (c) deep

The overlay analysis between tidal elevation and current velocity (Figure 4) during the period of 26 October–9 November 2024 shows that current velocities decrease at high and low tidal peaks, and increase during transitional phases between flood and ebb tides. According to Milasari et al. (2021), tidal currents contribute up to 89.09% of the total measured current in this region, indicating that tidal currents predominantly influence the waters around BBPBL in Lampung Bay. The reanalysis surface current velocity (0–0.04 m/s) is lower than field measurements, whereas in the middle layer (0–0.015 m/s), the difference is negligible. Although reanalysis data still indicate detectable bottom-layer currents (0–0.04 m/s), field measurements show a velocity of 0 m/s at the greatest depths. This discrepancy is suspected to result from reduced accuracy of the current meter (e.g., damaged propeller) compared to the higher reliability of reanalysis data sourced from multiple inputs (Chai et al., 2004).

Lampung Bay, particulary in the BBPBL waters, exhibits a mixed semidiurnal tidal type, dominated by the M2 component with a Formzahl value of 1.392. Tides influence current dynamics, with velocities increasing during transitional phases and decreasing at tidal peaks. Surface currents are stronger due to wind influence, while bottom-layer currents were not detected, and discrepancies between field measurements and reanalysis data indicate limitations in measurement instruments.

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Elucidation of fluconazole resistance in the emerging fungal pathogen *Candida auris*

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Purpose and Background

We investigated the drug resistance of *Candida auris*, an emerging pathogen. Fungal infection diseases are estimated to cause approcimetely 3.8 million deaths worldwide each year. This number is more than deaths caused by three major infectious diseases: HIV, tuberculosis, and malaria. Even though many people suffer from fungal infections, only four classes of antifungal drugs are currently available. Developing of antifungal agents is particularly challenging because fungal cells share many structure with animal cells, including those of humans. In addition to this challenge is growing global concern of antimicrobial resistance (AMR). Infections caused by drug-resistant microbes are difficult to treat and are associated with high mortality rates.

Since fungal infection and drug resistance are social issues, we focused our study on *C. auris*, a drug resistant fungal pathogen with drug resistance. First identified in Japan in 2009, *C. auris* is an emerging pathogenic yeast can cause life-threatening fungemia. Some strains are resistant to all know classes of antifungal drugs. Due to its high mortality rate and resistant profile, the WHO registered *C. auris* in the fungal priority pathogens list. In this study, we focused specifically on resistance to fluconazole. Azole antifungals, including fluconazole, making resistant to them problematic for long term treatment.

To date, ten clinical strains of *C. auris* have been isolated in Japan. Of these of three strains (highlighted in yellow in table 1) are held by the Medical Mycology Research Center (MMRC), Chiba University. According to Table 1, the Caur-R1 strain continues to grow in 64 µg/mL fluconazole, indicating that it is resistant to antifungal agent.

Table 1. *C. auris* strains isolated in Japan and their drug resistance

strains	MIC, minimum inhibitory concentration(µg/mL)			
	fluconazole	itraconazole	voriconazole	miconazole
Caur-R1	**> 64**	0.5	1	1
Caur-S1	1	0.03	0.015	0.03
Caur-S2	2	0.12	0.015	0.06
Caur-S3	1	≤ 0.015	≤ 0.015	N.A.
Caur-S4	4	0.03	≤ 0.015	≤ 0.03
Caur-S5	1	≤ 0.015	≤ 0.015	≤ 0.03
Caur-S6	16	0.125	0.125	0.06
Caur-S7	2	0.03	0.03	≤ 0.03
Caur-S8	4	0.06	0.03	0.125
Caur-R2	>64	0.25	2	1

A well characterized mechanism of fluconazole resistance involved in the *ERG11* genes. This genes encondes enzyme named lanosterol 14 alpha-demethylase biosynthesizes ergosterol, which plays a key role in the biosynthesis of elgosterol—an essential component of the fungal cell membrane. Fluconazole inhibits lanosterol 14 alpha-demethylase, thereby disrupting ergosterol synthesis. Mutation in *ERG11* can impair fluconazole binding, resulting in resistance. However, in our study, no mutations were detected in the *ERG11* genes of the Caur-R1; therefore, there might be an unknown fluconazole-resistant mechanism.

The goal of this study was to uncover novel genetic or molecular mechanisms of fluconazole resistance in *C. auris*. To prevent the emergence of AMR and provide information for new drug development, elucidating the mechanism of drug resistance is necessary.

Materials and Methods

Whole genome sequences was conducted on *C. auris* strains isolated in Japan (Table 1). The objective was to identify candidate genes potentially associated with fluconazole resistance. Thus, phylogenetic relationships were inferred using the results of genetic analysis.

Results and Discussion

The result of the phylogenetic relationships is shown in Fig 1. The symbol of pills in this figure means drug resistance. The closest relative to Caur-R1 was identified Caur-S6. This suggests that the genomic differences between Caur-S6 and Caur-R1 may underlie emergence or enhancement fluconazole resistance in Caur-R1. Comparative genomic analysis between these two strains, revealed 32 missense mutations. Among them, three listed in were considered to cause stop codon in Caur-R1 (Table 2). These mutations may play a critical role in the observed resistance phenotype.

We plan to use genome editing to check whether genes that differ between Caur-R1 and Caur-S6 affect fluconazole resistance.
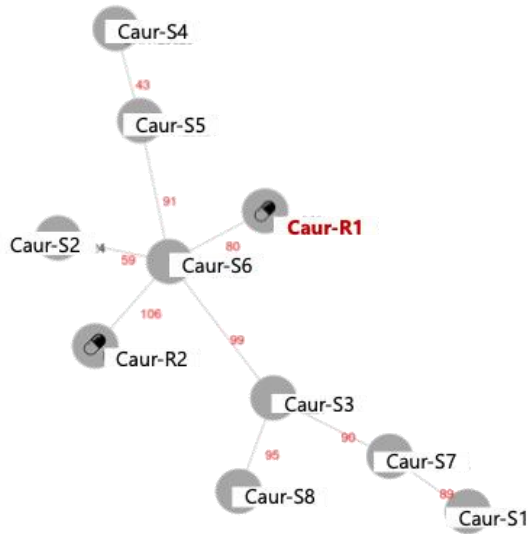
Table 2. three genes differ between Caur-R1 and Caur-S6 which causes stop codon in Caur-R1

mutation	suggested protein
nucleotide: 1093G>T amino acid: Glu365*	Alpha/beta hydrolase fold-3 domain-containing protein
nucleotide: 545T>A amino acid: Leu182*	Major facilitator superfamily profile domain-containing protein
nucleotide: 1313C>A amino acid: Ser438*	Oxidant-induced cell-cycle arrest protein

Figure 1. Relationship of *C. auris* strains isolated from Japan

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A Needs Assessment for Developing Learning Activities to Enhance Problem Solving and Mathematical Reasoning Abilities of Secondary School Mathematics Teachers

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Purpose and Background:

Between 2018 and 2022, Thai students achieved scores ranging from 21 to 31 percent on the Ordinary National Educational Test (O-NET) for mathematics in Grades 9 and 12, well below the 50 percent threshold (National Institute of Educational Testing Service, 2023). Moreover, PISA 2022 results indicated that Thai students scored below the OECD average in mathematics. These results make it clear that many Thai students still struggle with mathematics. An important factor is that classroom teaching often doesn't supply students enough chances to practice problem solving and reasoning in a systematic way (Institute for the Promotion of Teaching Science and Technology, 2012a). Therefore, mathematics teachers should emphasize these abilities to improve student learning. Consistent with Thailand's mathematics curriculum, together with National Council of Teachers of Mathematics (2000) and Institute for the Promotion of Teaching Science and Technology (2012b), they identify problem solving and reasoning as crucial skills and processes that all students are expected to develop. These skills enable students to think rationally, plan systematically, make decisions, and use mathematics in real-world situations.

According to important reasons that are mentioned above. This study was to investigate secondary mathematics teachers' needs so as to identify and prioritize the requirements for developing learning activities that enhance mathematical problem solving and reasoning abilities of secondary school mathematics teachers.

Materials and Methods

The sample consisted of 60 mathematics teachers from secondary schools under the Office of Bangkok Secondary Educational Service Area 2, chosen using convenience sampling. The research instrument was a 5-point rating scale questionnaire with a dual response format, which was used to assess the actual state and desired state of the teacher. The researcher developed the items by synthesizing guidelines for developing learning activities to enhance both abilities, drawing on Institute for the Promotion of Teaching Science and Technology (2012b), Makanong (2016), National Council of Teachers of Mathematics (2000), and Rowan and Morrow (1993). The resulting instrument comprises 15items.

The validity was checked by three mathematics education experts and the index of item objective congruence (IOC) varied from 0.67 to 1.00. The data was collected in September 2022 and statistically analyzed by using mean, standard deviation, and Modified Priority Needs Index (PNI$_{modified}$) (Wongwanich, 2019).

Results and Discussion

Table 1 presents the PNI$_{modified}$ results from the needs assessment, which identified and prioritized the requirements for developing learning activities to enhance mathematical problem-solving and reasoning abilities.

Table 1: The PNI$_{modified}$ results from the needs assessment

Item	Desired state		Actual state		(I - D)/D	Rank
	$\bar{x}$	S.D.	$\bar{x}$	S.D.		
1. Use introductory situations or problems to engage students' thinking and connect them to the lesson	4.40	0.59	4.15	0.63	0.060	9
2. Assign students to read, understand, and analyze the problem	4.50	0.60	4.30	0.67	0.047	11
3. Advise students to devise plans, develop strategies, and choose strategies before solving the problem	4.32	0.65	4.13	0.75	0.046	12
4. Encourage students to use various mathematical representations in solving problems	4.37	0.64	4.08	0.67	0.071	6
5. Facilitate opportunities for students to share ideas and present their ideas freely	4.50	0.54	4.35	0.58	0.034	14
6. Use questions to encourage students to think and find out answers	4.53	0.50	4.35	0.66	0.041	13
7. Use probing questions to encourage continued reasoning	4.53	0.57	4.32	0.70	0.049	10
8. Have students estimate answers before computing them	4.40	0.74	4.13	0.81	0.065	8
9. Organize activities for students to collaboratively solve problems and reason in groups or teams	4.45	0.62	4.03	0.74	0.104	1
10. Organize activities for students to individually solve problems and reason	4.42	0.56	4.07	0.66	0.086	4
11. Organize activities that encourage students explore, investigate, formulate conjectures, explain, and draw general conclusions	4.27	0.61	3.92	0.67	0.089	3
12. Organize activities that encourage students to use more than one problem solving strategy	4.42	0.65	4.12	0.69	0.073	5
13. Encourage reasoned presentation and discussion of conclusions	4.37	0.58	4.10	0.68	0.066	7
14. Encourage students to exchange opinions with peers and teacher	4.60	0.53	4.50	0.62	0.022	15
15. Encourage students to verify their procedures and answers	4.67	0.50	4.25	0.60	0.099	2
Overall mean	**4.44**	**0.60**	**4.19**	**0.69**	**-**	**-**

The needs assessment results showed teachers rated their highest priority as the ability to organize collaborative problem solving and reasoning activities (PNI$_{modified}$ = 0.104), followed closely by the need to encourage students to verify their procedures and answers (PNI$_{modified}$ = 0.099). These findings align with literature recommendations that collaborative learning activities allow students to work in teams, share ideas, and listen to one another, boosting their confidence in problem solving, encouraging them to articulate their reasoning, and deepening lasting connections among mathematical concepts (Institute for the Promotion of Teaching Science and Technology, 2012b). Moreover, the overall mean indicates that teachers are already attempting these practices to some extent but desire to use them more effectively.

Building on these results, mathematics teachers' professional development should focus on designing activities that enhance collaborative learning. The key priority is to empower teachers to structure effective teamwork and guide students in verifying their procedures and answers.

While the findings provide valuable insights into teachers' needs, the use of convenience sampling from a single educational service area limits generalizability; future research should expand the sample and incorporate qualitative data to gain deeper understanding.

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A LESSON STUDY IN TEACHING NATURE AND SOURCES OF LIGHT

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Purpose and Background

Enhancing science education remains a key priority within the Philippine basic education system, especially in light of students' persistent underperformance in national and international assessments. In the most recent 2022 Programme for International Student Assessment (PISA), the Philippines ranked 79th out of 81 participating countries in science, with an average score of 356, significantly below the OECD average of 485. Among the science disciplines, Physics is often perceived as the most difficult due to its content-heavy nature, complex formulas, unfamiliar terminologies, and the challenge of applying concepts to real-life situations, all of which are further compounded by teacher-centered instructional approaches (Camarao & Nava, 2017).

These challenges are particularly evident at the junior high school level, where foundational scientific concepts are introduced. One such topic is light, first formally taught in Grade 7. Understanding the nature and sources of light is essential for grasping advanced physics topics such as optics, wave behavior, and electromagnetic phenomena. Literature on teaching light is available and highlights the effectiveness of inquiry-based learning, an approach also endorsed by the Department of Education, in improving conceptual understanding (Srisawasdi & Kroothkeaw, 2014). Despite this, students continue to struggle. At Plaridel National High School, assessment data consistently show low performance in lessons on the Nature and Sources of Light, indicating persistent gaps in understanding.

To address this issue, the study adopted the Lesson Study (LS) model, an evidence-based, collaborative professional development approach where teachers co-plan, observe, and reflect on lessons to improve teaching and learning (Lewis et al., 2019). Widely applied in various educational settings, LS supports teacher growth, encourages reflective practice, and promotes student-centered instruction. By focusing on a topic where students consistently underperform, this study investigates the effectiveness of LS in improving instructional practice and enhancing students' understanding of light, with the goal of informing science teaching in the Philippine secondary context.

Materials and Methods

This study was conducted at Plaridel National High School and involved three Grade 7 science classes, each representing a distinct cycle of the Lesson Study (LS) process. The research team was composed of one model lecturer and four team members who, along with a More Knowledgeable Other (MKO), participated as observers and provided structured feedback throughout the implementation. The MKO was the Grade 7 Science Coordinator and had 16 years of teaching experience. The LS approach was employed as a teacher-led, classroom-based professional development intervention, following the four-phase framework proposed by Lewis (2019): (1) Study, (2) Plan, (3) Teach, and (4) Reflect. Each cycle focused on the collaborative design, implementation, and revision of a lesson on the topic "Nature and Sources of Light," aligned with the Most Essential Learning Competencies (MELCs) prescribed by the Department of Education for Grade 7 Science.

Data collection involved the use of a pre-test and post-test to assess students' conceptual understanding before and after the lessons. An observation checklist was used to document lesson flow, student engagement, and instructional effectiveness. Semi-structured interviews were conducted with students of varying performance levels to gather deeper insights into their learning experiences and perceptions. Descriptive statistics were used to analyze test results, with the Class Proficiency Level (CPL) computed in accordance with DepEd Order No. 31, series of 2012. Qualitative data from classroom observations and student interviews were analyzed thematically and used to guide instructional refinements across the three LS cycles.

Results and Discussion

As the lesson on Nature and Sources of Light progressed through three Lesson Study (LS) cycles, insights from classroom observations, MKO feedback, and student interviews guided targeted instructional revisions. Each cycle addressed specific challenges and informed improvements to enhance teaching

effectiveness and student engagement. The refinements, summarized in Table 1, focused on six key areas. These adjustments reflected the collaborative and data-informed nature of the LS process, with each iteration building on insights from the previous cycle to improve the overall quality of lesson delivery.

Table 1

Instructional Improvements Across Lesson Study Cycles

Focus Area	Cycle I	Cycle II	Cycle III
Learning Objectives	Briefly presented; students unclear about goals	Displayed throughout; students read aloud	Student inferred objectives after motivation
Language Support	English only; comprehension difficulties	Key terms translated to Filipino/ Bisaya	Bilingual instruction with clarification
Instructional Materials	Clear Slides; lacking visuals	Visuals and images added	Integrated visual and audio materials
Classroom Management	Off-task behavior; minimal rules reminder	Call-and-response routines introduced	Consistent use of attention-maintaining drills
Activities	Hands-on but misaligned with objectives	Aligned but time-consuming	Properly timed; group size reduced for active participation
Assessment and Feedback	Administered; limited time for checking or feedback	Assessment without feedback	Feedback provided post-assessment

The effectiveness of these interventions is reflected in the progressive increase in Class Proficiency Levels (CPLs), which rose from 57.14% in Cycle I to 76.67% in Cycle II and 90.00% in Cycle III. As summarized in Table 2, this upward trend reflects a shift from "Beginning" to "Advanced" proficiency level, based on the classification outlined in DepEd Order No. 31, s. 2012.

Table 2

Class Proficiency Levels Across Three Lesson Study Cycles

Cycle	CPL (%)	Proficiency Level
I	57.14	Beginning
II	76.67	Developing
III	90.00	Advanced

The findings affirm that Lesson Study (LS) served as a structured and reflective process that significantly enhanced both instructional practice and student learning. Through collaborative planning, systematic assessment, and iterative refinement, LS proved effective for professional development and pedagogical improvement, consistent with the findings of Lewis et al. (2019). In physics education, where abstract concepts often pose challenges, LS offers a research-based framework to support teacher growth and student achievement. In light of these results, it is recommended that LS-based strategies be sustained. To strengthen future implementation, LS may be applied to other science topics, and limitations such as time constraints, insufficient teacher training, and limited teaching resources should be addressed through better scheduling, targeted training, and the development of additional instructional materials.

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SEA SURFACE TEMPERATURE MONITORING IN THE NORTHERN WATERS OF SULAWESI ISLAND USING MODIS AQUA SATELLITE DATA IN 2024 WITH SEADAS SOFTWARE

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Purpose and Background

Remote sensing is a method used to gather information about Earth's surface without direct contact, utilizing sensors on satellites to record electromagnetic radiation reflected or emitted by surface objects. In oceanography, remote sensing helps monitor parameters like sea surface temperature (SST), chlorophyll-a, and salinity, enabling efficient spatial and temporal analysis of ocean conditions.

This study focuses on the northern waters of Sulawesi Island, known for its rich marine biodiversity and dynamic oceanographic conditions. It uses MODIS-AQUA Level 3 satellite data from 2024, processed and validated for SST analysis. The analysis, conducted using SeaDAS software, covers four seasonal phases: the Northeast Monsoon, First Transitional Season, Southeast Monsoon, and Second Transitional Season, with the goal of understanding SST distribution in the region.

Materials and Methods

This study analyzes Sea Surface Temperature (SST) data from MODIS-AQUA Level 3 imagery with a 4 km resolution, covering the northern waters of Sulawesi Island from January to December 2024. The data are divided into four seasons: Northeast Monsoon (January), First Transitional Season (April), Southeast Monsoon (July), and Second Transitional Season (October), with mid-month data representing each season. SST processing was done using SeaDAS software to extract, visualize, and calculate the average SST, ensuring proper spatial coverage and cropping to the study region.
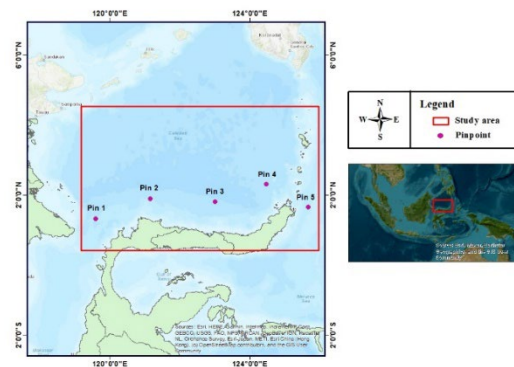
Figure 1. Map of the Study Area in the Northern Waters of Sulawesi

Results and Discussion
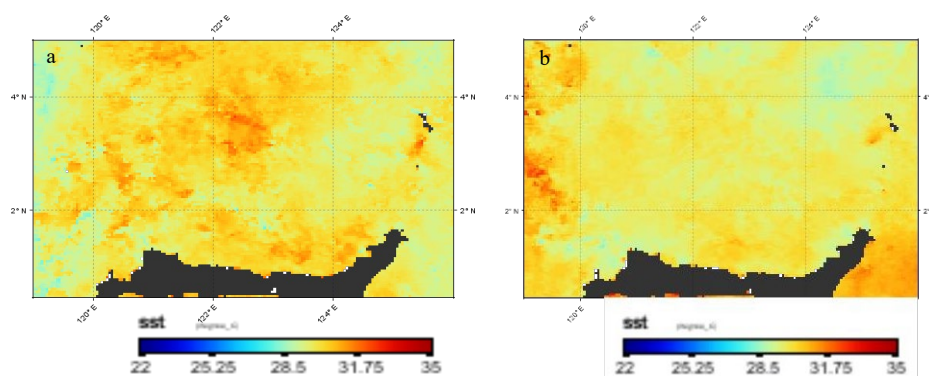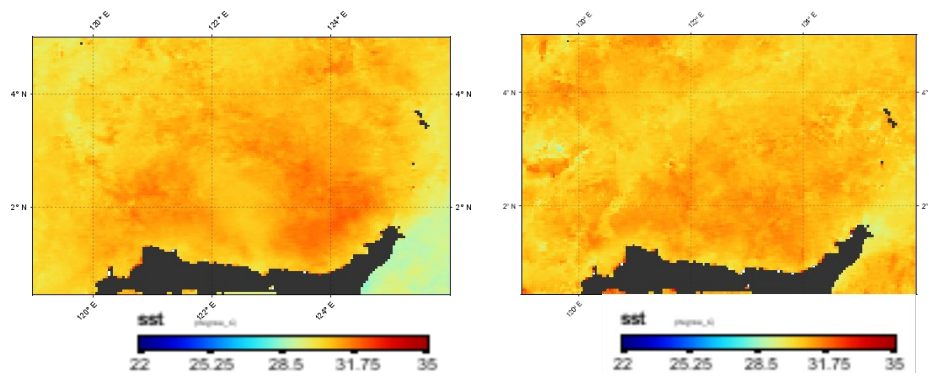
Figure 2. Spatial distribution of Level 3 Sea Surface Temperature (SST) during (a) the Northeast Monsoon (January 2024), (b) the First Transitional Season (April 2024), (c) the Southeast Monsoon (July 2024), and (d) the Second Transitional Season (October 2024).
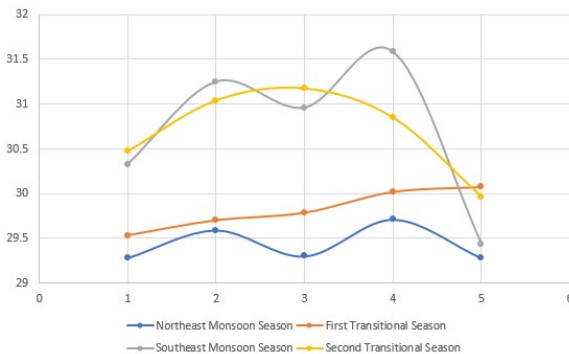
Figure 3. Seasonal variation of sea surface temperature at the observation point

Figure 2 (a), the Sea Surface Temperature (SST) visualization during the Northeast Monsoon (January 2024) over the northern waters of Sulawesi Island shows predominantly yellow to orange hues, indicating temperatures between 28.5°C and 31°C. Bright red areas represent the highest temperatures, while light blue regions indicate cooler waters, especially in the northwestern part of the study area. This pattern reflects the warm water conditions influenced by westerly winds and increased solar radiation, with potential thermal fronts between yellow and red zones suggesting temperature gradients. Figure 2 (b), during the First Transitional Season (April 2024), SSTs are relatively uniform, ranging from 28.5°C to 31.5°C, with slight temperature variations. The southeastern coastal zone shows warmer temperatures, while the northwestern region remains slightly cooler. This reflects the seasonal transition from the Northeast Monsoon to the Southeast Monsoon, characterized by a decrease in wind intensity and increased water column stratification. Figure 2 (c), the Southeast Monsoon (July 2024) visualization shows high SSTs (29°C to over 31.75°C) dominated by orange and yellow hues, with a bluish-green anomaly in the southeastern region, indicating a temperature drop. This is likely caused by upwelling, where colder subsurface water rises to the surface due to strong easterly monsoon winds, bringing cooler, nutrient-rich water to the surface. Figure 2 (d), during the Second Transitional Season (October 2024), SSTs are warm and uniform, ranging from 30°C to 31°C, with no significant temperature contrasts. This indicates stable ocean conditions during the seasonal transition, with less prominent thermal fronts or upwelling due to weakened winds and decreased water mixing. Figure 3, five observation points (Pin 1 to Pin 5) were selected across the study area to capture seasonal SST variations. The Southeast Monsoon recorded the highest SSTs, particularly at Pin 4 (exceeding 31.5°C), indicating intense solar radiation or warm water accumulation. The Northeast Monsoon exhibited the lowest SSTs (29°C to 29.6°C) due to moist winds and high rainfall. The First and Second Transitional Seasons showed stable temperatures, with the Second Transitional Season recording slightly higher SSTs. Spatially, Pin 1, in the northwestern part, had consistently lower temperatures, while Pin 4 and Pin 5, near the eastern coastal waters, showed higher temperatures during the Southeast Monsoon and Second Transitional Season, likely due to local circulation patterns.

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Analysis of Land Cover Classification in Northern Sumatra 2024

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Purpose and Background

Land cover (LC) is one of the key objects for various environmental, social, and economic analyses, such as environmental monitoring and management (Khadka *et al*., 2020), resource management (Ojha *et al*., 2019), and urban and regional planning. Analysis of LC has been frequently conducted, improved over time, and widely studied around the world. The availability of multiple spectral bands in remote sensing data helps distinguish different land surface properties, making it easier to classify various land cover types such as water, built-up, and vegetation. Thus, this study aims to analyze the LC classification in Northern Sumatra in 2024 and to evaluate the classification results.

Materials and Methods

The area of this study covers parts of Medan and Deli Serdang in North Sumatra, Indonesia. Medan is the center of government for North Sumatra Province. The Deli Serdang Regency surrounds it on all sides. On the other hand, Deli Serdang is a large, highly urbanized buffer region in the province of North Sumatra. However, compared to Medan, Deli Serdang has a much larger area with a lower population density.

The data for this study were sourced from the Landsat 9 Surface Reflectance collection (Collection 2 Level-2). The image dataset was collected from Google Earth Engine with the product code LANDSAT/LC09/C02/T1_L2 for the year 2024, covering January to December. These data were chosen because of the atmospheric corrections that have been made, providing more accurate surface reflectance values for spatial and temporal analysis. The image was filtered with less than 50% cloud coverage and delimited based on the study area (ROI). Subsequently, median composites were performed to reduce the influence of clouds, haze, and seasonal spectral variations, with a total of 19 images used in this composite. The composite images were used to calculate two spectral indices, namely NDVI (Normalized Difference Vegetation Index) and NDWI (Normalized Difference Water Index). NDVI is a widely used indicator to measure vegetation health and density and to distinguish between vegetation and non-vegetation cover (Narayani *et al*., 2023). On the other hand, NDWI is an index used in remote sensing to detect water bodies and distinguish them from other land cover types (Latuamury *et al*., 2021).

LC classification was performed using the Random Forest (RF) algorithm in Google Earth Engine, by using a combination of surface reflectance bands (SR_B1, SR_B2, SR_B3, SR_B4, SR_B5, SR_B7) as well as NDVI and NDWI. The training and testing processes involved the data samples that have been labeled for the three main classes of vegetation, built-up, and water, to produce the classification map. Accuracy assessment was conducted by calculating overall accuracy and kappa. The areas of each class were calculated to obtain the cover of each LULC that occurred in 2024.

Results and Discussion

The kappa index of the classification resulted in approximately 0.82 with an overall accuracy of 0.91, with the domination of vegetation. The high value of kappa index and overall accuracy show a high accuracy performance of RF classification model. The vegetation dominated 76.9% of the study area with 95,815 ha, followed by the built-up in 27,150 ha (21.8%). Water became the least LC area with 1,665 ha or 1.3% of the study area. The coverage area and percentage of each class are shown in Table 1 as follows.

Table 1. The land cover areas (ha) and percentage in 2024

Land Cover Class	Areas (ha)	Percentage (%)
Water	1,665	1.3
Built-up	27,150	21.8
Vegetation	95,815	76.9
Total	124,630	100

Figure 1 shows the LC classification of the study area using the RF algorithm in 2024. Built-up is mainly concentrated in the middle of the study area and to the north, which is located in Medan city. This shows a high urbanization occurs in this region. However, it is also seen spreading to the east of the study area, which is located in Deli Serdang regency. The vegetation dominated almost all areas of Deli Serdang included in the study area. Deli Serdang is a peri-urban area that is closely associated with agriculture and crops. Hence, the area has extensive vegetation cover. The water in the study area is the Deli River, distinguished by its flow shape, and empties into the sea. The water cover in the study area is also predicted to be ponds and swamps.
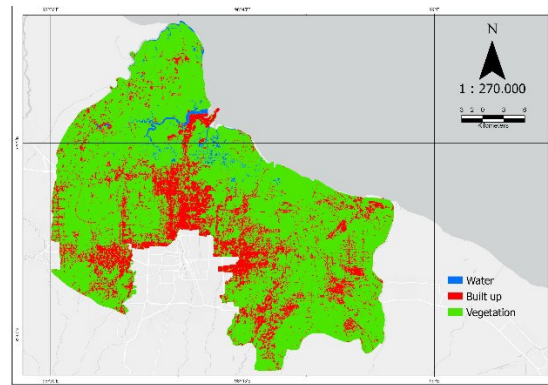
Figure 1. Map of land cover in 2024

NDVI and NDWI were used to train the RF classification algorithm along with six bands in Landsat 9 imagery. Water, bare land, and built-up areas tend to have NDVI values from -1 to 0.09, while the NDVI values of vegetation are mostly above 0.09 (Ubaya *et al*., 2019). A high value of NDWI indicates strong water content in the objects, while a low NDWI shows the absence of water content. The value of NDVI and NDWI for each LC in this study is shown in Table 2.

Table 2. Average of NDVI and NDWI values of land cover classifications

Land Cover Class	NDVI	NDWI
Water	0.05	0.04
Built-up	0.40	-0.40
Vegetation	0.65	-0.59

Water shows a low value of NDVI due to its low reflectance towards the NIR band. However, water results in a low value of NDWI in this classification. This condition may occur due to several reasons, such as a high concentration of sediment and pollutants in the water bodies (Wang *et al*., 2022). The increase in sediment and pollutants in the water LC of this study might also be caused by urbanization, affecting the NDWI value of water (Pang *et al*., 2021). Built-up have the NDVI value of 0.40 and NDWI of -0.40, while vegetation has the highest value of NDVI, which is 0.65 with an NDWI value of -0.59. Built-up tends to have a low value of NDVI due to the predominance of non-vegetative surfaces (Almadrones-Reyes & Dagamac, 2023). The high NDVI value of built-up in this study indicates the presence of vegetation, which is mixed with the built-up (Wang & Zhang, 2015). For future study improvement, sample selection is expected to be done in the form of areas and not points. It is also expected to perform ground truthing to increase the accuracy of classification.

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Fostering Mastery of the Pythagorean Theorem through Active Learning approach

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Purpose and Background

Understanding mathematical concepts is essential for middle school students, as emphasized by the National Council of Teachers of Mathematics (NCTM), which highlights the importance of reasoning, problem-solving, and making meaningful connections in mathematics (NCTM, 2000). One fundamental concept in the Grade 8 curriculum is the Pythagorean Theorem, which supports the development of both geometric and algebraic thinking. Despite its importance, many students still struggle to grasp the concept—particularly when identifying the sides of right triangles and applying the theorem accurately (Atteh et al., 2020). To address these difficulties, instruction should move beyond rote memorization and incorporate hands-on activities that promote exploration and active participation. The use of concrete materials and visual models allows students to engage with abstract concepts in more tangible ways, leading to improved conceptual understanding and retention.

Beyond mastering the concept itself, students must also be able to apply their knowledge in real-world contexts. Integrating mini-projects—short, purposeful tasks that connect classroom learning to everyday problem-solving—can foster both engagement and deeper learning. These projects not only develop problem-solving skills but also help students see mathematics as a practical and valuable tool. As Freeman et al. (2014) point out, active engagement in meaningful tasks enhances academic achievement and supports intellectual growth. This study applied these principles to design lessons that foster students' conceptual understanding and application of the Pythagorean Theorem through active learning approach.

Research and Method

This study focused on Grade 8 students (ages 13–14) enrolled in the English for Integrated Studies (EIS) program, who generally demonstrated weak to moderate proficiency in mathematics. Many students showed limited understanding of the Pythagorean Theorem. They frequently confused the hypotenuse with the legs of a right triangle when substituting values and were unable to apply the theorem correctly to solve problems.

Accordingly, the learning activities were structured into three main phases:

Phase 1: Knowledge Construction through Practical Activities

Given AC and BC that sides and form the right angle, and AB side is the hypotenuse. Students explored and find the relationship between the sides of a right triangle

Phase 2: Justification and Verification

Students were guided to justify the Pythagorean relationship using area-based reasoning and verified their hypotheses using *The Geometer's Sketchpad*, allowing for dynamic visualization and confirmation.

Phase 3: Application through Doing mini project.

In the final phase, students applied their knowledge in a mini project that involved designing and constructing traditional Thai kites. This activity required them to calculate string lengths and dimensions using the Pythagorean Theorem, considering real-world constraints such as material limits, structure, and balance of the kite.
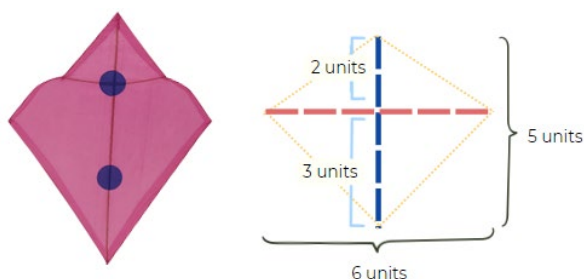
A figure showing a sample of the traditional Thai kite and constructing the Frame of a Traditional Thai kite used in this mini project.

Following instruction, students were assessed using a structured test that required them to apply their understanding of the Pythagorean Theorem to find unknown side lengths in right triangles, as well as to solve word problems. The test included both direct answer questions and items requiring full solution steps. The total score was 20 points. The results indicated that 70% of students scored above 60% of total score, as shown in the graph below, suggesting that the majority achieved a satisfactory level of understanding.
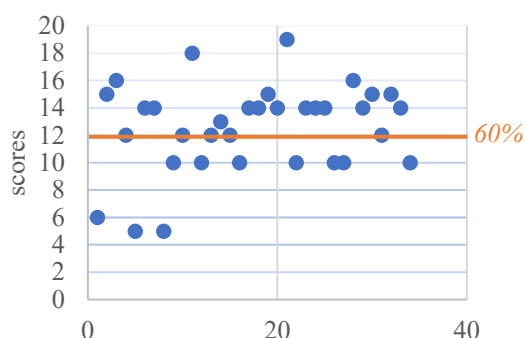
Graph : presents the students' scores and their corresponding ranks.

Results and Discussion

The fact that 70% of students scored above the baseline of 60% reflects the effectiveness of active learning strategies. Students engaged in hands-on exploration using physical models, applied spatial reasoning to prove the Pythagorean Theorem, and used The Geometer's Sketchpad to verify their understanding. These self-directed, inquiry-based activities supported deeper conceptual learning (Freeman et al., 2014; Litster et al., 2020), while visual and tangible tools enhanced comprehension of abstract ideas (Carbonneau et al., 2013). In addition, mini projects such as building a traditional Thai kite allowed students to apply mathematical concepts in authentic, culturally relevant contexts. Addressing practical challenges—like string length or structural balance—promoted real-world problem-solving and increased motivation (Condliffe et al., 2017; Krajcik & Blumenfeld, 2006). Such culturally meaningful tasks not only reinforced learning but also boosted engagement and confidence in mathematics (Litster et al., 2020).

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Multitemporal Analysis of the Urban Thermal Field Variance Index in DI Yogyakarta

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Purpose and Background

The main problem often faced by large cities in Indonesia is the high rate of urban population growth. This is caused by natural population growth and urbanization factors (Prihatin, 2016). Changes in land use conversion have resulted in an increase in built-up areas and a decrease in green and blue spaces, which play an important role in lowering temperatures in these areas (Atianta et al., 2025). This phenomenon also occurs in the city of Yogyakarta, which shows a significant temperature difference, ranging from 10°C to 40°C, between the city center and its surroundings (Atianta, 2020). The use of remote sensing and Google Earth Engine (GEE) can enhance the efficiency and effectiveness of urban analysis, one method that can be applied in this analysis is the Urban Thermal Field Variation Index (UTFVI) (Naim & Kafy, 2021; Velastegui-Montoya et al., 2023). This study aims to analyze the intensity and distribution of the Urban Heat Island (UHI) over time in the Province of DI Yogyakarta using the UTFVI method with Landsat 8 imagery. The analysis utilizes the GEE platform using data from 2016, 2020, and 2024.

Materials and Method

This study was conducted in the Province of DI Yogyakarta, Indonesia, using multitemporal Landsat 8 imagery from 2016, 2020, and 2024. Multitemporal images are used to identify differences and understand changes in spatial distribution in urban areas caused by increases in surface temperature. The DI Yogyakarta region was selected because it is influenced by the volcanic activity of Mount Merapi and the presence of fertile lowlands, as well as rapid urban development that has not yet been regulated by the government. UTFVI is an index widely used to describe the UHI effect with greater precision (Naim & Kafy, 2021). Landsat images were downloaded and processed using the GEE platform. The median surface temperature values generated by Band 10 of the Landsat Thermal Infrared Sensor (TIRS) were used for each year. The advantage of using median images is that they reduce the effects of cloud cover. Next, we determined the average temperature in the study area and then calculated the UHI using the UTFVI index equation (Zhang, 2006). This calculation produces an index indicating how much higher the surface temperature is compared to the average. Based on the index results, classification is then performed into several categories: weak (0–0.005), middle (0.005–0.010), strong (0.010–0.015), stronger (0.015–0.020), and strongest (>0.020).

Result and Discussion

UTFVI calculations using remote sensing with Landsat 8 data enable us to measure temperature variations in urban areas, which are related to thermal distribution or heating occurring on the earth's surface. The use of remote sensing imagery provides spatial information and the distribution of UTFVI values. Based on the results of processing Band 10 Landsat 8 imagery using GEE in 2024, the mean temperature value produced was 34.35°C, in 2020 it was 33.72°C, and in 2016 it was 33.07°C. This shows an increase in surface temperature from 2016 to 2024. Based on Graph 1, which shows changes in the UTFVI area from 2016 to 2024, in 2016, the value with a range of 0-0.005 had the highest area but decreased in 2020 and slightly increased in 2024. Meanwhile, from 2016 to 2024, the index values of 0.005 to 0.020 in each year showed a decrease in area, with the highest value in 2016 and a further decrease in 2024. Conversely, in the index value range >0.020, there was highest in area in 2024 compared to 2016 and 2020. This indicates a change in thermal distribution in the analyzed urban areas during the period.

On the 2016, the strongest category (>0.020) of UTFVI analysis map is spread across coastal areas, the city of Yogyakarta, and its surroundings. Furthermore, there is an increase in area with the strongest classification in 2024, which is depicted in red. Meanwhile, the weak classification is distributed in northern Sleman, western Kulon Progo Regency, and parts of Bantul and Gunung Kidul

Regencies. Areas with values of 0–0.005 are located in high-altitude topography where there is abundant vegetation cover. Landsat 8 imagery uses Band 10 to measure surface temperature. The higher the surface temperature, the higher the UTVFI index value, as areas with high temperatures typically have less vegetation and more heat-absorbing surfaces, such as roads or buildings.
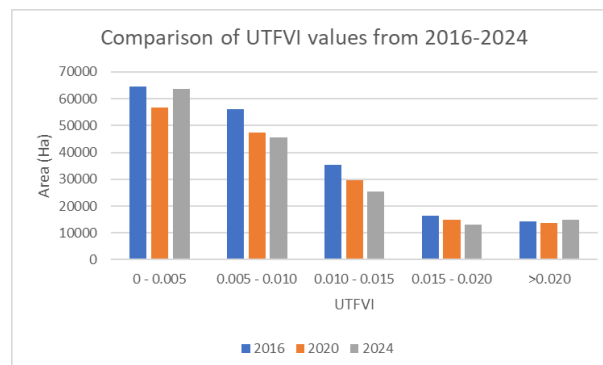
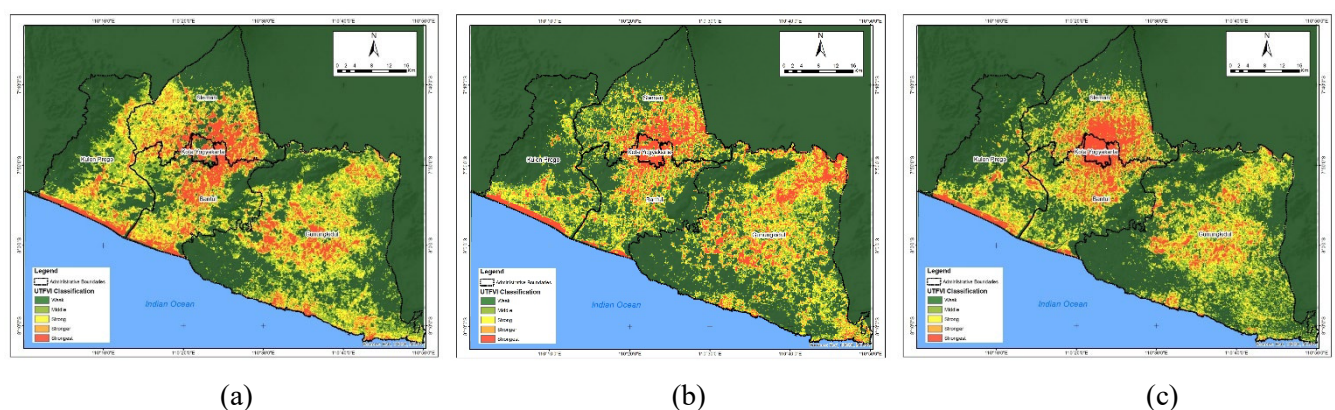Graph 1. Comparison of UTFVI values from 2016 - 2024

Figure 1. UTFVI Distribution Map (a) 2016 (b) 2020 (c) 2024

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High Voltage Mosquito Zapper

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Purpose and Background

This project explores how high voltage can be used to kill mosquitoes and other flying insects. The idea is to convert a low-voltage DC input (3.7V battery) into a high-voltage DC output using a simple inverter and voltage multiplier. When an insect touches the metal grid, it completes the circuit and gets shocked by the high voltage.

This method is commonly used in commercial mosquito zappers. Research shows that voltages between 1kV and 3kV are effective for killing insects without using too much power. [1]

Materials and Methods

The circuit is divided into two parts: a DC-to-AC inverter and a voltage multiplier. The inverter circuit includes an NEC D882P NPN transistor, a 680Ω resistor, and a small high-voltage transformer. It runs on a 3.7V lithium-ion battery. The transistor switches the current through the transformer rapidly, generating pulsed AC and stepping up the voltage.

All components were first assembled and tested on a breadboard, which allowed easy adjustments and safe experimentation during the design phase. This also helped identify any faulty connections before moving to a more permanent setup.

The high-voltage AC is then fed into a voltage multiplier made from two 561K 3kV ceramic capacitors, three RFC4K high-voltage diodes, two 0.01µF 2kV mylar capacitors, and a CBB81 223J2KV metallized film capacitor rated at 0.022µF and 2kV. This section boosts the voltage further and converts it into high-voltage DC. The output is connected to two wire mesh grids with a small gap between them. The high-voltage area is insulated to reduce the risk of accidental shock during use.[2]
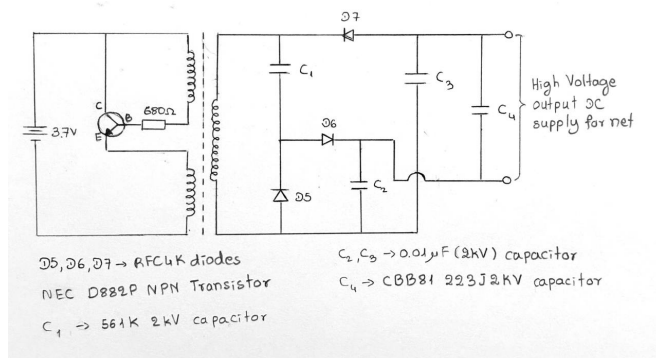
Figure 1.1: Circuit Diagram
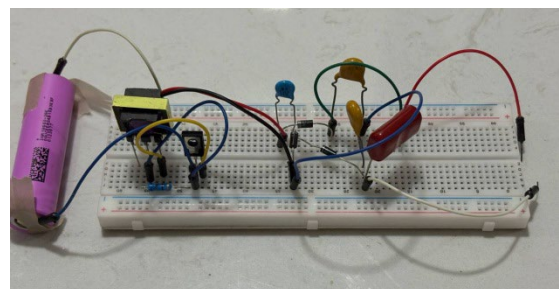
Figure 1.2: Actual Circuit

Results and Discussion

The zapper successfully killed mosquitoes and other small insects on contact. A small visible spark between the mesh wires showed that the circuit was producing high voltage. Output measurements ranged from around 1kV to 2.5kV depending on input conditions and component performance. The circuit ran efficiently and didn't heat up much during use. Overall, this project shows how a basic inverter and voltage multiplier can create high voltage from a low-voltage source, with practical use in DIY mosquito zappers or similar devices.
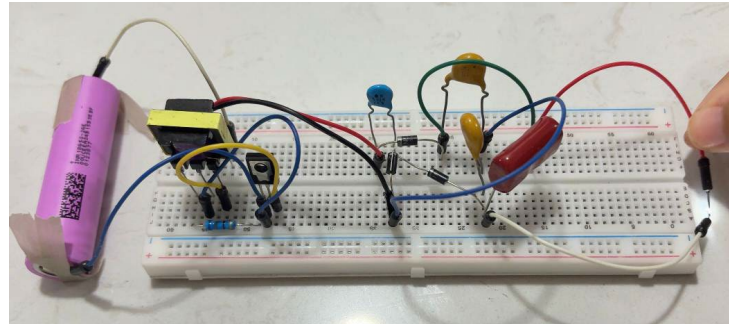
Figure 1.3: Installed Circuit Producing Spark

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Link about Circuit Functions Overview, Google Drive:
https://share.google/9tGWrefWaCs4cJQrk
Link Circuit diagram:
https://share.google/l8cHyfnMGqQ7OSZFf
Link for project inspiration
https://howtodosteps.blogspot.com/2017/10/how-mosquito-racket-bug-zapper-fly.html?m=1

The Effects of Using Real-World Problem Tasks in a Grade 4 Mathematics Classroom

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Purpose and Background

Mathematics education aims to develop students' ability to apply mathematical knowledge as a tool for solving real-world problems. A key competency in this regard is mathematical literacy, which involves the capacity to reason mathematically and to formulate, apply, and interpret mathematics in a variety of real-world contexts (OECD, 2022). It also includes the use of mathematical concepts, procedures, and tools to describe and predict phenomena.

Despite being able to solve textbook problems, many students struggle to apply mathematical thinking to real-world situations. This is often due to their familiarity with well-structured problems that provide all necessary data, requiring only procedural calculations. In contrast, real-world problems are typically open-ended and ill-structured. They require students to identify missing information, collect data independently through observation, measurement, or estimation, and apply appropriate strategies.

Relying solely on textbook-based tasks is insufficient to foster such problem-solving skills. Therefore, this study engaged Grade 4 students in mathematical tasks based on familiar, real-life contexts—without providing the required data. Students were encouraged to analyze the problem, gather relevant information, and apply mathematical reasoning to find and interpret solutions.

This approach aims to promote meaningful mathematical engagement, enhance mathematical literacy, and cultivate critical thinking—skills essential for life in the modern world.

Research Method

To develop students' mathematical application skills, this study used real-world mathematical tasks as the main learning tool. Each task presented a real-life problem without providing the necessary data. Students identified required information, collected it through measurement, estimation, observation, or inquiry, and applied suitable mathematical strategies to solve the problem.

Tasks were based on real-world situations, such as planning classroom events, comparing market prices, or dividing milk cartons among classmates during a long break. Activities lasted four weeks, with students working individually and in small groups to encourage discussion.

The teacher facilitated learning by asking guiding questions instead of direct instruction. Students documented their problem-solving processes, including data identification, collection, and application of mathematical knowledge.

Students' problem-solving abilities were assessed through teacher observations of their behaviors during tasks and analysis of their written work to understand their mathematical thinking and reasoning.

Observations focused on the following aspects:

1. Engagement and persistence in solving the tasks using existing mathematical knowledge
2. Demonstration of mathematical literacy, including the ability to make sense of problems, select and apply appropriate mathematical strategies, and interpret results within real-life contexts
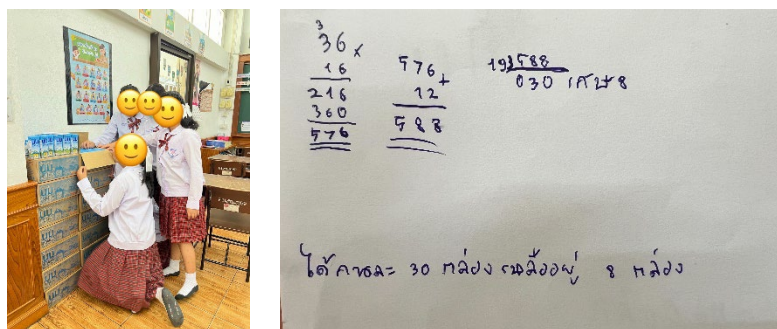3. Communication of ideas and solutions clearly, confidently, and in a way that reflected genuine understanding

Figure showing the student's problem-solving process based on the task: "If all these milk cartons are to be shared equally among all students in the class, how many cartons will each student receive?"

Results and Discussion

The implementation of real-world mathematical tasks over four weeks led to several meaningful outcomes regarding students' engagement, thinking, and problem-solving abilities.

First, students showed noticeable enthusiasm and motivation in completing the tasks. They were eager to explore the problems assigned and demonstrated a strong commitment to finding solutions, making use of their existing mathematical knowledge. These tasks sparked curiosity and encouraged active participation throughout the learning process. This is consistent with the findings of Dinglasan et al. (2024), who found that realistic mathematical tasks enhanced students' engagement and encouraged them to participate actively in problem-solving.

Second, students' written ideas reflected mathematical thinking grounded in appropriate mathematical knowledge. Although their presentations were not always formally structured, students demonstrated sound mathematical reasoning, appropriate selection and application of mathematical concepts, and solutions consistent with real-world contexts. These characteristics indicate mathematical literacy, aligning with the findings of Dinglasan et al. (2023), who observed that students engaged with RME exhibited improved learning outcomes.

Third, students showed improvement in communication and presentation skills during class discussions. They shared their ideas fluently and naturally, explaining their problem-solving processes in their own words. While their language was often informal, their reasoning was mathematically sound, indicating deep understanding. They confidently defended their thinking and learned from their peers through open dialogue.

These findings highlight the benefits of using real-world mathematical tasks without provided data. Such tasks encourage students to think critically about what information is needed, gather that data through observation or estimation, and apply mathematics to solve real-world problems. In doing so, students became more independent thinkers, more confident learners, and more capable of using mathematics as a practical tool in daily life.

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Microstructural and Elemental Analysis of Xiaomi Smart Band 9 using Optical Microscopy, SEM, and EDX Techniques

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Purpose & Background

The purpose of this study is to analyze the physical structure and material composition of key components in the smart band, specifically the flash memory and microcontroller unit (MCU), which are responsible for data and signal management. Optical Microscopy (OM) and Scanning Electron Microscopy (SEM) were employed to provide detailed insights into the internal structure, material properties, and spatial arrangement of these components. Understanding these factors is essential for improving device performance, durability, and manufacturing processes, as well as advancing future wearable technology design.

Materials and Methods

A Xiaomi Smart Band 9 was disassembled to extract and analyze its key components, focusing on the MCU and flash memory.

Table 1 Key electronic components extracted from the Xiaomi Smart Band 9 and their functions.

No.	Model/Name	Function	Package	Key Material
1.	ATS3085E ZR31CMR	MCU, power management, Bluetooth communication	QFN, WLCSP	Si, Cu, Al, Au
2.	MD AY2419 25Q128WIG	Serial flash memory for data storage	SOP-8	Si, Al

After extraction, each component was analyzed using different techniques:

Optical Microscopy (OM), Scanning Electron Microscopy (SEM), and Energy Dispersive X-ray Spectroscopy (EDX). OM (up to 50 μm) provided surface imaging, while SEM (2500×, 5000×) revealed bonding wires and packaging. EDX identified key elements—Cu, Al, Si, O, and C—used in semiconductor fabrication.

Results and Discussion
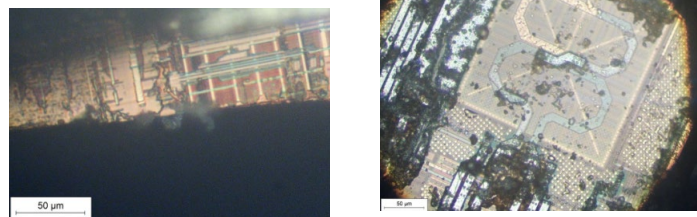
Figure 1: Flash memory image from (OM) (Left) and Microcontroller Unit image from (OM) (Right).

Figure 1. Optical Microscopy (OM) of Xiaomi Smart Band 9 components. Left: Flash memory showing an organized surface with metal traces and bonding areas, indicating precision in memory cell layout. Right: MCU image revealing a complex structure with bonding pads and interconnects, confirming its multifunctional role in data processing and signal control.
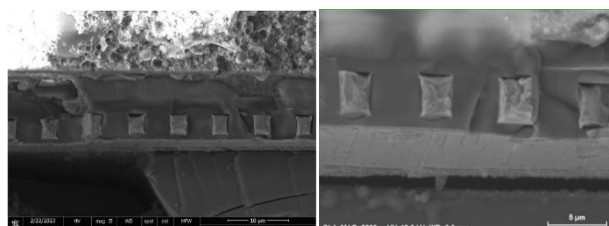
Figure2: Scanning Electron Microscopy (SEM) provides detailed images of flash memory structures (2500×) and (5000×)
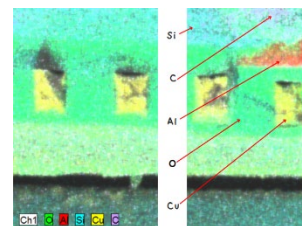
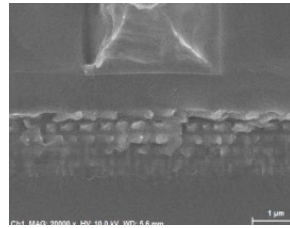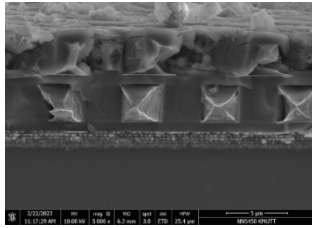Figure3: elements that make up this memory

Figure4: Scanning Electron Microscopy (SEM) provides detailed images of Microcontroller Unit structures (2500×) and (5000×)
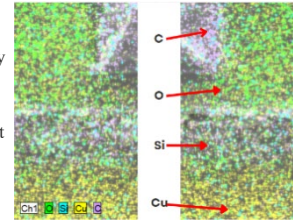
Figure5: elements that make up this memory

The flash memory cross-section (Figures 2 and 3) clearly demonstrates the stacked-layer architecture typical of NAND flash, where precise layer thickness and uniformity are essential for reliable data storage. The bonding areas show well-defined interfaces, indicating high-quality fabrication.

For the MCU (Figures 4 and 5), the SEM images highlight the complexity of multilayer interconnects, including fine bonding wires and intricate metallization patterns. Such structures are crucial for handling multiple signal pathways and ensuring stable operation of the microcontroller.

The EDX mapping (Figures 3 and 6) reveals how materials are distributed within these components:

- **Copper (Cu)** forms the interconnects that enable high-speed signal transmission.

- **Aluminum (Al)** is used in bonding pads, essential for making electrical connections between the chip and its packaging.

- **Silicon (Si)** serves as the substrate forming the base of the semiconductor structure.

- **Carbon (C)** and **Oxygen (O)** are present as part of insulating and passivation layers, including SiO_2 which provides electrical insulation between metal layers.
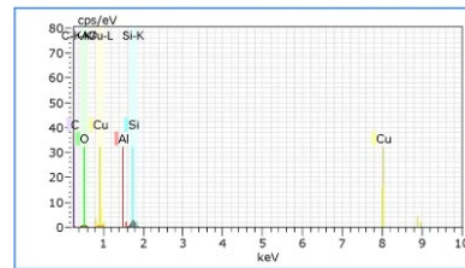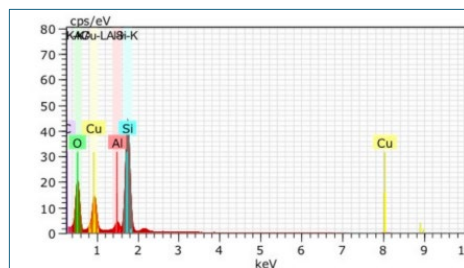
Figure 7: EDX spectra graph of flash memory and Microcontroller

Figure 7 (EDX spectra) confirm these compositions, with prominent peaks corresponding to each component's functional materials.

The integration of OM, SEM, and EDX techniques allows comprehensive analysis of internal structure and material composition, supporting both component understanding and engineering education through hands-on investigation.

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Creating and Controlling an Electromagnet Using DC Power

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Purpose and Background

This project demonstrates how direct current (DC) electricity can be used to create and control an electromagnet. An electromagnet is a type of magnet that is made by passing electric current through a coil of wire. When the current flows, a magnetic field is produced around the coil. Unlike permanent magnets, electromagnets can be turned on and off by simply controlling the electric current. This basic concept is widely used in many devices such as electric bells, magnetic locks, motors, and relays. The goal of this project is to show how simple and low-cost materials can be used to build a working electromagnet and control its magnetic power using a small DC power source.

Materials and Methods

This project used an iron about 3 to 4 inches long, approximately one meter of insulated copper wire, 1.5V AA batteries connected of DC power, electrical tape for securing parts, and paper clips or other small metal objects to test the magnetic field.

The copper wire was tightly wound around the iron nail, forming a coil. The two ends of the wire were left free for connection. The batteries were connected in series, and the ends of the coil were attached directly to the battery terminals. Electrical tape was used to hold the batteries in place, secure the wire, and insulate any exposed metal parts.

When the wire was connected to the batteries, an electric current flowed through the coil. This created a magnetic field around the nail, turning it into an electromagnet. The magnet was strong enough to attract paper clips and small metal objects. When the batteries were disconnected, the magnetic field disappeared, showing how the magnet could be controlled using direct current power.

Results and Discussion

The electromagnet worked successfully. When the wire was connected to the battery, the iron nail became magnetized and was able to pick up paper clips and other small metal objects. As soon as the wire was disconnected, the nail lost its magnetism and the objects fell off. The strength of the electromagnet could be slightly increased by making more wire turns around the nail or by improving the connection to reduce resistance. The project clearly shows how an electric current can generate a magnetic field and how that field can be controlled easily. This experiment is a simple and effective way to understand the basic principles of electromagnetism and its use in real-life technology.
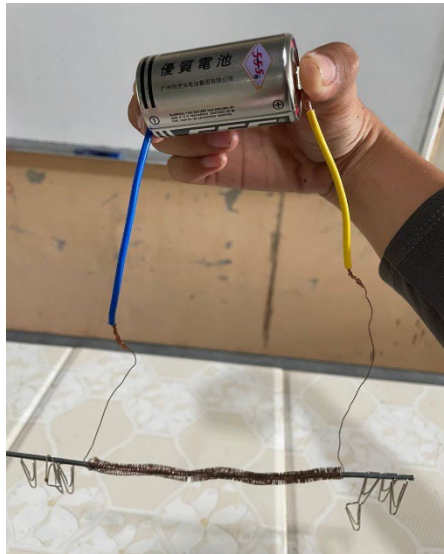
REFERENCES

Link for project
1. https://www.sciencelearn.org.nz/resources/2564-making-an-electrom
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3. https://www.sciencelearn.org.nz/resources/2564-making-an-electromagnet

Spatial Distribution and Mapping Strategy of Flood Inundation in Pekalongan City using the SCS-CN Hydrological Model

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Purpose and Background

Pekalongan City, located in Central Java Province, is highly susceptible to flooding, with a history of frequent river, urban, and tidal floods. The aim of this study is to assess the spatial distribution of potential flood inundation under different land cover scenarios to support effective spatial planning and disaster risk reduction strategies. Specifically, the study compares existing land cover with the city's official spatial plan, models flood inundation using both scenarios, evaluates the consistency between modelled peak discharge and observed river discharge, and analyses the influence of rainfall and land cover changes on monthly flood variations throughout 2022.

Materials and Methods

The study was conducted in Pekalongan City, covering an area of 46.29 km², located within the Meduri, Kupang, and Susukan watersheds (Figure 1). The city is characterized by low-lying, flat terrain dominated by alluvial soils and receives high annual rainfall. To assess flood potential, hydrological modelling was performed using the Soil Conservation Service – Curve Number (SCS-CN) method. This approach incorporates several key datasets: Digital Elevation Model (DEM), soil type, rainfall data (both annual and monthly from CHIRPS), land cover data from 2017 representing existing conditions (Figure 2), land use planning data from the 2009–2029 Spatial Plan (Figure 3), and river discharge measurements. Two modeling scenarios were analyzed: the first using the 2017 existing land cover, and the second based on the planned land cover as defined in the Pekalongan City Spatial Plan.
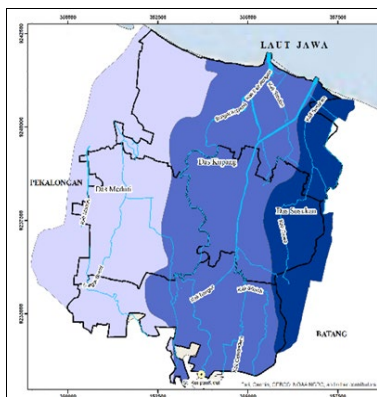

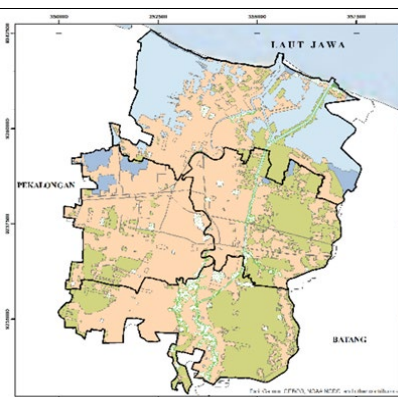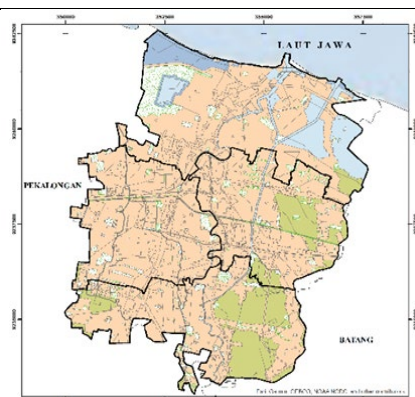| Figure 1. Map of the study area based on the watershed (DAS) boundaries	Figure 2. Existing land cover map based on reclassification results (2017).	Figure 3. Spatial pattern map of the 2009–2029 Spatial Plan RTRW based on reclassification results.

Results and Discussion

In terms of land cover, the Spatial Plan scenario shows a significant increase in residential areas, from 51.09% to 71.06%, while dry land and agricultural areas decreased from 25.69% to 11.25%. Forest cover was completely removed in the Spatial Plan. These changes indicate a reduction in infiltration areas, potentially increasing flood risk.

Under Scenario 1, which models current land cover, approximately 13.97% of the city (6.47 km²) is identified as flood-prone. These high-risk zones are predominantly located in flat areas below 11 meters in elevation, particularly in the southern and central parts of the city. Scenario 2, which uses the RTRW spatial plan, reveals a slightly larger flood-prone area of 14.06% (6.51 km²), attributed to increased residential development and decreased vegetative land cover.

Monthly modelling for 2022 indicates that flood risk correlates closely with rainfall patterns. December showed the highest flood potential at 8.74 km², followed by January and February. In contrast, the lowest flood risks were observed in June (0.06 km²), September, and November, reflecting reduced rainfall during these months. Peak discharge (Qp) estimates ranged from 1.66 to 5.66 m³/s. Observed river discharge data from the Pagerukir station recorded a maximum of 16.33 m³/s, while the Kuripan Kidul station showed much higher peaks, up to 106.80 m³/s. The modelled results align reasonably with observed data for lower flow rates, particularly those recorded at Pagerukir.
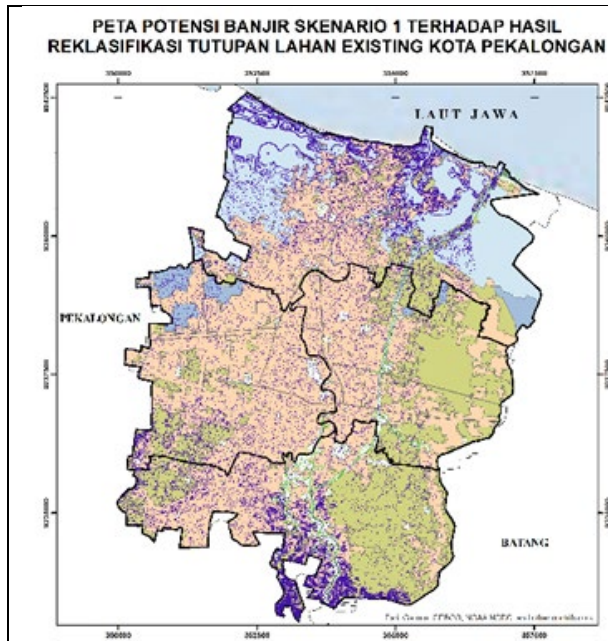
Figure 4. Flood Potential Map of Scenario 1 based on the Reclassified Existing Land Cover of Pekalongan City	Figure 5. Flood Potential Map of Scenario 2 based on reclassified spatial pattern of Pekalongan City Spatial Plan (RTRW) 2009-2029
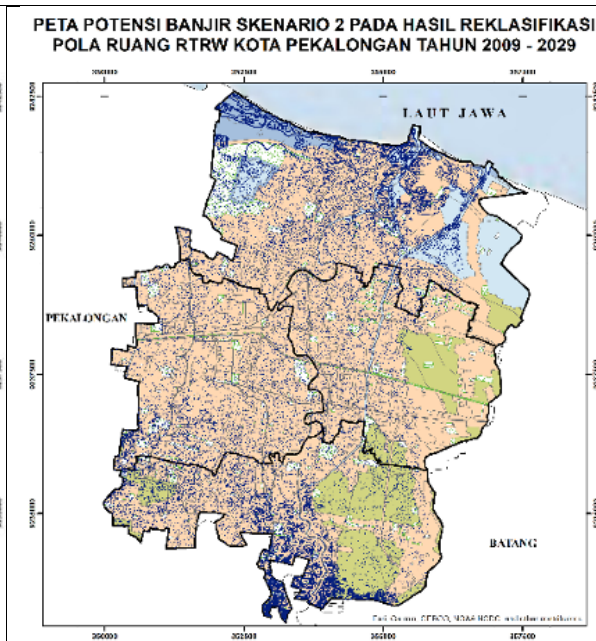
Conclusions

The SCS-CN method proves effective for modelling flood potential in urban environments. The results clearly show that changes in land use, especially the expansion of residential areas, increase flood risk by reducing the city's natural water absorption capacity. Monthly modelling highlights rainfall as a major influencing factor on flood potential. Overall, integrating hydrological modelling into spatial planning is essential for better flood risk management in cities like Pekalongan.

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Stamp Duty Detection using YOLO11

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Purpose and Background

In the corporate environment, documents regulated by government policy are essential. Law No. 8 of 1997 concerning Company Documents has been enacted in Indonesia, which mandates that corporate documents must serve as legal evidence of a company's rights, obligations, and business activities, and therefore must be free from errors (Republik Indonesia, 1997).

Stamp duty is a tax imposed on certain documents, represented by a physical stamp affixed to or printed on the document and signed by relevant parties (Stamp Duty | Direktorat Jenderal Pajak, n.d.). A stamp duty confirms the document's legality, enforceability, and admissibility in court. It is applicable to various documents such as agreements, certificates, contracts, and documents involving transactions above IDR 5,000,000 (five million Rupiah), as well as other types defined in government regulations.

A critical step in document processing is verifying the presence of the stamp duty to determine document validity. However, in some cases, physical stamp duties are fraudulently reused across multiple documents as a cost-saving measure. This practice invalidates the documents and constitutes a legal violation.

The Indonesian stamp duty includes a unique code of 17 alphanumeric characters, which can be checked to detect duplicate use. However, manually inspecting a large number of documents is time-consuming and inefficient. With advancements in computer vision, an automated system can be developed to detect stamp duty using artificial intelligence. This research proposes a detection system that identifies the presence of a stamp duty and extracts its unique code for validation against a known database.

Materials and Methods

This research uses a dataset collected from a private company, comprising 224 Indonesian invoices and receipts from various vendors. The dataset is split into 174 training and 50 testing files. The object detection stage utilizes the You Only Look Once (YOLO) algorithm, which is widely adopted for its real-time performance and lightweight architecture. In document-related applications such as logo detection, YOLOv4 has achieved a mean Average Precision (mAP) of 93.73% and an accuracy of 73.44% (Rezkiani et al., 2022). In this study, YOLO11 is employed due to its significant performance improvements (Ultralytics, 2024).

Text extraction is performed using EasyOCR, chosen for its straightforward installation and system integration (Thennavan et al., 2023). EasyOCR extracts all text from within the detected stamp area, after which a filtering mechanism is applied to isolate the 17-character alphanumeric code.

The full pipeline involves detecting the stamp duty region using YOLO11, extracting the unique code using EasyOCR, and then comparing it with existing codes stored in a database to check for duplication.

Results and Discussion

The YOLO11 model was trained using default parameters, including 60 epochs and an image size of 640. The model successfully detected stamp duties in 49 out of 50 test documents.

The only failure occurred with a document rotated 90° clockwise, which the model had not been sufficiently trained to handle. The model's average confidence score was 0.8625 (86.25%).
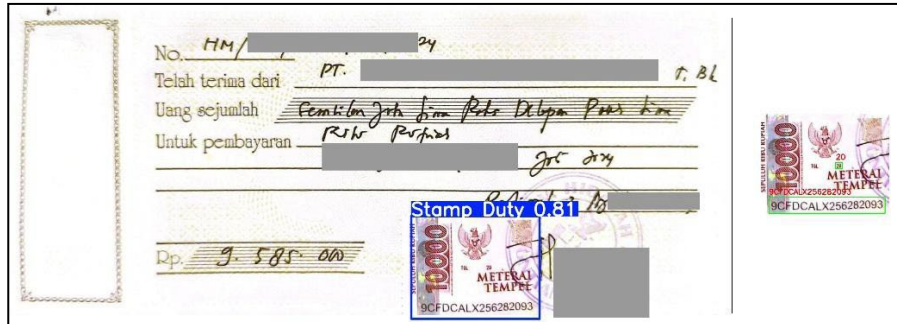
Figure 1. Example of successful YOLO detection (left) and corresponding OCR result (right)
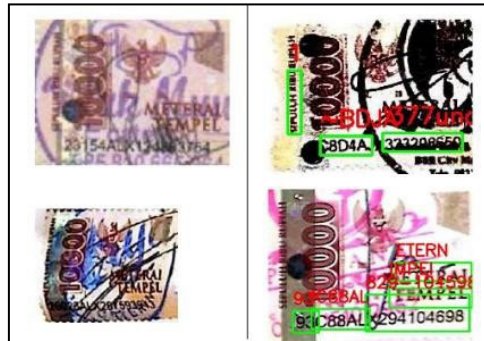

Figure 2. Example of failed OCR extraction

Despite successful detection, EasyOCR extracted the 17-character unique code in only 11 of the 50 documents, with an average OCR confidence score of 0.6789 (67.89%). Of those 11, only 7 codes were accurately recognized.

The low recognition rate is attributed to image quality issues, such as low resolution and visual noise. The noise originates from signatures and additional stamps overlapping the stamp duty, as signatures are mandatory for document validity. Additionally, poor image resolution is caused by mobile devices and apps like CamScanner, which often compress image quality and combine multiple documents in one capture.

Future improvements include augmenting the training dataset with rotated document images to enhance YOLO's robustness. For OCR, applying image enhancement techniques—such as noise reduction and contrast adjustment—alongside hyperparameter tuning is expected to increase the accuracy of unique code extraction.

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HOW TO MAKE ENEMIES LOOK SMART IN GAMES: SIMPLE DESIGN BUT EFFECTIVE AI BEHAVIOR

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Purpose and Background

Enemy behavior design plays a crucial role in shaping the player's perception of intelligence and realism within video games. While advanced AI algorithms can create complex and unpredictable actions, they often come with increased computational costs and development challenges. Therefore, many developers prefer using simpler methods that can still simulate lifelike behavior effectively. This paper explores the design and implementation of an enemy AI system based on the Finite State Machine (FSM) model, combining patrol, chase, and return behaviors to create the illusion of intelligence without the need for complex computation.

Material and Methods

The AI system was designed using a Finite State Machine (FSM), a widely used technique in game development that organizes behavior into distinct states and manages transitions based on in-game conditions.

Initially, the enemy remained in the Patrol State, moving randomly within a designated home area to simulate natural wandering. When the player entered the enemy's detection range, the system transitioned to the Chase State, where the enemy actively pursued the player's position. If the player escaped and the distance exceeded a predefined threshold, the AI entered the Return State, prompting the enemy to navigate back to its patrol area and resume random movement.

This FSM logic relies on basic distance checks and state transitions, which are lightweight in terms of computational cost. The implementation can be efficiently realized in common game engines such as Unity, using built-in functions for position tracking and navigation.

Results and Discussion

The designed AI behavior successfully created a dynamic interaction between the enemy and the player, enhancing the gameplay experience by providing both challenge and realism. Although the FSM itself consists of simple rules, the combination of patrol, chase, and return states gives the illusion of decision-making and awareness.

From a technical perspective, this approach maintains high performance since it avoids resource-intensive algorithms. Additionally, the FSM structure is highly extensible; developers can integrate advanced features like stealth detection, cooperative behaviors between enemies, or context-based decision making without restructuring the entire system.

Overall, this AI design strikes a balance between simplicity and perceived intelligence, making it practical for real-time games, including those running on devices with limited processing power.

This outcome matches the initial objective of designing an AI system that is both lightweight and capable of creating the perception of intelligent behavior for players.

Figure 1: State Diagram of the Enemy AI Behavior
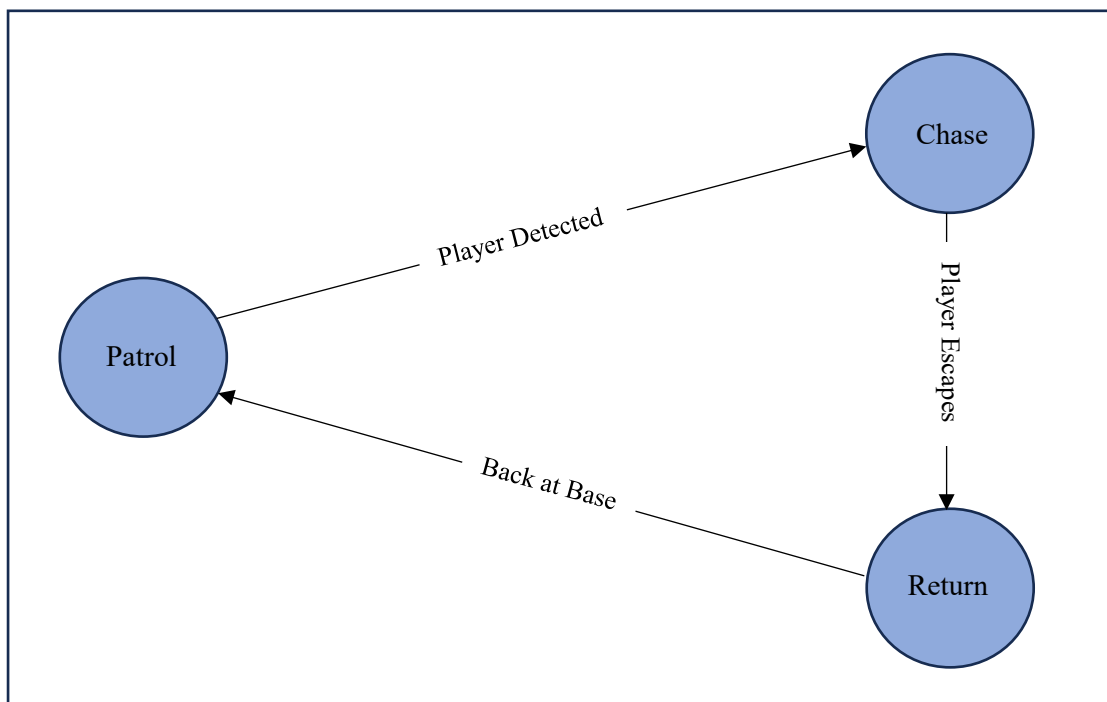
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TRENDS IN FEDERATED LEARNING FOR BIG DATA: A BIBLIOMETRIC ANALYSIS (2022-2025)

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Purpose and Background

Federated learning has gained popularity in recent machine learning topics. Google introduced the concept in 2016, but it gained popularity in 2021 after overcoming regulatory hurdles. Federated Learning (FL) enables models to train collaboratively on its own datasets without other device to access the entire dataset(Hard et al., 2018), which is crucial for addressing significant challenges in big data, such as privacy, communication efficiency, and heterogeneity. This proceeding presents a concise bibliometric analysis of FL research based on IEEE Transactions on Big Data (IEEE TBD) from 2022 to 2025, aiming to identify key trends and themes within this high-impact area.

Materials and Methods

A systematic search on IEEE Xplore targeted "IEEE Transactions on Big Data" (Publication Number: 6687317) for articles explicitly using the phrase "Federated Learning" from 2022 to 2025. The result yielded 75 papers. Metadata (publication year, keywords) extracted and processed using Python scripts to count frequencies. The analysis focuses on annual publication trends and the most frequent keywords to map the dominant research themes. Due to the limitation of available space, only a qualitative discussion of the significant themes selected is presented, illustrated by a representative sample of papers.

Result and Discussion

The bibliometric analysis of 75 FL papers in IEEE TBD (2022-2025) reveals a rapidly intensifying research focus. As shown in Table 1, the total number of publications has gradually increased each year, with the year 2024 leaping the previous year by total number of volume (44 papers), signifying FL's heightened relevance in big data. The substantial partial count for 2025 (19 papers) indicates this growth continues.

Table 2 highlights the dominant research themes. Beyond "federated learning" itself (52 occurrences), "privacy" (6 occurrences) and "differential privacy" (6 occurrences) signify that data protection is a crucial focus. "Vertical federated learning" (9 occurrences) and "blockchain" (5 occurrences) also feature highly, indicating interest in specific FL paradigms and integrated security solutions for distributed big data.

These trends confirm that the need for robust, private, and efficient solutions for big data fundamentally drives FL research in IEEE TBD. Papers frequently address challenges like data heterogeneity(Beikmohammadi et al., 2024), security against adversarial attacks (Li et al., 2023), and privacy preservation(Hallaji et al., 2024). Furthermore, research explores integrating FL with technologies like blockchain(Cai et al., 2025)and its application in sensitive domains such as healthcare(Mao et al., 2024). This ongoing research aims to enhance FL's practical deployment across diverse, large-scale data environments.

Table 1. Annual Publication Count of Federated Learning Papers

Publication Year	Number of Paper
2022	3
2023	9
2024	44
2025(Partial)	19
Total	75

Table 2. Top 5 Most Frequent Keywords and Their Occurrences

Keyword	Frequency
Federated Learning	52
Vertical Federated Learning	9
Privacy	6
Differential Privacy	6
Blockchain	5

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Developing Mathematical Fluency and Flexibility of Grade 6 Students through Collaborative Game-Based Learning

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Purpose and Background

In the 21st century, creativity is a crucial skill for success in a rapidly changing and complex world (Trilling & Fadel, 2009). Particularly in mathematics, fluency and flexibility are essential components of creative thinking that enable students to solve problems effectively and in diverse ways. Numerous studies have shown that game-based learning creates an engaging environment that encourages experimentation, problem-solving, and the generation of new ideas (Hung, Kinshuk, & Chen, 2012). Moreover, collaborative learning and brainstorming allow students to exchange diverse perspectives, leading to shared learning and the development of creative problem-solving skills (Johnson & Johnson, 1999). Research by Thinnakorn and Jitgarun (2023) also found that the use of board games combined with mathematical tasks can effectively enhance students' fluency and flexibility, which are fundamental foundations for advanced mathematics learning. Therefore, this study aims to develop collaborative game-based learning activities in which students first learn key concepts and then work in small groups to play games that emphasize teamwork and brainstorming within the group to compete with other groups. The goal is to foster mathematical fluency and flexibility among Grade 6 students. Fluency is assessed based on students' ability to generate diverse answers, while flexibility is assessed based on their ability to adapt and select problem-solving methods according to given conditions.

Materials and Method

The study adopted the action research framework proposed by Kemmis and McTaggart (1998), which consists of four steps: Planning, Action, Observation, and Reflection. The implementation was conducted in three cycles, based on learning plans covering factors, prime numbers, the greatest common divisor, and the least common multiple. The study involved a total of 36 grade 6 students.

Data Collection Tools

1. Three sets of student fluency and flexibility assessment instruments: These were open-ended tests requiring students to produce many varied answers consistent with specified conditions within a time limit.

2. Teacher's reflective journal: This was used to record students' responses to questions, their behaviors during brainstorming and collaborative gameplay, as well as the outcomes of the learning activities.

Data Collection

The teacher conducted learning activities through Collaborative Game-Based Learning and recorded reflective observations at the end of each class session. Upon completion of each research cycle, students completed assessments designed to measure mathematical fluency and flexibility.

Data Analysis

1. Analysis of students' scores: Individual scores from the fluency and flexibility assessments were analyzed, categorizing students into two groups: those meeting the criterion (scoring 50% or higher) and those not meeting the criterion (scoring below 50%).

2. Content analysis of the teacher's reflective journal: Journal entries were analyzed to synthesize effective practices and inform improvements for the design and implementation of learning activities in subsequent cycles.

Result and Discussion

Table 1: Students' Average Percentage Scores on Mathematical Fluency and Flexibility and Percentage of Students Meeting the Criterion Across Three Assessment Rounds

Assessment Round	Average Fluency Score (%)	Students Meeting Fluency Criterion (%)	Average Flexibility Score (%)	Students Meeting Flexibility Criterion (%)
1	70.49	91.67	62.50	91.67
2	83.33	91.67	90.28	97.22
3	84.44	91.67	97.22	100.00
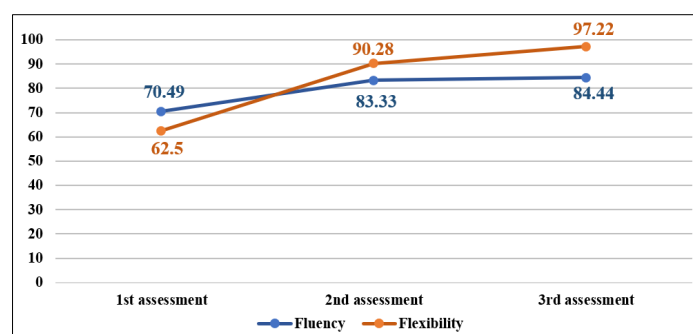
Figure 1: Students' average percentage scores on mathematical fluency and flexibility.

The research findings indicate that Collaborative Game-Based Learning effectively enhanced students' mathematical fluency and flexibility. The majority of students (between 91.67% and 100%) met the established criteria for both aspects in each assessment cycle. These results align with the study by Thinnakorn and Jitgarun (2023), which found that board game-based learning activities promote students' mathematical fluency and flexibility. Furthermore, average scores across all three assessments showed overall improvement, particularly in the second assessment where a marked increase was observed.

Effective practices Identified:

1. Designing game-based activities with clear mathematical goals that encourage multiple solution paths strengthens students' fluency and flexibility, which aligns with the recommendations of NCTM (2014).

2. Using strategic, open-ended questions during gameplay promotes deeper thinking, reasoning, and comparison of different strategies, which aligns with Boaler's (2016) suggestions.

3. Facilitating brainstorming and peer discussions enables students to share ideas and develop diverse approaches to mathematical problems.

4. Organizing students into small collaborative groups of four to five members ensures active participation and effective teamwork, which aligns with the guidance of Johnson and Johnson (1999).

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Will you survive the Titanic? An Introduction to prediction in statistics using Logistic Regression model

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Purpose and Background

In today's data-driven world, the ability to extract meaningful insights from data has become a significant advantage. One key application of data analysis is statistical prediction, which plays a crucial role across various fields such as business, healthcare, and the social sciences.

This study aims to introduce the fundamental concept of statistical prediction and demonstrate its application using a well-known and accessible case study: the Titanic dataset. This dataset includes variables such as age, gender, and passenger class, making it an ideal example for applying Logistic Regression to a binary classification problem which in this case is predicting whether a passenger is likely to survive or not.

The objective is not only to build a predictive model but also to explore the relationships between input variables and survival outcomes. This allows for a better understanding of how different factors influence the likelihood of survival, which is the key to prediction.

This study is designed to help individuals interested in statistics or data science including general audiences gain a basic understanding of predictive thinking and the practical use of statistical models in a real-world, multi-variable context.

Materials and Methods

The analysis began with data cleaning, where rows containing missing values were removed to ensure data consistency. Key variables relevant to survival prediction such as sex, passenger class, age, number of parent and children aboard the Titanic, and number of siblings and spouse aboard the Titanic were selected based on basic domain understanding.

A brief exploratory data analysis (EDA) was conducted to observe general survival patterns across variables. Visualizations such as bar plots, stacked bar plots and histograms were used to support initial interpretations.

A Logistic Regression model was chosen to predict the binary outcome Survived, based on the selected predictors. The dataset was randomly split into a training set (80%) and a test set (20%). The model was trained on the training set and evaluated on the test set to assess its predictive performance.

Finally, the model was evaluated by constructing a confusion matrix using the test set predictions. From this, key performance metrics used were accuracy, precision, recall, and F1-score were calculated to provide a comprehensive understanding of the model's effectiveness in classifying survival outcomes.

Results and Discussion

Exploratory data analysis from **Figures 1 to 3** revealed clear patterns related to survival. It showed that females (75.5%) and first-class passengers (65.6%) had the highest survival rates. Passengers with 1–2 family members aboard tended to survive more than those alone or in large groups. Older age was generally associated with a lower likelihood of survival. These patterns guided the information for predicting and selecting models.
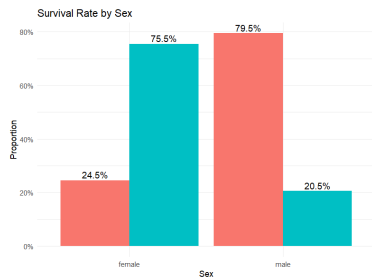
Figures 1: Survival rate by Sex
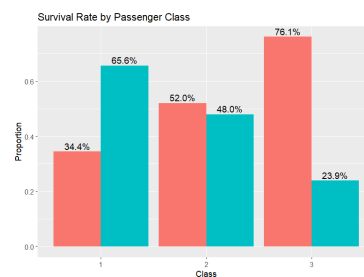
Figures 2: Survival rate by Passengers Class
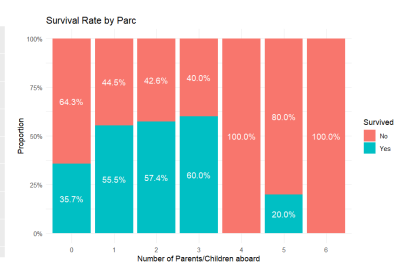
Figures 3: Survival rate by No. of pa... Titanic

From **Figure 4**, the logistic regression coefficients show that the variables Sex, Passenger class, and Age are statistically significant predictors of survival (p < 0.001 for all). Being male (β = -2.800) significantly decreases the probability of survival, while passengers in second class (β = -1.272) and third class (β = -2.527) also had lower chances compared to first class. Additionally, age negatively correlates with survival (β = -0.049), meaning that as age increases, the likelihood of surviving decreases. These findings are consistent with earlier EDA results, reinforcing that **gender, class, and age** play critical roles in predicting survival on the Titanic.

Figures 4: An example of Coefficients from Logistic Regression model

Figures 5: Confusion matrix and model's accuracy

From **Figures 5**, the logistic regression model achieved an accuracy of 73.94% on the test dataset. The confusion matrix revealed a reasonable balance between true positives (37 survivors correctly predicted) and true negatives (68 non-survivors correctly predicted), though some misclassifications remained. The model's precision for predicting survival was approximately 68.5%, with a recall of 64.9%, resulting in an F1 score of around 66.7%. These results indicate that the model performs reasonably well in identifying passengers who were likely to survive, consistent with earlier insights from EDA.

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DEVELOPING A MULTI-SENSORY INTEGRATED TEACHING KIT ON THE THEME OF PLANTS AND ANIMALS FOR NATURAL AND SOCIAL, SCIENCE IN PRIMARY SCHOOLS

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Truong Thi Thao, Tran Thanh Luan

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Purpose and Background

Nowadays, cities around the world, especially in Vietnam, are facing serious challenges of environmental pollution. Air pollution has reached an alarming level, with 99% of the global population breathing polluted air, while Vietnam's major cities are often covered with toxic PM2.5 dust. In addition, billions of tons of untreated urban waste properly have seriously polluted soil, water and air. To raise the awareness of the younger generation, the multi-sensory integrated teaching kit is an urgent solution. In the context of the fundamental and comprehensive reform of education in Vietnam, as outlined in Resolution No. 29-NQ/TW and the 2018 General Education Curriculum, the application of multi-sensory integrated teaching aids has become an urgent requirement to enhance instructional effectiveness. At the primary level, Natural and Social Sciences (grades 1–3) and Science (grades 4–5) play a vital role in fostering scientific thinking, observational skills, the ability to explore the natural world and cognitive ability about environmental protection awareness. However, the implementation of multi-sensory teaching aids in current classroom practice remains limited, resulting in suboptimal learning outcomes among pupils.

Materials and Methods

This study aimed to design and develop a multi-sensory integrated teaching kit themed on Plants and Animals to support teaching activities in Natural and Social Sciences (grades 1–3) and Science (grades 4–5) at the primary level.

Drawing upon Mayer's (2001) Cognitive Theory of Multimedia Learning and Sweller's (1999) Cognitive Load Theory as a solid scientific foundation, multisensory learning not only facilitates faster knowledge acquisition but also supports long-term retention and more effective practical application. By engaging multiple senses in the learning process, learners can optimize their cognitive capacities, reduce the working memory burden, and enhance overall learning effectiveness.

The research was conducted in two phases: (1) a theoretical study combined with a survey of practical teaching at primary schools; (2) the construction of the teaching kit. The study employed key methods including literature review, and field surveys via questionnaires. Specifically, the research team conducted a survey involving 37 teachers and 206 pupils at Nam Trung Yen Primary School (Hanoi), analyzing the data to identify the needs, interests, and actual experiences of teachers and students in using multi-sensory integrated teaching aids.
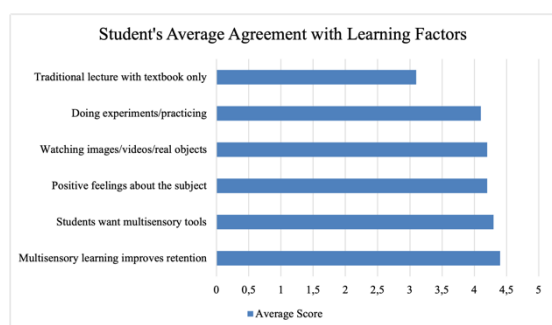
Results and Discussion

Figure 1. The average level of consensus of elementary students for learning factors (scale 1-5)

	Mean	Std Dev	Min	Max
Multisensory learning improves retention	4,4	0,52	3	5
Students want multisensory tools	4,3	0,58	3	5
Positive feelings about the subject	4,2	0,6	3	5
Watching images/videos/real objects	4,2	0,55	3	5
Doing experiments/practicing	4,1	0,66	3	5
Traditional lecture with textbook only	3,1	0,89	1	5

Table 1. Statistics describing the student's consent of the key learning factors.

The two charts present the survey results on the factors affecting learning in Nature and Social, Science of primary students. Figure 1 shows the average level of students' consensus for learning methods, while the

Table 1 provides detailed statistics describing the student's consent of the key learning factors. In general, the results show that students highly appreciate and have a great consensus for the effectiveness of the multisensory learning method, in contrast to the traditional learning method that only listens to lectures and reading textbooks, which is less interested and controversial.

In addition to incorporating multi-sensory elements to enhance teaching effectiveness, the teaching kit was designed in alignment with green education and sustainable development principles, consistent with the spirit of innovation in the 2018 General Education Curriculum. The authors prioritized the use of recycled, eco-friendly, and easily accessible materials such as used cardboard, colored paper, felt fabric, old straws, cotton wool, tissue paper, and thread. The use of these materials not only helps reduce costs and facilitates adoption across various educational institutions—particularly in rural areas—but also fosters environmental awareness among both teachers and pupils.

The kit serves not only as a means of knowledge transmission but also as a tool for promoting green behaviors, community responsibility, and life skills. Pupils are encouraged to participate in constructing the teaching aids themselves, thereby developing creativity, dexterity, and awareness of sustainable development from the earliest years of schooling.

Figure 2. The First Stage

Figure 3. The Second Stage

Figure 4. The Third Stage

Figure 5. The Fourth Stage

Structurally, the teaching kit is designed in the form of a circular base divided into four compartments on a turntable, corresponding to the four stages of organism development. The butterfly represents the animal life cycle, while the sunflower represents plant growth. Specifically:

- **Stage 1**: The model simulates butterfly eggs attached to a leaf and sunflower seeds placed in soil, illustrating the initial stage of life.
- **Stage 2**: The model depicts a caterpillar hatching from the egg and the seed beginning to germinate, representing the early development process.
- **Stage 3:** The butterfly enters the chrysalis stage, while the sunflower develops into a seedling with a stem and leaves.
- **Stage 4:** The butterfly emerges as a fully developed adult and the sunflower blooms, marking the completion of the life cycle.

The kit's components are designed to be flexible, replaceable, or creatively adapted, allowing repeated use across multiple lessons and themes. This design not only enhances practical applicability but also facilitates the organization of experiential learning activities, project-based learning, and group work—approaches strongly encouraged in modern education.

The multi-sensory integrated kit includes physical models, illustrative images, and materials with varying textures, combined with colors and motion, to simultaneously stimulate sensory channels such as visual, tactile, and kinesthetic senses. This comprehensive sensory activation improves cognitive engagement, memory retention, and learning motivation. Younger pupils (grades 1–3) typically respond positively to vivid, visual stimuli, while older pupils (grades 4–5) are more capable of employing the kit in analytical, practical, and critical thinking activities.

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Application of Disaster Education through the Interactive Game Concept "TRUWELU"

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Purpose and Background

Indonesia is a country highly prone to natural disasters, which frequently result in significant casualties. Its geographic location at the convergence of three tectonic plates—Pacific, Eurasian, and Indo-Australian—renders it vulnerable to earthquakes and volcanic eruptions. A major contributing factor to the high number of disaster-related casualties is the low level of disaster awareness and understanding of mitigation strategies among the population (Mardiatno et al., 2019). Children play a crucial role in saving lives and protecting community members during disasters when equipped with disaster education knowledge (Setianingsih et al., 2023). This paper aims to present an innovation in disaster education through the concept of the interactive game "TRUWELU."

Materials and Methods

This study employed a descriptive qualitative approach using a limited experimental study method. The experiment was designed to evaluate the impact of the "TRUWELU" interactive board game as a medium for disaster education targeting junior high school students. This approach was selected to illustrate the learning processes and outcomes facilitated by gameplay activities. The trial was conducted in two junior high schools—SMPN 1 Cangkringan and SMPN 2 Cangkringan, Yogyakarta—both purposively selected based on their location in high-risk areas for volcanic eruptions from Mount Merapi.

Results and Discussion

"TRUWELU" is a semi-digital interactive board game offering a unique and educational playing experience (figure 1). The game board is based on the classic Snakes and Ladders design, adapted from the beliefs of Jainism (ancient India). Disaster-related questions are integrated into the gameplay to enhance the learning experience. The game is accessible via www.truweluboardgame.id, combining physical and digital elements to create an engaging experience. The acronym "TRUWELU" originates from the Javanese language and stands for Trustha (joy), Wigya (wisdom), Edi (beauty), and Luhur (virtue), reflecting an educational process grounded in joy, which enhances knowledge in a beautiful and virtuous way.

The questions in the game cover disaster mitigation issues specific to the Special Region of Yogyakarta (DIY), offering an authentic educational dimension tied to the players' local environment. Additionally, the *kawruh* (knowledge) feature provides cultural wisdom and practical advice for disaster situations, reinforcing the local context. "TRUWELU" is designed for students aged 14 and above, a group that generally lacks firsthand experience with natural disasters. As such, the game serves as an introductory tool for fostering disaster awareness and understanding.

Positive outcomes from trials conducted at SMPN 1 and SMPN 2 Cangkringan (figure 2), both designated as Disaster Safe Education Units (Satuan Pendidikan Aman Bencana, SPAB) demonstrated high enthusiasm and acceptance among teachers and students. Although some students initially struggled with basic disaster mitigation questions, this challenge was viewed as an opportunity to deepen their comprehension. The *kawruh* feature, designed to introduce a relaxed and cheerful atmosphere, successfully created a fun and engaging learning environment throughout the gameplay.
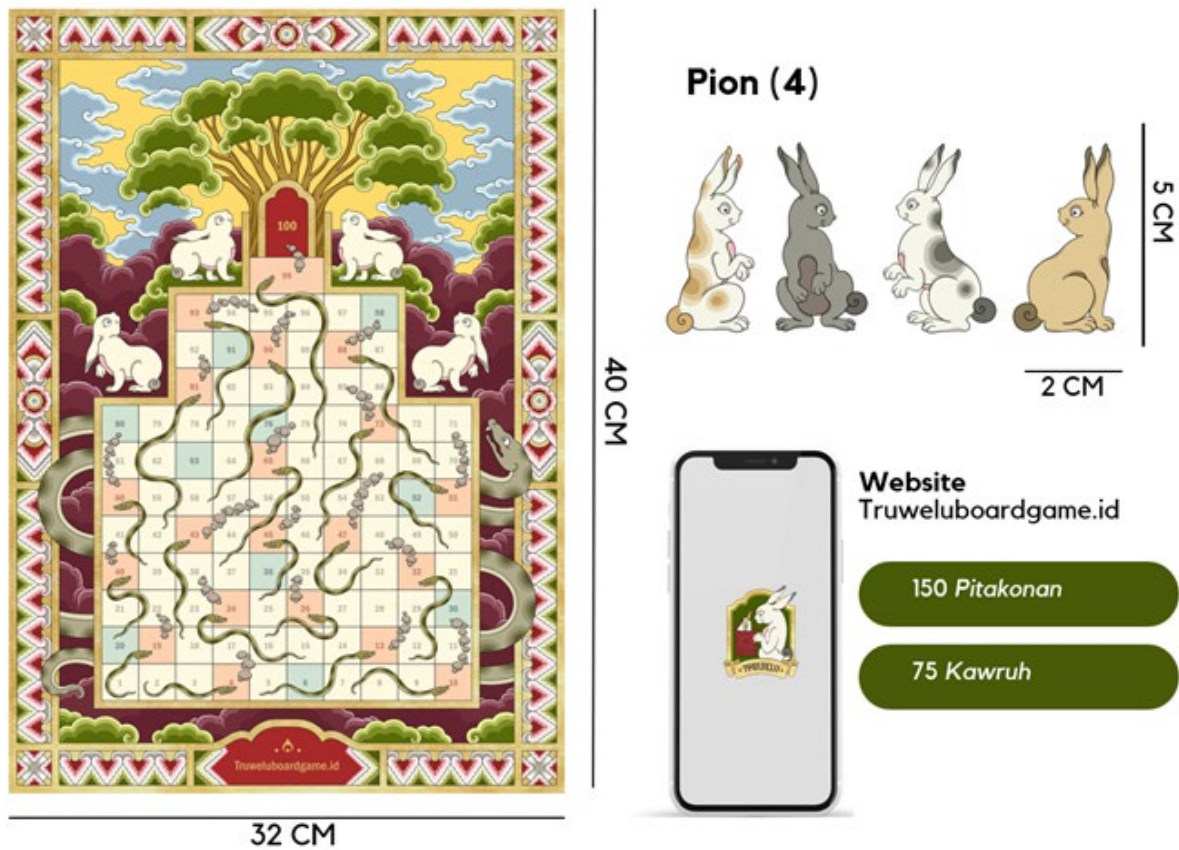
Figure 1. TRUWELU game design

Figure 2. TRUWELU game trial at SMPN 1 Cangkringan (left) and SMPN 2 Cangkringan (right)

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Digital Literacy in English Language Teaching: A Bibliometric Analysis

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Purpose and Background

The integration of digital literacy into English Language Teaching (ELT) has become increasingly important in the digital age. Digital literacy involves the ability to access, understand, evaluate, and use information from digital sources, which is vital for students and educators in a technologically rich world (Alakrash & Razak, 2021). As educational institutions globally adapt to digital platforms, understanding the impact of digital literacy on ELT is crucial for both learners and teachers.

The purpose of this bibliometric analysis is to examine the publication trends and the evolving themes in the academic research surrounding *digital literacy in ELT*. The increasing incorporation of digital tools in education, especially in language classrooms, has driven a rise in scholarly interest, as seen in the growing volume of related publications (Son et al., 2017). This analysis utilizes data from Scopus to explore publication trends over time, identify key research areas, and recognize influential contributors in the field.

Materials and Methods

This bibliometric analysis used data from the Scopus database, covering English-language publications from 2007 to 2025 related to digital literacy in ELT, including peer-reviewed journals, articles, conference papers, books, and reviews. Articles were selected based on their relevance to digital literacy within English language teaching, using keywords such as "digital literacy" and "EFL," "ESL," "ELT," "English Language," or "Foreign Language" to narrow the search scope (Almusharraf & Engemann, 2020). The data analysis involved identifying yearly publication trends and conducting a keyword co-occurrence analysis to visualize research patterns and relationships using the VOSviewer software, which enabled the mapping of significant research clusters in this evolving field.

Results and Discussion

Figure 1. Publication Per Year of Digital Literacy in EFL context based on scopus data
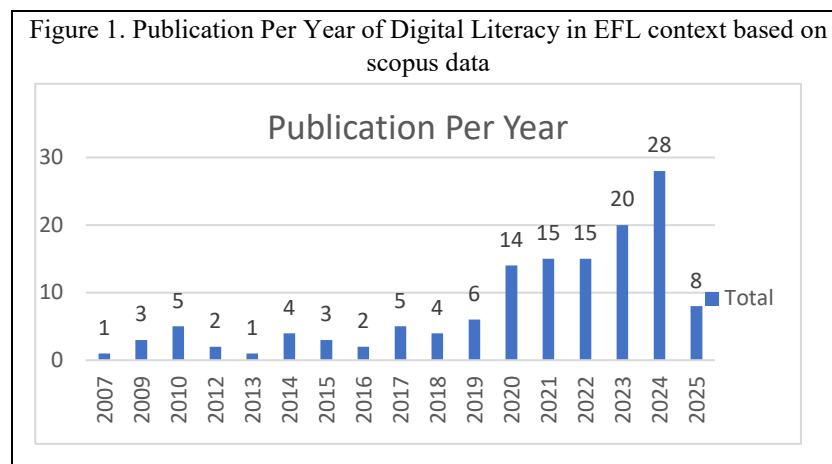
Publication Trends

The figure 1 displays a significant increase in publications on digital literacy in ELT, especially post-2020. The number of papers published jumped dramatically from 14 in 2020 to 28 in 2024, reflecting the global shift towards digital education prompted by the COVID-19 pandemic (Alakrash & Razak, 2021). The period after 2020 saw substantial growth, driven by the need for e-learning solutions and digital resources in teaching English (Hafner, 2019).

Despite a slight decline in 2025, the overall trend shows an upward trajectory, indicating that research on digital literacy in ELT remains vibrant and growing. This growth is supported by the recognition that digital literacy has become a foundational skill for modern language learners (Deiniatur et al., 2024).

Co-occurrence Analysis

Figure 2. Overlay Keywords Trend of Digital Literacy in EFL
context based on scopus data
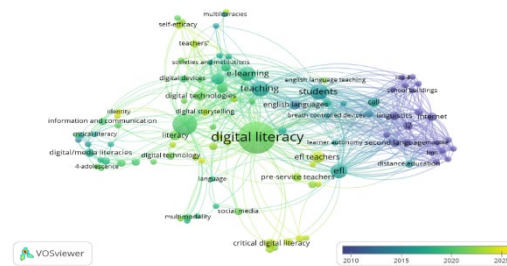
The figure 2 presents a co-occurrence network of keywords derived from the publications analyzed. Central themes in this network include *digital literacy*, *e-learning*, *critical literacy*, *teaching*, and *students*. These terms indicate that recent research is emphasizing the integration of digital literacy into both student learning and teaching practices.

The keywords *critical literacy* and *e-learning* emerged as prominent themes, suggesting a focus on empowering students to engage critically with digital tools and fostering the development of critical thinking skills (Hafner, 2019). Additionally, the term *pre-service teachers* indicates that a significant amount of research is focusing on teacher education and the preparation of future educators to handle digital tools effectively (Iskandar et al., 2022).

Key Findings

The analysis shows a significant rise in publications from 2020 onward, reflecting the global shift to online education due to the pandemic. Keywords such as *critical digital literacy* indicate a growing emphasis on not just using digital tools but also engaging with them critically in language learning (Deiniatur et al., 2024). Network analysis highlights connections among digital devices, language learning, self-efficacy, and pre-service teachers, pointing to the urgent need for comprehensive teacher training (Pratolo & Solikhati, 2020). It also reveals a research gap in digital literacy for English language teaching in rural contexts, while more attention has been given to urban settings (Alakrash & Razak, 2021; Dewi et al., 2019), raising important concerns related to equity in education. Overall, research trends underscore that digital literacy in ELT is a complex, evolving area that integrates technology, pedagogy, critical thinking, learner autonomy, and educational equity. Future research should further explore underexamined areas at the intersection of digital literacy, equity, critical thinking, and pedagogy to offer practical solutions for educators and learners.

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DEVELOPMENT AND VALIDATION OF A FRAMEWORK FOR MULTIDISCIPLINARY CURRICULUM INTEGRATION

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Purpose and Background

Higher Education Institutions (HEIs) should offer students relevant and meaningful learning opportunities. This is to equip students to address the challenges of the contemporary world. Instruction in higher education institutions (HEIs) should integrate global initiatives, such as the *Pact for the Future*, that reflect these challenges. However, the curriculum programs in the Philippines remain predominantly disciplinary in structure. These programs are constrained by prescribed standards and a defined set of competencies for each course within every program. Thus, the challenge in implementing these initiatives rests on the teachers' ability to integrate the curriculum.

Mathematics in the Modern World (MMW) is a General Education course designed for all undergraduate students, regardless of their field of study. It explores the essence of mathematics, highlighting its practical, intellectual, and aesthetic dimensions. The course aims to help students recognize the crucial role mathematics plays in daily life, from performing everyday tasks to addressing workplace challenges and broader societal issues (Commission on Higher Education, 2013). It seeks to inspire a deeper appreciation for the significance and relevance of mathematics in today's world.

On September 22, 2024, various heads of state and government adopted the *Pact for the Future* (A/RES/79/1) during the Summit of the Future at the United Nations headquarters in New York, USA. The resolution aims to address significant global issues, support long-term growth, and protect future generations. It aims to encourage people worldwide to collaborate in addressing current problems and challenges, thereby ensuring a better future (United Nations General Assembly, 2024).

Since the *Pact of the Future* reflects the global challenges that need to be addressed, *Mathematics in the Modern World* should be grounded in these areas. In this regard, teachers play an important role in designing and implementing the curriculum. Therefore, they should facilitate the demonstration of how mathematics can contribute to sustainable development, international peace and security, science and technology, youth and future generations, and transforming global governance.

This study aimed to develop and validate a multidisciplinary curriculum integration framework that incorporates the commitments outlined in the Pact for the Future, the goals of General Education based on CMO no. 20, series of 2015, and other institutional quality standards for the course.

Materials and Methods

This research is a qualitative exploratory study aimed at developing and validating a Multidisciplinary Curriculum Integration Framework for MMW. Using purposive sampling, five (5) MMW teachers were selected and participated in the study. An online questionnaire was used to gather data on their knowledge, skills, and attitudes towards multidisciplinary curriculum integration, in terms of multidisciplinary problem applications and contextualization. Furthermore, their instructional practices, challenges encountered, and perceived opportunities in doing multidisciplinary curriculum integration were also gathered. These data were analyzed and used in developing a Logic Model. The Logic Model also incorporates integrating the commitments outlined in the *Pact for the Future*. The components of the Logic Model were incorporated through a rating sheet and were validated by the five (5) MMW teachers and four (4) curriculum experts. The level of agreement was computed through Fleiss' Kappa. Their corrections, comments, and suggestions were used in revising the Logic Model.

Results and Discussion

Teachers understand that multidisciplinary problem applications involve integration across disciplines and real-world application and relevance. And, contextualization involves aligning math concepts with practical and empirical applications, responding to current local and global challenges, aligning with students' interests, field of study, and future careers, and connecting math to other

disciplines. They utilize real-world problems, technological tools for data analysis and decision-making, collaborative learning among students, and project-based activities. Cross-curricular mapping of learning outcomes and collaborating within and across disciplines were also evident. They appreciated the role of multidisciplinary problem applications and contextualization for multidisciplinary relevance, practical applications of mathematics, improving student engagement, and enhancing the critical thinking and problem-solving skills of students.

Teachers promote multidisciplinary curriculum integration by using real-world data, fostering student collaboration, and incorporating technology to enhance learning. They face challenges such as limited cross-disciplinary collaboration, difficulty in pinpointing real-world math applications, time constraints, resource shortages, and differences in disciplinary language. Nonetheless, they recognize opportunities to develop integrative teaching skills, encourage cross-disciplinary teamwork, and utilize technology to create meaningful, real-world learning experiences.

A Logic Model was developed using these data while accounting the commitments outlined in the *Pact for the Future* and relevant institutional standards. In the initial validation, the Fleiss Kappa value was -0.01, which suggests no level of agreement. The standard error is 0.01. The curriculum experts and MMW teachers suggested revising and removing specific components, enhancing sentence structures, and ensuring outputs are aligned and coherent. The same curriculum experts and MMW teachers validated the revised Logic Model, with a Fleiss Kappa value of 1, which suggests an almost perfect level of agreement, and a standard error of 0.03. With that, the revised Logic Model served as the Multidisciplinary Curriculum Integration Framework for Mathematics in the Modern World.

The Multidisciplinary Curriculum Integration Framework for MMW includes cross-curricular planning, curriculum mapping, curriculum weaving, and curriculum quality auditing. Teachers must be empowered and capacitated within these components. Cross-curricular planning enables teachers to identify relevant disciplines and student contexts that can be meaningfully integrated into the MMW syllabus. Curriculum mapping helps align key commitments from the *Pact for the Future* with appropriate learning outcomes and content areas. Curriculum weaving brings coherence by connecting cross-curricular plans and curriculum maps into a unified, integrated syllabus. Finally, curriculum quality auditing ensures that the developed syllabus meets institutional standards and adheres to quality assurance protocols.
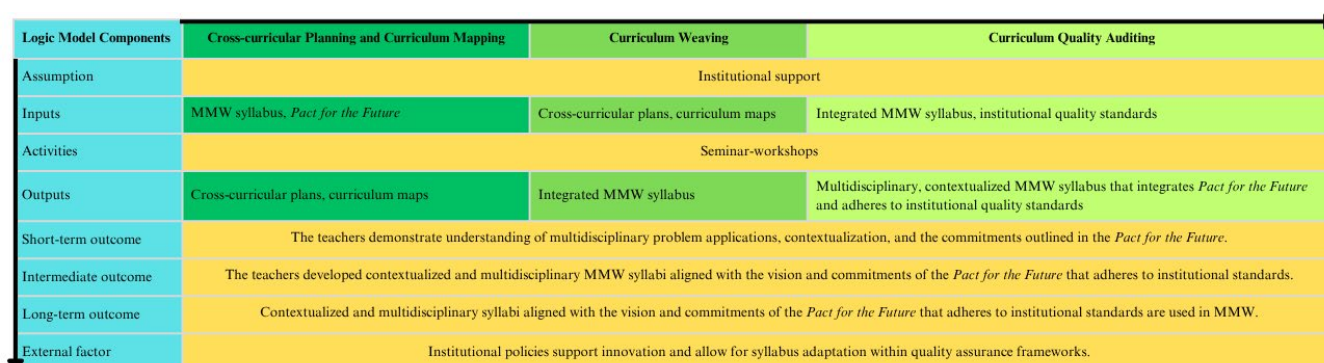
Logic Model Components	Cross-curricular Planning and Curriculum Mapping	Curriculum Weaving	Curriculum Quality Auditing
Assumption	Institutional support		
Inputs	MMW syllabus, *Pact for the Future*	Cross-curricular plans, curriculum maps	Integrated MMW syllabus, institutional quality standards
Activities	Seminar-workshops		
Outputs	Cross-curricular plans, curriculum maps	Integrated MMW syllabus	Multidisciplinary, contextualized MMW syllabus that integrates *Pact for the Future* and adheres to institutional quality standards
Short-term outcome	The teachers demonstrate understanding of multidisciplinary problem applications, contextualization, and the commitments outlined in the *Pact for the Future*.		
Intermediate outcome	The teachers developed contextualized and multidisciplinary MMW syllabi aligned with the vision and commitments of the *Pact for the Future* that adheres to institutional standards.		
Long-term outcome	Contextualized and multidisciplinary syllabi aligned with the vision and commitments of the *Pact for the Future* that adheres to institutional standards are used in MMW.		
External factor	Institutional policies support innovation and allow for syllabus adaptation within quality assurance frameworks.		

Figure 1. Multidisciplinary Curriculum Integration Framework MMW

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REDUCING URBAN AIR POLLUTION: LESSONS FROM TOKYO FOR HANOI IN MANAGING FINE PARTICULATE MATTER (PM$_{2.5}$)

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Purpose and Background

Air pollution from PM$_{2.5}$ is a major challenge for rapidly growing cities like Hanoi, driven by urbanization, traffic, and unsustainable development. This poses serious health and environmental risks.

In contrast, Tokyo has successfully improved its air quality through strong local policies. This study aims to examine Tokyo's experience to identify practical, adaptable strategies for Hanoi. By comparing the two cities, the goal is to support effective air quality management and promote healthier, more sustainable urban development in Hanoi.

Materials and Methods

This study used a data collection approach. For Hanoi, PM$_{2.5}$ pollution level data (2023-2024) was collected from the Vietnam Center For Environmental Monitoring Portal (cem.gov.vn).

The analysis followed three main methods: (1) quantitative analysis of PM$_{2.5}$ levels in Hanoi, focusing on trends, daily changes and seasonal changes; (2) qualitative analysis of Tokyo's air quality policies, including emissions control, transport policies, and monitoring systems; and (3) comparative analysis to find key differences and identify practical lessons Hanoi could apply.

Results and Discussion

Variation of PM$_{2.5}$ Levels in Hanoi (2023-2024)
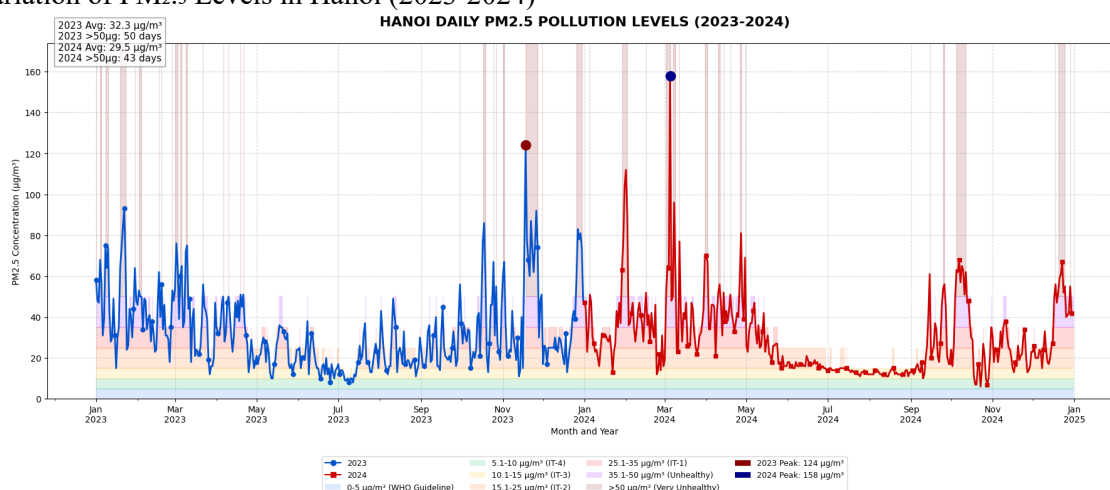
Fig. 1. Hanoi daily PM$_{2.5}$ pollution levels (2023-2024)

Hanoi's daily PM$_{2.5}$ levels in 2023-2024 significantly fluctuated, with frequent exceedances of the WHO guideline (5µg/m³). Most daily concentrations ranged from 15-50 µg/m³ - classified as "Unhealthy for Sensitive Groups" or "Unhealthy." The 2023 peak occurred at 124 µg/m³ on November 13th and the 2024 peak at 154 µg/m³ on March 12th - both deemed "Very Unhealthy." Extended episodes above 50 µg/m³ were common from late October to early March. To examine seasonal trends, data were grouped by spring (Feb–Apr), summer (May–Jul), autumn (Aug–Oct), and winter (Nov–Jan). Results showed that spring had the highest seasonal average at 40.85 µg/m³, followed closely by winter at 37.98 µg/m³. Both fall within the "Unhealthy for Sensitive Groups", posing heightened health risks for vulnerable populations.

Sources of PM$_{2.5}$ pollution in Hanoi

Main sources of PM$_{2.5}$ pollution in Hanoi include biomass burning, coal and heavy fuel oil use, vehicle emissions, industrial activities, construction and road dust, and open burning of solid waste (Dominutti et al., 2024). These are seasonal: PM$_{2.5}$ levels can increase during rice harvest seasons due to widespread burning. In northern Vietnam's winter and early spring (Oct–Mar), inversion layers often trap vehicle and construction emissions near the ground. Besides, the Northeast Monsoon can also carry pollution from other regions and neighboring countries into Hanoi, worsening air quality.
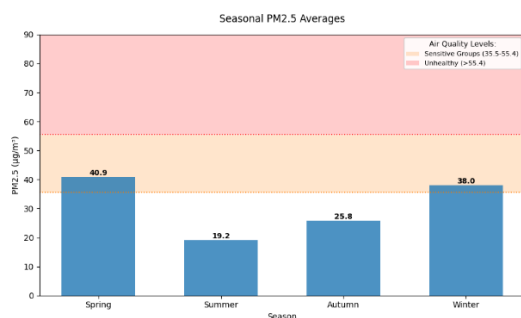
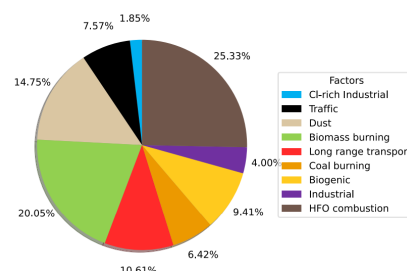**Fig. 2.** Hanoi seasonal PM$_{2.5}$ pollution levels (2023-2024)

Fig. 3. PM$_{2.5}$ sources at Hanoi (Dominutti et al., 2024)

Tokyo's Air Management

Tokyo enforces strict emissions policies under Japan's Air Pollution Control Act, limiting black carbon, nitrogen oxides, and volatile organic compounds from factories and boilers. VOCs are reduced via certified fuel stations with vapor recovery. Vehicle standards include PM limits for gasoline direct injection engines; modern diesels require filters. Since the 2000s, Tokyo has banned old diesel vehicles, enforced inspections, adopted low-sulfur fuels (MARPOL), and applied industrial controls like de-NOx burners and flue-gas desulfurization. In transport, the government supports electric and hydrogen vehicles with tax incentives, aiming for 50-70% of new sales by 2030, reducing traffic-related PM$_{2.5}$ to just ~2% of total sources. The Vehicle Control Act removes old diesel vehicles and promotes eco-driving. Over 1,000 PM$_{2.5}$ monitors and the VENUS model support forecasts, alerts, and planning.

Comparative Evaluation

Vietnam only started requiring Euro-4/5 standards for new cars in 2017 and 2022. Most vehicles currently used in Hanoi meet only a low "Level 2" standard. Many older trucks and buses pollute well above legal limits. Open burning of biomass, like rice straw, is still common in Hanoi whereas Japan mostly bans open burning and uses controlled waste incineration. Hanoi also continues to use high-pollution fuels like heavy oil and raw coal, often without proper filters. The city has fewer air quality monitoring stations, weak enforcement of factory emission standards, and limited public understanding of air pollution.

Adaptation Strategies

To cut PM$_{2.5}$ pollution in Hanoi, several key actions are needed. (1) Tighten vehicle emissions by applying Euro-5/6 standards early, adding filters to old diesel trucks, and setting up low-emission zones. (2) Promote electric transport by supporting electric buses and motorbikes with subsidies and charging stations, and expanding metro and bus systems. (3) Cut industrial emissions by using low-sulfur fuel, adding filters to factories, and checking coal plants often. (4) Stop biomass burning, especially rice straw and waste, by encouraging composting and bioenergy. (5) Reduce dust with more road paving, street cleaning, and banning trash burning. (6) Improve air monitoring with more sensors and public alerts, and use satellite data to guide policies. (7) Work with neighbors through ASEAN or ASEAN+3 to manage cross-border pollution.

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An Impact of Wage and Education on Labor Productivity in the ASEAN Countries

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Purpose and Background:

One of essential components of economic performance is labor productivity, it measures the efficiently total input labor can produce output, higher labor productivity encourage GDP growth and increasing income per capital (ADB,2020). particularly across Association of Southeast Asian Nations (ASEAN) is varied economic regions comprising with high-income country like Singgapore and Malaysia, middle income countries such as Thailand, Philipine, Vietnam and Indonesia, and low-income countries like Lao, Myanmar and Cambodia (World Bank,2020). labor productivity is directly connected for sustainable economic growth, which improve living standards, and direct with Sustainable Development Goals (SDG), specifically SDG 8 to achieve productive employment and decent work for all (United Nations, 2023), where disparities in productivity levels highlight differences in education, wages, and external economic influences (United Nations, 2023). While Singapore and Malaysia have established themselves as global leaders in productivity, other such as Laos, Cambodia, and Myanmar face challenges due to lower human capital development and weaker wage structures (World Bank, 2021; Asian Development Bank (ADB), 2022).

Materials and Methods:

To analyze Workers Education and Wages Impact on Labor Productivity in the ASEAN Countries. This research will use panel data from 7 countries year 2005 to 2023. Econometric model we use in this study is defined as:

$$LP_{it} = \beta_0 + \beta_1\,wage_{it} + \beta_2 educ_{it} + \beta_4 health_{it} + \beta_4 FDI_{it}$$

This model implies labor productivity is influenced by wage, education, health and foreign direct investment. These assumptions determine whether parameters remain constant across cross-sectional units and time periods, allowing for variations to be accounted for effectively. By considering both fixed and random effects models, panel data analysis provides a flexible and powerful tool for capturing economic relationships and improving inference accuracy

Results and Discussion

Table.1. Hausman Test Results for Model Selection

Variable	(b) Fixed	(B) Random	(b-B) Fixed-Random	S.E
wage	0.002831	0.00287	-0.000041	0.000247
Mean year of schooling	1.975606	2.01628	-0.040674	0.106197
Life expectancy of birth	0.292408	0.27621	0.0161364	0.023582
FDI per capital	0.000764	0.00092	-0.000156	0.000057
Chi-squared	11.18			
Prob>Chi2	0.0246			

Source: Authors based on STATA 14 ,2025

The findings of Hausman test obtained from the Fixed Effects Model (FEM) highlight the substantial impact of education, wage policies, FDI, and health on labor productivity in ASEAN countries. The Chi-square statistic of 19.65 strongly rejects the null hypothesis (p < 0.01), indicating statistically significant differences between the coefficient estimates of the Fixed Effects and Random Effects models.

The Fixed Effects Model (FEM) regression results
Table.2. Fixed Effect Model

Variable	Coef.	Std.Err_t	T	P> |t|
wage	0.002831	0.001087	2.60	0.011
Average year of schooling	1.975606	0.318868	6.20	0.000
Life expectancy of birth	0.292408	0.092271	3.17	0.002
FDI per capital	0.000764	0.000552	1.38	0.016
Number of Obs	123			
Chi-squared	53.63			
Prob>Chi2	0.000			

- An increase of 1 USD in minimum wage results that labor productivity will increase 0.0028 USD, statistically significant at the 5 percent.
- An one year increase of schooling correlates with a productivity increase 1.976 USD, statistically significant at the 1 percent .
- Every additional year of life expectancy results in a productivity increase 0.292 USD, which is statistically significant at the 1 percent level
- FDI per capita exhibits a modest positive correlation with labor productivity, Increase of 1 USD in FDI per capital lead labor productivity increase by 0.00076 USD, statistically significant at the 5 percent.

Source: Authors based on STATA 14 ,2025

In conclusion, the panel data demonstrates that education, health, and wage levels are key drivers of labor productivity gains in ASEAN nations. These results reinforce the notion that investing in human resources, particularly through education and healthcare, as well as ensuring equitable compensation, boosts economic performance. Although external capital, namely FDI, does have an influence, its impact tends to be less consistent and is shaped by the management and utilization strategies of ASEAN countries regarding this investment. Ultimately, the research suggests prioritizing human capital and labor market development as vital for enhancing productivity. By concentrating on these elements, ASEAN member states can foster more sustainable and inclusive productivity growth, thereby improving their competitiveness and long-term development outlooks.

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ASSESSMENT OF ABOVE-GROUND CARBON AND SPATIAL DISTRIBUTION OF MANGROVES IN GILI LAWANG & GILI SULAT USING CLOUD-BASED GEOSPATIAL ANALYSIS

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Background and Purpose

Mangrove forests are productive coastal ecosystems that store large amounts of carbon both above and below ground (Donato et al., 2011). Indonesia, home to the world's largest mangrove area, plays a central role in global blue carbon efforts (Murdiyarso et al., 2015). Gili Lawang and Gili Sulat in East Lombok are notable for their biodiversity and have been designated local marine conservation areas (Sudarmadi et al., 2020). However, increasing threats from tourism, land use change, and climate impacts make monitoring their condition essential. Cloud-based platforms like Google Earth Engine now enable efficient, large-scale analysis of mangrove extent and carbon stock using satellite imagery (Gorelick et al., 2017; Lagomasino et al., 2019). This study uses such tools to assess above-ground carbon (AGC) and spatial distribution of mangroves in Gili Lawang and Gili Sulat, to supporting conservation and climate mitigation efforts such as REDD+.

Materials and Methods

This study was conducted in the mangrove areas of Gili Lawang and Gili Sulat, East Lombok, which are designated local marine conservation zones (KKLD).

Figure 1. Location of Gili Lawang and Gili Sulat, East Lombok, Indonesia.

To assess AGC and spatial distribution in 2025, Sentinel-2 Level-2A imagery, offering 10–20 m spatial resolution imagery were processed using cloud-based geospatial analysis Google Earth Engine (GEE). Mangroves were mapped using supervised classification with the Random Forest algorithm, supported by NDVI and NDWI indices. Since carbon is a component of biomass, AGC is derived from AGB (Above-ground Biomass) was estimated using NDVI-based equations, converted to carbon using a 0.47 factor. Accuracy was assessed through confusion matrices. All analysis and visualizations were completed using GEE.

Results and Discussion

The above-ground carbon (AGC) in mangroves of Gili Lawang and Gili Sulat was estimated using regression models validated with reference data. The model showed moderate accuracy, with RMSE of 0.24 tonC/pixel, MAE of 0.19 tonC/pixel, and R^2 of 0.70, indicating that 70% of the carbon variation was explained. This aligns with acceptable standards for regional biomass mapping (Chave et al., 2014; Fatoyinbo & Simard, 2013). The total mangrove area was 858.56 ha, with an average AGC of 0.86 tonC/pixel or 25.79 tonC/ha, and a total carbon stock of 22,143.30 tons. Carbon values ranged from 0.59 to 1.17 tonC/pixel. These values suggest moderate carbon storage, likely due to species type, stand maturity, and local conditions. Compared to global mangrove averages of 50–150 tonC/ha (IPCC, 2014), this area is on the lower end, possibly due to disturbance or limited tidal influence. Despite lower values, the mangroves in this area are important carbon sinks. Further research should include below-ground carbon estimates and enhanced validation using multi-sensor data.
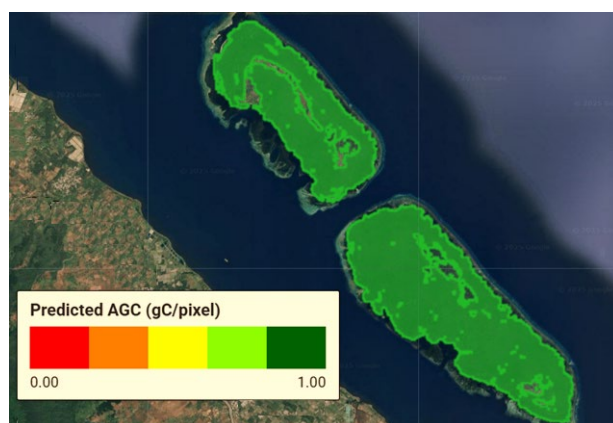
Figure 2. Mangrove Carbon Stock and Distribution Spatial in Gili Lawang and Gili Sulat, East Lombok, Indonesia.

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FUTURE PROJECTION OF FOREST FIRE HAZARD IN BORNEO DURING DRY SEASON USING CMIP6 CLIMATE SCENARIOS

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Purpose and Background

Forest fires, a type of wildfires common in tropical regions, refer to a condition in which fire spreads across forested areas, leading to a significant ecological damage and economic loss (Rasyid, 2014). These fires can be triggered by both human activities and natural factors, causing forest degradation and biodiversity loss. Anthropogenic climate change, marked by the rise of surface temperatures about 0.9°C, has increased the frequency of heat and drought that supplies wildfires, affecting nearly a quarter of vegetated areas since 1979 (IPCC, 2022). In Indonesia, deforestation and the drainage of peat swamp forests have provided enough fuel sources for fires ignition and spread (Page and Hooijer, 2016). Kalimantan, the Indonesian portion of Borneo, contains an estimated 45,000 km^2 of peatlands where in the last three decades experience degradation due to deforestation and intentional burning (Schmidt et al., 2024). These degraded peatlands are significantly more vulnerable to recurring fires (Miettinen et al., 2012). Based on data from the Ministry of Environment and Forestry of the Republic of Indonesia, most regions in Kalimantan have experienced a growing trend in forest and land fire events, both on peatlands and mineral soils. Central Kalimantan and West Kalimantan consistently report the largest burned areas indicating their vulnerability to recurring wildfires. Considering the vulnerability of Kalimantan ecology to wildfire and the fact that anthropogenic climate change also increases the potential of wildfire, this study aims to assess the projected forest fire hazard during the dry season (June-November) in Kalimantan using CMIP6 climate model scenarios.

Materials and Methods

The study focuses on Kalimantan, the Indonesian part of Borneo Island, which include five provinces which characterized by extensive tropical forests and peatlands ecosystems that are highly vulnerable to fire, particularly during dry season. We use two datasets: (1) reanalysis data from the European Centre for Medium-Range Weather Forecasts (ECMWF), and (2) climate projections from five CMIP6 models: GFDL-ESM4, CMCC-ESM2, MIROC6, KIOST-ESM, and TaiESM1 under scenarios SSP2-4.5 and SSP5-8.5. Both datasets provide daily maximum temperature, relative humidity, total precipitation, and wind speed, that can be used to calculate the Fire Weather Index (FWI) based on the Canadian Forest Fire Danger Rating System (Van Wagner, 1987). However, as the CMIP6 model still has uncertainty, we apply CDF matching between historical FWI (1985–2014) derived from ECMWF and each CMIP6 model. This allows the adjustment of BMKG's FWI threshold for high to extreme fire danger (FWI above 6) before applying it to future projections (2015–2044). The frequency of high-to-extreme FWI is then calculated and mapped across Kalimantan to assess wildfire hazard in the future under different emission pathways. We focus on this category because FWI above 6 indicate fires that are difficult to control, with high intensity and rapid spread, according to BMKG classification.

Results and Discussion

Figure 1 show spatial distribution of the number of days with high-to-extreme FWI during the dry season over Kalimantan, based on historical data from 1985 to 2014. Panel (a) shows the observed estimation by ECMWF, while panel (b) shows the ensemble mean from five CMIP6 models. Both panels show a similar spatial pattern, with the southern coastal regions of Kalimantan showing the highest number of fire-prone days. These patterns indicate a transitional zones between inland and coastal ecosystems, where peatlands and local wind circulation may contribute to higher fire susceptibility. From seasonal perspective, August and September stand out as the months with the most frequent fire weather conditions, aligning with the peak of the dry season in this region. Meanwhile, June and November typically mark the start and end of the dry season, with lower frequencies. Although the general distribution is consistent between observed and modeled data, some differences in spatial coverage and intensity are still remain. This suggests that the models are capable of capturing the main patterns but may still struggle with local-scale variability. Given its historical vulnerability, the southern Kalimantan region should be considered a priority area for wildfire early warning systems and fire risk management.
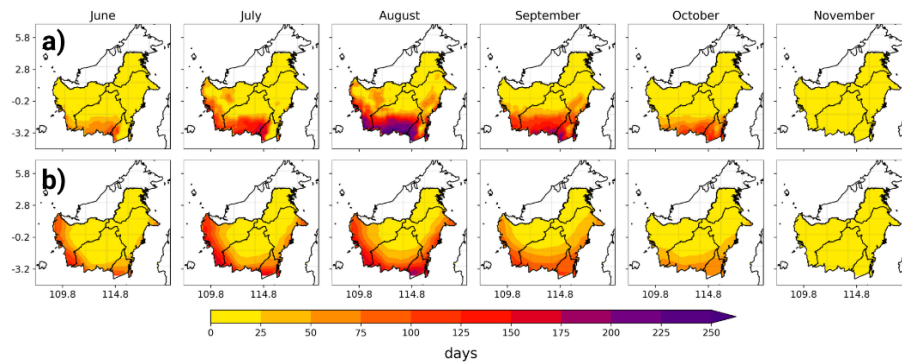
Figure 1. Number of days with high-to-extreme FWI during the dry season over Kalimantan derived from observed (a) and modeled (b) data

To asses wildfire hazard in the future, we calculated the relative percentage change in the number of days with high-to-extreme FWI between historical and future periods. The change was computed as the difference between future and historical values, divided by historical values, and then multiplied by 100. To ensure reliability, we only considered grid point where at least 3 out of 5 models (> 60%) agreed that there would be an increase in fire-prone days. Figure 2 shows the results of this analysis under two different climate scenarios: SSP2-4.5 (panel a) and SSP5-8.5 (panel b). Both scenarios project substantial increases in the number of fire-prone days, especially across the southern parts of Kalimantan. The seasonal peak remains prominent in August and September, suggesting a likely intensification of the fire season. However, the magnitude and spatial extent on the high-emission scenario SSP5-8.5 are more pronounced compared to SSP2-4.5. This highlights Kalimantan's sensitivity to more severe levels of global warming, with future fire risk strongly linked to emission trajectories.
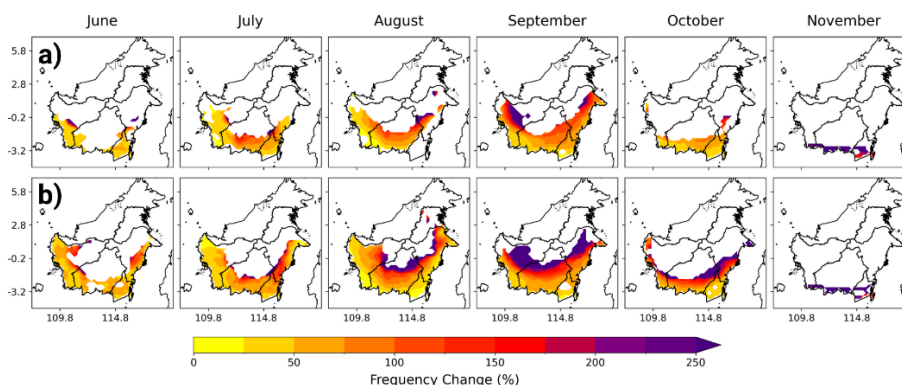
Figure 2. Percentage change in number of days with high-to-extreme FWI for SSP2-4.5 (a) and SSP5-8.5 (b)

This study confirms that anthropogenic climate change is likely to intensity wildfires hazards in Kalimantan during the dry season, with greater risks under high-emission scenarios (SSP5-8.5), especially in the southern parts of the island. This results can be used as insight for policymakers to strengthen adaptation strategies and develop more effective early warning systems in the face of a changing climate.

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BIOMECHANICAL AND NEUROMUSCULAR EFFECTS OF CLUBBELL WEIGHTS AND LENGTHS IN OVERHEAD ATHLETES

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Purpose and Background

Traditional resistance tools in overhead sports, such as barbells and dumbbells, typically allow movement in a single plane(Kolber et al., 2010). Clubbells originating from India enable multiplanar motion and may activate both upper and core musculature more dynamically(Choi & Lee, 2022; Walter et al., 2023). Despite their unique movement patterns, limited research has explored how variations in clubbell weight and length affect neuromuscular control. This study aimed to investigate the effects of clubbell weight and length on upper and core body muscle activity and joint kinematics during the GAMA CAST exercise.

Materials and Method

Sixteen male overhead athletes performed 10 repetitions of the GAMA CAST (Fig. 1) under four randomized conditions: short 2.5 kg (S2.5), short 5 kg (S5), long 2.5 kg (L2.5), and long 5 kg (L5). Surface electromyography (EMG) was recorded from six muscles (AD, UT, LT, LAT, RA, ES) and normalized to %MVC. Inertial measurement units (IMUs) were used to assess joint kinematics at six anatomical sites.
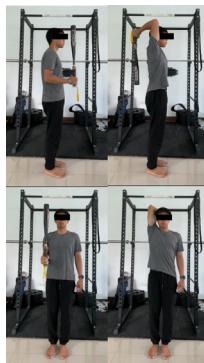
Figure 1: GAMA CAST exercise with clubbell.

Results and Discussion

This study demonstrated that clubbell weight and length distinctly influenced muscle activation during the GAMA CAST exercise (Fig. 2). The S5 condition resulted in significantly greater activation of LT and RA compared to S2.5, while L5 led to higher activation of UT, LT, RA, and ES compared to L2.5. Additionally, AD activity was greater in S5 than in L2.5, and ES activation was higher in L5 than in S2.5. These results reflect underlying biomechanical principles, where increased weight elevates force demands(Latash, 2017) and increased length raises the moment of inertia(Anson, 1989), requiring greater stabilization from the trunk and scapular muscles(Escamilla & Andrews, 2009). Overall, these findings support the strategic use of clubbell parameters to selectively engage AD, UT, LT, RA, and ES during overhead training.

Conclusion and Practical application

Clubbell weight and length affect muscle activation in overhead movements. S5 increased anterior deltoid and core activation, while L5 enhanced spinal and scapular stabilizer engagement. Both also activated the trapezius and rectus abdominis. Choosing S5 or L5 allows targeted training for strength, stability, or muscle balance supporting performance and injury prevention in overhead athletes(Choi & Lee, 2022; Walter et al., 2023).
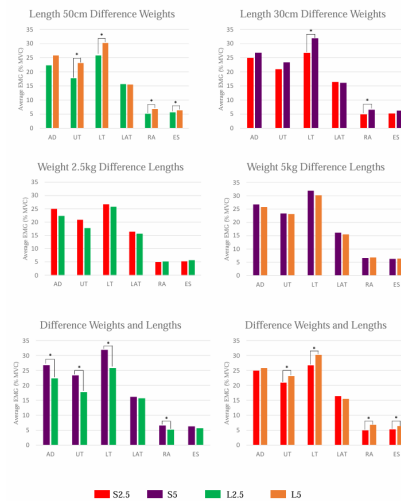

Figure 2: Average %MVC of muscle AD = anterior deltoid, UT = upper trapezius, LT = lower trapezius, LAT = latissimus dorsi, RA = rectus abdominis, ES = erector spinae with clubbell's weights and lengths S2.5 = (2.5kg., 30cm.), S5 = (5kg., 30cm.), L2.5 = (2.5kg., 50cm.), L5 = (5kg., 50cm.). * = significant p value < 0.05.

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Effects of Listening Favorite and Selected Music on Muscle Strength and Muscle Endurance Exercise Weight Training Performance

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Purpose and Background

Exercise was defined as any activity that involves bodily movement aimed at promoting health, enjoyment, and social interaction. It involves simple activities or those with basic rules, such as walking, running, jumping rope, bodyweight exercises, and weightlifting. This definition excludes movements performed as part of daily living or occupational tasks. (Kanchanasri, 2012). In recent years, exercise has become increasingly popular among the general population, especially weight training, also known as resistance training. This type of exercise is widely recognized for its benefits in building muscle strength, enhancing musculoskeletal health, and boosting metabolic function (Schoenfeld et al., 2016). Weight training has gained increasing popularity as it effectively enhances muscular strength and endurance, both of which are essential for overall health and functional movement in daily life. One commonly used strategy to enhance workout motivation and reduce perceived fatigue is listening to music. Recent studies have shown that listening to music with an appropriate tempo during exercise can improve motivation, reduce feelings of tiredness, and enhance performance (Tavares et al., 2021). Moreover, music has been reported to positively influence exercisers' mood, enjoyment, concentration, and perception of effort (Ballmann, et al., 2018). In the studied of Ballmann, et al. (2021) showed listening to preferred music during resistance exercise significantly enhances exercise performance compared to listening to non-preferred music. Participants were able to complete more repetitions of the bench press, and showed higher average velocity, average power, peak power, and motivation while exercising with preferred music. These findings suggest that athletes may benefit from listening to their preferred music to increase motivation and improve performance during weight training.

Although there is a growing body of international research supporting the benefits of music in various types of physical activity, studies that specifically focus on the effects of music during weight training remain limited especially within the context of general fitness enthusiasts in Thailand. Jermsuravong, et al. (2025) studied about the effects of listening to music with different tempos on muscle strength and endurance during weight training. The research findings, listening to music at 130-150 bpm between exercise strength and endurance weight training were push the highest average scores than 90-110 bpm and not listening to music. Therefore, this study aims to investigate the effects of listening favorite and selected music on muscle strength and muscle endurance exercise weight training performance. The findings are expected to provide useful insights into how music can be integrated into exercise routines to promote better training outcomes and enhance the overall exercise experience.

Material and Method

The participants in this study were 12 male third-year students from the Sport Science program, Faculty of Education, Silpakorn University, academic year 2025. They had completed the course 459341 Weight Training, were healthy, passed the Par-Q screening, and volunteered to participate. Simple random sampling was used.

The research materials have two types of music playlists 1 the favorite music is the music that the participants like is not limited to the style or type of music. and 2 the selected music that researcher has selected are songs with lyrics that stimulate positive energy and have a speed of 130-150 bpm), The

selected music will be submitted to music experts, exercise experts to review their suitability before use in this research. The muscle strength and muscle endurance exercise weight training will be submitted to exercise experts to review their suitability too.

The method of entering the experiment is counterbalanced. All participants will participate in weight training and listen to their favorite music, selected music, and no music. The exercise protocols consisted of muscle strength exercise (80–85% 1RM for 30 seconds) and muscle endurance exercise (50–55% 1RM for 1 minute). Perform 4 sets of exercises and count the number of repeat participant can do. The data analysis using mean, standard deviation, repeated measures ANOVA, and Bonferroni post hoc tests with significance level at .05.

Expected Outcomes

Listening to selected music and favorite music is expected to enhance exercise performance in terms of both muscle strength and endurance compared to exercising without music. It is anticipated that participants will show significant improvements in muscle fitness.

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LINGUISTIC ACCOMMODATION AND TOURIST EXPERIENCE: THE IMPACT OF BALISH USE BY THE ACUNG TRADERS IN UBUD, BALI

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Purpose and Background

Bali and tourism are two inseparable worlds. Not only the natural beauty and culture, the warm authentic connections are fostered between locals and visitors. Especially in Ubud, where the market is a place for personal interactions within the local sellers. One of the interactions is acung traders, or a mobile sellers, that play a significant role in shaping authentic experiences between them. The engagement with international tourists, these traders often use 'Balish,' a naturalized language combining Balinese and English lexicons. Balish helps tourism workers communicate with visitors and is a key skill for their jobs (Beratha, 2024)

This research seeks to understand the influences of the tourists emotional comfort, satisfaction, and interpersonal bonding with the acung traders in Ubud. This research is based on the Communication Accommodation Theory (CAT) (Giles H. C., 1991) which explains how people adjust their language to make communication smoother and create closer relationships. Hence, we can see how simple language practices can help strengthen community ties and make the tourism experience more meaningful for both visitors and locals.

Materials and Methods

A descriptive quantitative method is used to understand how tourists feel about Balish. The research was done in Ubud, Bali, where many acung traders meet international tourists every day, especially in market areas and along the busy streets. Next, the data were collected through a survey that are given to 20 foreign tourists who had interacted directly with the acung traders. The survey had five statements measured using a five-point Likert scale.

Below are the statements that is asked to the tourist.

1. I am comfortable with the use of Balish with the sellers
2. I am happy to experience a unique tourism experience by learning a new language called Balish
3. Balish did not limit my personal bonding with the sellers
4. I am satisfied enough with the use of Balish in creating friendly communication
5. I am not satisfied with the use of Balish because it made me take too much time to explain a basic idea

These statements aimed to find out how comfortable, happy, and connected the tourists felt when using Balish, and whether they thought it helped or made communication more difficult. As the last step, the results were analyzed using the Communication Accommodation Theory to help explain how traders' language adjustments affected tourists' feelings and experiences.

Results and Discussion

The result of the study on the tourist feelings for Balish used by the acung traders are as follows.

The findings show that most tourists felt comfortable when using Balish which the average score is 3.75 out of five and enjoyed learning something new through this mixed language which scored 3.95. They also felt that Balish did not make it harder to build a personal connection with the sellers (3.8) and were generally happy with how friendly and welcoming the communication felt (3.95). In

contrast, some tourists said a longer explaination were occurred in which fall to an average score 2.45 out of five, which this was not a major problem compared to the overall positive feelings they experienced. Adjustment that were made by the acung traders in their language to include the lexicon of English and Balinese helped to reduce social distance and made tourists feel more connected and included.
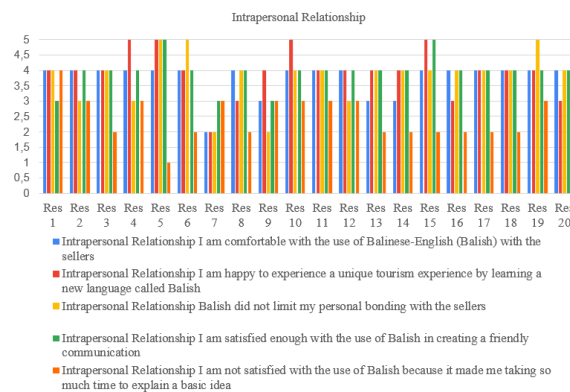

Figure 1 Table of Intrapersonal Relationship

These findings are drawn based on the Communication Accommodation Theory (CAT) (Giles, Coupland, & Coupland, 1991). CAT suggests that speakers adjust their communication to reduce social distance and create a more positive interaction. Acung traders used Balish as a convergence strategy to accommodate tourists language needs which is making the interactions more accessible and personal. The blending of English and Balinese used by the acung traders were able to maintain cultural authenticity while also making tourists feel more included and welcomed. The positive responses to Balish reflect how language can serve as a bridge between different cultures, turning simple market interactions into meaningful cultural exchanges. The approach made by the acung traders supports the creation of inclusive, friendly, and culturally rich tourism spaces. This ideas are in line with the values of Sustainable Development Goal (SDG) 11 that have an aiming to make communities more inclusive and sustainable.

As a conclusion, Balish demonstrates that language adaptation not only facilitates communication but also strengthens social bonds and promotes cultural understanding, contributing to Ubud's image as a warm and welcoming destination.

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Effects of The Musical Ladder Agility Training on Agility and Response Time in Female Futsal Athletes

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Purpose and Background

Currently, female futsal athletes in Thailand are increasingly active in national and university-level competitions. Futsal demands rapid movements, sudden directional changes, and quick responses to constantly changing situations. Thus, agility and response time are essential skills that directly impact performance in offense, defense, and decision-making. However, many female athletes lack specialized and systematic training programs focusing on speed, agility, and response.

The Office of Sports and Recreation Development (2016). emphasizes that developing physical components specific to each sport is critical for athletic career progression, particularly for females who often have fewer opportunities for specialized training compared to males. One widely accepted training method is agility ladder training, which focuses on fast, precise, and continuous directional changes to improve agility, foot speed, and neuromuscular coordination. Boonlert Saisanit (2018). found that agility ladder training effectively enhances neuromuscular function and is suitable for female athletes since it does not require heavy equipment or physical contact.

Moreover, research indicates that incorporating music, especially fast-tempo rhythms, into training significantly improves motivation, emotional stimulation, and neural response, thereby enhancing movement accuracy and training enjoyment (Sukapatra, 2020; Niransewat, 2019). Effective training should systematically stimulate the nervous system to coordinate with the body, leading to improved physical fitness and sports skills (Niransewat, 2019).

Based on existing literature, agility ladder training enhances agility, while music boosts motivation and responsiveness. Combining these approaches may significantly improve both physical and neural performance in female futsal athletes. Therefore, the purpose of this study are investigate the effects of the musical agility ladder training on agility and response time in female futsal athletes.

Material and Method

The sample group of this study consisted of female futsal athletes from Nakhon Pathom Municipality Sports School, aged between 16–18 years, who were currently studying at the upper secondary level at Nakhon Pathom Municipality Sports School, Nakhon Pathom Province, Thailand. The sample was selected using simple random sampling, with a total of 20 participants. The research design was quasi-experimental research using two-group pretest-posttest design.

The instruments used in this research include the musical agility ladder training program designs by the researcher and will be quality checked by sports science and futsal experts that its validates for female futsal athletes. The agility will assess using standardized tests: Illinois Agility Test, 5-10-5 Shuttle Run Test, and Figure-of-Eight Agility Run Test, all valid and reliable. Response time was measured with the Reactive Agility Lighting System, which tests visual reaction to randomly lit targets. Additionally, a personal information form was used to collect demographic data such as age, height, weight, education, and futsal experience. Research method will collect the data via pre-test before

training. The subjects were divided into two groups with not significant differences. The experiment will conduct for 8 weeks, with all variables will test after 4 and 8 weeks. The data will analyst by one-way ANOVA with repeated and bonferroni post hoc test, compare between group by independent t-test.

Expected Outcomes

The participant will improve agility and response time after 8 weeks and the musical agility ladder will be greater improvement agility and response time than the control group.

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VIEWS OF TEACHER EDUCATION STUDENTS ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE: A QUALITATIVE STUDY

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Purpose and Background

The emergence of Generative Artificial Intelligence (GenAI) has attracted attention from researchers, business professionals, politicians, and educators. Castelli and Manzoni (2022) highlighted that GenAI has become a valuable tool for various industries, including entertainment, business, product design, and education. Suh and Ahn (2022) noted that GenAI plays a significant role in the fields of technology, economy, and politics. In the context of education, several studies have shown that GenAI has many potential applications (Del Mundo et al., 2024; Tala et al., 2024). Consequently, university educators and other stakeholders have initiated discussions through webinars, workshops, seminars, and newspaper articles about the role of GenAI in education. However, some of these activities were attended mainly by professionals rather than students, primarily empowering them with the applications of GenAI in education. According to Chiu (2024), the majority of the responses from teachers in all gatherings regarding the application of GenAI in education relate to concerns about evaluating students' outputs. Also, Cooper (2023) noted that neither the voices nor the perspectives of the students are included in most of these responses. Chiu (2024) added that students' viewpoints are essential for understanding the impact that GenAI will have on universities in the future, particularly in terms of learning, teaching, assessment, and administration. For this reason, this study explores the different views towards the use of Generative Artificial Intelligence (GenAI) among Teacher Education students of a state university in Tacloban City, Philippines for School Year 2024 – 2025.

Materials and Methods

This research is a qualitative in nature to investigate the diverse perspectives of Teacher Education students on the use of GenAI. Thirty-two participants were purposively selected and voluntarily participated in the study. Researchers used an interview guide and an audio recorder to conduct the semi-structured, one-on-one interview. Researchers also employed the data collection circle outlined by Creswell (2013) to gather the data and the six-phase thematic analysis of Braun and Clarke (2006) for analyzing the qualitative data, utilizing Google Collaboratory and MAXQDA software.

Results and Discussion

Through the use of MAXMaps, as shown in Figure 1, the diversity of viewpoints among Teacher Education students has been explored about the flourishing existence of GenAI as they navigate their journey to becoming teachers. Five themes emerged; namely, (1) GenAI as a Useful Pedagogical Tool: Supporting Learning and Teaching; (2) GenAI as a Relational Entity: Mentor and Companion; (3) GenAI as a Double-edged Sword; (4) GenAI as a Contemporary Demand; and (5) GenAI as Human Knowledge Imitation. The first theme highlights the perceptions of Teacher Education students regarding GenAI as a tool for guiding and supporting learning and teaching processes. Many participants perceived that GenAI is a handy tool for clarifying and simplifying concepts, generating test questions and problems for lesson planning, providing context and solutions, correcting grammar and sentence structure, and making tasks easier. Furthermore, they highlighted that GenAI serves as a machine that provides students with guidance, improves their understanding, and facilitates their learning of concepts. The second theme highlights Teacher Education students view on GenAI as a relational entity. Specifically, they perceived GenAI as their friend, partner, companion, and mentor in supporting their learning. The third theme "GenAI as a double-edged sword" captures students' views on GenAI's dual nature, recognizing both its benefits and potential risks. The fourth theme "GenAI as a Contemporary Demand" highlights on students' recognition of the importance of GenAI in both

academic and professional contexts. In addition, instead of viewing it as an academic tool, Teacher Education students perceive it as a means to acquire valuable skills that will enhance their employability.
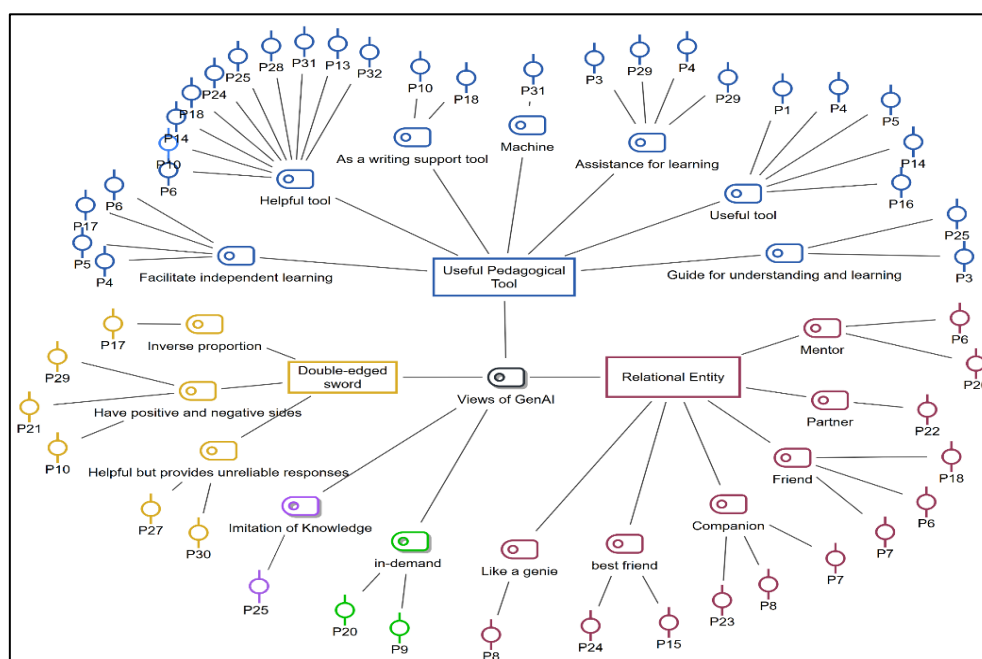

Figure 1. *Teacher Education Students' Views on Generative Artificial Intelligence in Supporting Their Learning*

The last theme, "GenAI as Human Knowledge Imitation," highlights students' concern on the originality and authenticity of GenAI-generated information. Students perceive that GenAI functions by mimicking human thought and behavior, rather than generating original ideas.

Hence, Teacher Education students do not perceive GenAI as a fixed concept but rather as a multifaceted thing with diverse roles and implications. The aforementioned various views of Teacher Education students on the use of GenAI could serve as a guide for educators and school administrators in higher education institutions to improve their teaching strategies, employ appropriate assessments, and have clear guidelines on the responsible use of GenAI in supporting their learning.

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INTEGRATING JAPANESE MORAL EDUCATION (DOUTOKU KYOUIKU) INTO KAMPUS MENGAJAR: SUPPORTING INDONESIA'S MERDEKA BELAJAR FLAGSHIP PROGRAM

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Purpose and Background

The Kampus Mengajar Program is one of the flagship initiatives under the Merdeka Belajar policy, primarily focuses on improving literacy and numeracy competencies among primary school students, especially in frontier, outermost, and underdeveloped areas, while providing university students with meaningful, contextual teaching experiences (Kementerian Pendidikan dan Kebudayaan Republik Indonesia, 2020).
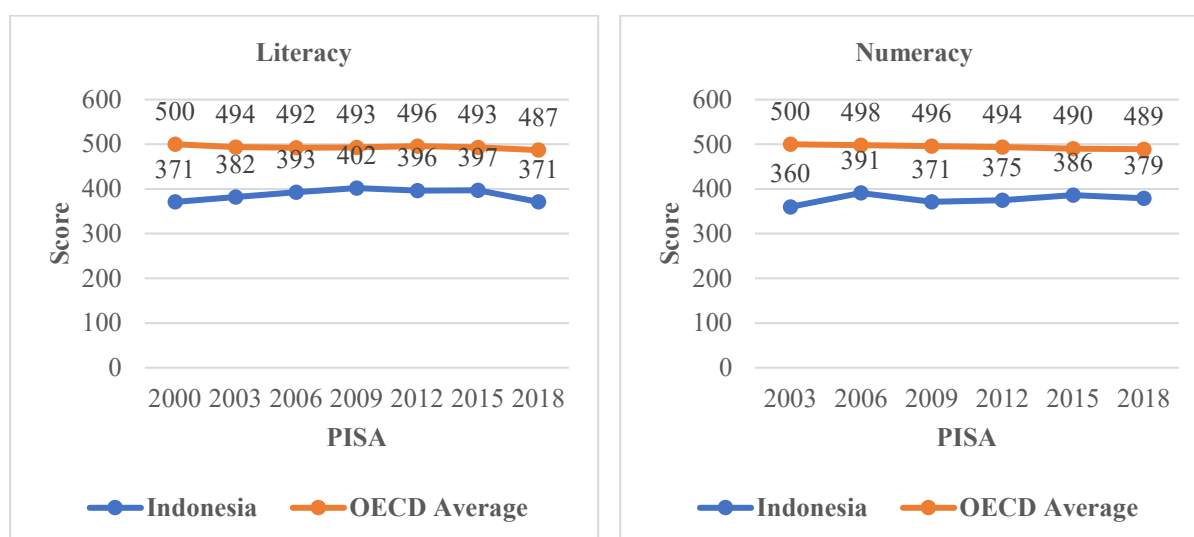
Chart 1. PISA Results: Literacy (Left) and Numeracy (Right) (Source: OECD, 2018)

Despite various efforts, Indonesia's education system still faces serious challenges in foundational skills. PISA data shows stagnant literacy and numeracy scores over the past 10–15 years, with around 70% of 15-year-olds unable to comprehend simple texts or apply basic math concepts (OECD, 2018). This study analyzes the effectiveness of integrating Japanese moral education values (Doutoku Kyouiku) into the Kampus Mengajar Program to strengthen students' character and enhance their minimum literacy and numeracy competencies.

Materials and Methods

This study was conducted at SMP Pertiwi Dewata Denpasar from September to December 2024 with 15 purposively selected students. After observing the school's conditions, a learning program was developed integrating Japanese moral values: responsibility (sekinin), cooperation (kyouryoku), respect (sonkei), and self-reflection (hansei) (Roesgaard, 2016). These values were applied through contextual learning activities and moral discussions within literacy and numeracy lessons. The program's effectiveness was measured using pre- and post-tests adapted from Indonesia's Asesmen Kompetensi Minimum (AKM).

Results and Discussion

Table 1. Pre-test and Post-test Results of Literacy and Numeracy Skills of Students at SMP Pertiwi Dewata Denpasar

Student Number	Literacy		Numeracy	
	Pre-Test	Post-Test	Pre-Test	Post-Test
1	75	85	70	75
2	75	90	80	65
3	40	85	35	40
4	85	85	80	85
5	70	90	90	85
6	60	95	65	65
7	0	80	0	60
8	65	80	70	45
9	70	90	65	80
10	0	80	0	75
11	0	80	0	60
12	75	80	70	70
13	70	85	80	70
14	70	85	85	85
15	70	85	40	55
Average Score	**57%**	**85%**	**56%**	**68%**

The analysis showed improved literacy scores, especially in reading comprehension, inference, and critical reasoning, indicating that Japanese moral values fostered a reflective learning environment supporting students' thinking skills. However, numeracy improvements were less pronounced, suggesting the need for a more explicit approach to strengthen mathematical understanding. Overall, integrating Doutoku Kyouiku complements the Kampus Mengajar Program by enhancing character development and promoting sustainable learning attitudes.

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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

	Group A	Name	University / School	Country
1	Facilitator	Rizvon Suleimanov	Chiba University	Tajikistan
2	Learner	FAKSI RANA AL KAHFI	Universitas Pendidikan Indonesia	Indonesia
3	Learner	JAKKAPHONG PIEWNAUN	Kasetsart University	Thailand
4	Learner	YAZAKI Kazuto	Chiba University	Japan
5	Learner	ENOKIDO Kana	Chiba University	Japan
6	Learner	FUCHIGAMI Sota	Chiba University	Japan
7	Learner	SAKUMA Hinako	Chiba Prefectural Funabashi High School	Japan

	Group B	Name	University / School	Country
1	Facilitator	Margaret Bro	Chiba University	Papua New Guinea
2	Learner	NI MADE NIA BUNGA SURYA DEWI	Udayana University	Indonesia
3	Learner	SRETTAWUT VANNAVISUTE	King Mongkut's University of Technology Thonburi	Thailand
4	Learner	TATESAKA Tamaki	Chiba University	Japan
5	Learner	KASUGA Michiya	Chiba University	Japan
6	Learner	IIMURA Haru	Chiba University	Japan
7	Learner	KASE Yuya	Chiba Prefectural Funabashi High School	Japan

	Group C	Name	University / School	Country
1	Facilitator	Savira Salsabila	Chiba University	Indonesia
2	Learner	CINDY KEZIA RIKKA MARBUN	Bandung Institute of Technology	Indonesia
3	Learner	THONGDEELERT NATNARONG	Mahidol University	Thailand
4	Learner	VU THU AN	University of Education -Vietnam National University	Vietnam
5	Learner	KOBAYASHI Yusuke	Chiba University	Japan
6	Learner	KOMATSU Hinata	Chiba University	Japan
7	Learner	TSUJI Arisa	Chiba Prefectural Funabashi High School	Japan

	Group D	Name	University / School	Country
1	Facilitator	Joceline Theda Kadarman	Chiba University	Indonesia
2	Learner	DINI RACHMADHANI	Universitas Gadjah Mada	Indonesia
3	Learner	ARGIE ANTHONY CATACIO INCISO	University of San Carlos	Philippines
4	Learner	THANAPAT SUKITPANEENIT	Silpakorn University	Thailand
5	Learner	SHOJI Yuya	Chiba University	Japan
6	Learner	FUJIKURA Tomoki	Chiba University	Japan
7	Learner	YAMAZAKI Kyoko	Chiba Municipal Chiba High School	Japan

SDGs Workshop

Group E		Name	University / School	Country
1	Facilitator	Huixin Wang	Chiba University	China
2	Learner	NI KADEK TEJA ARINI	Udayana University	Indonesia
3	Learner	THARATHIP PHUETPHOL	King Mongkut's University of Technology Thonburi	Thailand
4	Learner	NAKAJIMA Ayaka	Chiba University	Japan
5	Learner	SEKINE Tomoya	Chiba University	Japan
6	Learner	KANESHIMA Ryosei	Chiba University	Japan
7	Learner	KUNIYASU Ema	Chiba Municipal Chiba High School	Japan

Group F		Name	University / School	Country
1	Facilitator	Yuhui Liao	Chiba University	China
2	Learner	MIKAEL KEVIN	Universitas Indonesia	Indonesia
3	Learner	WEERIS STITMAN	King Mongkut's University of Technology Thonburi	Thailand
4	Learner	KATO Mika	Chiba University	Japan
5	Learner	OSHIDA Hiraku	Chiba University	Japan
6	Learner	KATOU Souma	Chiba University	Japan
7	Learner	KADOWAKI Ayui	Chiba Municipal Chiba High School	Japan

Group G		Name	University / School	Country
1	Facilitator	Rabiatul Hazirah binti Idris	Chiba University	Malaysia
2	Learner	SELLA LESTARI NURMAULIA	Bandung Institute of Technology	Indonesia
3	Learner	DUANGHATHAI SITSUEA	Kasetsart University	Thailand
4	Learner	ITO Jun	Chiba University	Japan
5	Learner	TAKASHINA Haru	Chiba University	Japan
6	Learner	MIURA Masahiro	Chiba University	Japan
7	Learner	NOJIRI Kotaro	Chiba Municipal Chiba High School	Japan

Group H		Name	University / School	Country
1	Facilitator	Punnat Changsalak	Chiba University	Thailand
2	Learner	RAHMA IZZATUN NABIHA	Universitas Gadjah Mada	Indonesia
3	Learner	MARICON DELA VEGA LAPLANA	University of San Carlos	Philippines
4	Learner	NAKAMURA Keigo	Chiba University	Japan
5	Learner	FUJISHIRO Masaho	Chiba University	Japan
6	Learner	KAWAGUCHI Naohiro	Chiba University	Japan
7	Learner	KAWASUMI Takuma	Chiba Municipal Inage High School	Japan

SDGs Workshop

Group I		Name	University / School	Country
1	Facilitator	Regmi Loknath	Chiba University	Nepal
2	Learner	ANDRI RIFKY ADITAMA	Universitas Indonesia	Indonesia
3	Learner	THENG NARY	Royal University of Phnom Penh	Cambodia
4	Learner	SAITO Yuta	Chiba University	Japan
5	Learner	UEKI Akane	Chiba University	Japan
6	Learner	FUKUHARA Chinatsu	Chiba University	Japan
7	Learner	ABDULLAH Attariq Alhadi	Tokyo Metropolitan High School of Science and Technology	Japan

Group J		Name	University / School	Country
1	Facilitator	Sihan Zhang	Chiba University	China
2	Learner	I PUTU EDWIN WAHYU SAPUTRA	Udayana University	Indonesia
3	Learner	NANTHIDA SITHISANE	National University of Laos	Laos
4	Learner	SAITO Hirotoshi	Chiba University	Japan
5	Learner	TAKAHASHI Wakana	Chiba University	Japan
6	Learner	SATO Hayate	Chiba University	Japan
7	Learner	HANEISHI Reo	Chiba Municipal Chiba High School	Japan

Group K		Name	University / School	Country
1	Facilitator	WANNEE JERMSURAVONG	Silpakorn University	Thailand
2	Learner	SRI UTAMI	Universitas Gadjah Mada	Indonesia
3	Learner	NGUYEN THI HONG LINH	University of Education -Vietnam National University	Viet Nam
4	Learner	SUZUKI Hikari	Chiba University	Japan
5	Learner	WATABE Taisuke	Chiba University	Japan
6	Learner	SAKUMA Kazuki	Chiba University	Japan
7	Learner	HAYASHI Waka	Chiba Municipal Chiba High School	Japan

Group L		Name	University / School	Country
1	Facilitator	Roxana Mayhin Del Rocio Quispe Cuadros	Chiba University	Peru
2	Learner	GILANG RAMDHAN HUDA	Universitas Pendidikan Indonesia	Indonesia
3	Learner	THANYATHEP SANGKAPONG	Silpakorn University	Thailand
4	Learner	SUGIYAMA Towa	Chiba University	Japan
5	Learner	SAITO Kotone	Chiba University	Japan
6	Learner	TAKADA Moe	Chiba University	Japan
7	Learner	HAMADA Morihiro	Chiba Municipal Chiba High School	Japan

SDGs Workshop

Group M		Name	University / School	Country
1	Facilitator	Yunchen Xu	Chiba University	China
2	Learner	RIFDA AMARA AULIA	Bandung Institute of Technology	Indonesia
3	Learner	KUNANON PITHAPORNCHAIKUL	Mahidol University	Thailand
4	Learner	YAMAMOTO Kodai	Chiba University	Japan
5	Learner	HIGUCHI Miyu	Chiba University	Japan
6	Learner	MATSUSHITA Hina	Chiba University	Japan
7	Learner	TAKAHASHI Yoshiaki	Chiba Municipal Inage High School	Japan

Group N		Name	University / School	Country
1	Facilitator	Zai Qurratu' Ainie Zainal Abbidin	Chiba University	Malaysia
2	Learner	ADELLYA ANDARISTA	Bandung Institute of Technology	Indonesia
3	Learner	KUNLANAT THANYAJAROEN	Kasetsart University	Thailand
4	Learner	HATANO Yusei	Chiba University	Japan
5	Learner	YOKOYA Kazuki	Chiba University	Japan
6	Learner	MIYAJIMA Takeru	Chiba Municipal Chiba High School	Japan

Group O		Name	University / School	Country
1	Facilitator	Fakih Irsyadi	Chiba University	Indonesia
2	Learner	ANUPAT LENGYINDEE	Silpakorn University	Thailand
3	Learner	CRISTOBAL JR ARANETA RABUYA	University of San Carlos	Philippines
4	Learner	MORIYAMA Haruka	Chiba University	Japan
5	Learner	MIHARA Kosei	Chiba University	Japan

Group P		Name	University / School	Country
1	Facilitator	Savira Aristi	Chiba University	Indonesia
2	Learner	SOMCHAI PHOTHIJATHOOM	Kasetsart University	Thailand
3	Learner	MENG SOPHORN	Royal University of phnom penh	Cambodia
4	Learner	ARAI Yurika	Chiba University	Japan
5	Learner	TAKEHARA Keito	Chiba University	Japan
6	Learner	KIMURA Hiroto	Chiba Municipal Chiba High School	Japan

Poster

Name & Room List

■ASEAN Faculty Member

Name	University	Research Session		Workshop	
WANNEE JERMSURAVONG	Silpakorn University	2205	Chairperson	2208-K	Facilitator

■ASEAN Students

Name	University	Research Session		Workshop	
ADELLYA ANDARISTA	Bandung Institute of Technology	2201	Presenter	2208-N	Learner
ANDRI RIFKY ADITAMA	Universitas Indonesia	2203	Presenter	2208-I	Learner
ANUPAT LENGYINDEE	Silpakorn University	2205	Presenter	2208-O	Learner
ARGIE ANTHONY CATACIO INCISO	University of San Carlos	2204	Presenter	2207-D	Learner
CINDY KEZIA RIKKA MARBUN	Bandung Institute of Technology	2201	Presenter	2207-C	Learner
CRISTOBAL JR ARANETA RABUYA	University of San Carlos	2205	Presenter	2208-O	Learner
DINI RACHMADHANI	Universitas Gadjah Mada	2202	Presenter	2207-D	Learner
DUANGHATHAI SITSUEA	Kasetsart University	2202	Presenter	2207-G	Learner
FAKSI RANA AL KAHFI	Universitas Pendidikan Indonesia	2204	Presenter	2207-A	Learner
GILANG RAMDHAN HUDA	Universitas Pendidikan Indonesia	2201	Presenter	2208-L	Learner
I PUTU EDWIN WAHYU SAPUTRA	Udayana University	2205	Presenter	2208-J	Learner
JAKKAPHONG PIEWNAUN	Kasetsart University	2201	Presenter	2207-A	Learner
KUNANON PITHAPORNCHAIKUL	Mahidol University	2205	Audience	2208-M	Learner
KUNLANAT THANYAJAROEN	Kasetsart University	2202	Presenter	2208-N	Learner
MARICON DELA VEGA LAPLANA	University of San Carlos	2201	Presenter	2207-H	Learner
MENG SOPHORN	Royal University of phnom penh	2202	Presenter	2208-P	Learner
MIKAEL KEVIN	Universitas Indonesia	2203	Presenter	2207-F	Learner
NANTHIDA SITHISANE	National University of Laos	2204	Presenter	2208-J	Learner
NGUYEN THI HONG LINH	University of Education - Vietnam National University	2203	Presenter	2208-K	Learner
NI KADEK TEJA ARINI	Udayana University	2205	Presenter	2207-E	Learner
NI MADE NIA BUNGA SURYA DEWI	Udayana University	2204	Presenter	2207-B	Learner
RAHMA IZZATUN NABIHA	Universitas Gadjah Mada	2202	Presenter	2207-H	Learner
RIFDA AMARA AULIA	Bandung Institute of Technology	2204	Presenter	2208-M	Learner
SELLA LESTARI NURMAULIA	Bandung Institute of Technology	2202	Presenter	2207-G	Learner
SOMCHAI PHOTHIJATHOOM	Kasetsart University	2203	Presenter	2208-P	Learner
SRETTAWUT VANNAVISUTE	King Mongkut's University of Technology Thonburi	2203	Presenter	2207-B	Learner
SRI UTAMI	Universitas Gadjah Mada	2203	Presenter	2208-K	Learner
THANAPAT SUKITPANEENIT	Silpakorn University	2205	Presenter	2207-D	Learner
THANYATHEP SANGKAPONG	Silpakorn University	2205	Presenter	2208-L	Learner
THARATHIP PHUETPHOL	King Mongkut's University of Technology Thonburi	2202	Presenter	2207-E	Learner
THENG NARY	Royal University of Phnom Penh	2202	Presenter	2208-I	Learner
THONGDEELERT NATNARONG	Mahidol University	2205	Presenter	2207-C	Learner
VU THU AN	University of Education - Vietnam National University	2204	Presenter	2207-C	Learner
WEERIS STITMAN	King Mongkut's University of Technology Thonburi	2203	Presenter	2207-F	Learner

■ASCENT-6E Student

Name	University	Research Session		Workshop	
YODA Chihiro	Shibaura Institute of Technology Kashiwa High School	-	Audience	-	-

■High School Students

Name	University/School	Research Session		Workshop	
ABDULLAH Attariq Alhadi	Tokyo Metropolitan High School of Science and Technology	2203	Presenter	2208-I	Learner
HAMADA Morihiro	Chiba Municipal Chiba High School	-	-	2208-L	Learner
HANEISHI Reo	Chiba Municipal Chiba High School	-	-	2208-J	Learner
HAYASHI Waka	Chiba Municipal Chiba High School	-	-	2208-K	Learner
KADOWAKI Ayui	Chiba Municipal Chiba High School	-	-	2207-F	Learner
KASE Yuya	Chiba Prefectural Funabashi High School	-	Audience	2207-B	Learner
KAWASUMI Takuma	Chiba Municipal Inage High School	2205	Presenter	2207-H	Learner
KIMURA Hiroto	Chiba Municipal Chiba High School	-	-	2208-P	Learner
KUNIYASU Ema	Chiba Municipal Chiba High School	-	-	2207-E	Learner
MIYAJIMA Takeru	Chiba Municipal Chiba High School	-	-	2208-N	Learner
NOJIRI Kotaro	Chiba Municipal Chiba High School	-	-	2207-G	Learner
SAKUMA Hinako	Chiba Prefectural Funabashi High School	-	Audience	2207-A	Learner
TAKAHASHI Yoshiaki	Chiba Municipal Inage High School	2205	Presenter	2208-M	Learner
TSUJI Arisa	Chiba Prefectural Funabashi High School	-	Audience	2207-C	Learner
YAMAMOTO Yuto	Shibaura Institute of Technology Kashiwa High School	2201	Presenter	-	-
YAMAZAKI Kyoko	Chiba Municipal Chiba High School	-	-	2207-D	Learner

■TWINCLE Students

Name	University	Research Session		Workshop	
ARAI Yurika	Chiba University	2201	Audience	2208-P	Learner
ENOKIDO Kana	Chiba University	2205	PC Assistant	2207-A	Learner
FUCHIGAMI Sota	Chiba University	2204	Audience	2207-A	Learner
FUJIKURA Tomoki	Chiba University	2205	Audience	2207-D	Learner
FUJISHIRO Masaho	Chiba University	2204	Timekeeper	2207-H	Learner
FUKUHARA Chinatsu	Chiba University	2202	Audience	2208-I	Learner
HATANO Yusei	Chiba University	2203	Audience	2208-N	Learner
HIGUCHI Miyu	Chiba University	2201	Timekeeper	2208-M	Learner
IIMURA Haru	Chiba University	2202	Audience	2207-B	Learner
ITO Jun	Chiba University	2201	PC Assistant	2207-G	Learner
KANESHIMA Ryosei	Chiba University	2203	Audience	2207-E	Learner
KASUGA Michiya	Chiba University	2205	PC Assistant	2207-B	Learner
KATO Mika	Chiba University	2203	Timekeeper	2207-F	Learner
KATOU Souma	Chiba University	2203	Audience	2207-F	Learner
KAWAGUCHI Naohiro	Chiba University	2204	Audience	2207-H	Learner
KOBAYASHI Yusuke	Chiba University	2202	PC Assistant	2207-C	Learner
KOMATSU Hinata	Chiba University	2203	PC Assistant	2207-C	Learner
MATSUSHITA Hina	Chiba University	2201	Timekeeper	2208-M	Learner
MIHARA Kosei	Chiba University	2202	PC Assistant	2208-O	Learner
MIURA Masahiro	Chiba University	2204	Audience	2207-G	Learner
MORIYAMA Haruka	Chiba University	2201	Audience	2208-O	Learner
NAKAJIMA Ayaka	Chiba University	2204	Timekeeper	2207-E	Learner
NAKAMURA Keigo	Chiba University	2205	Timekeeper	2207-H	Learner
OSHIDA Hiraku	Chiba University	2205	Audience	2207-F	Learner
SAITO Hirotoshi	Chiba University	2202	Audience	2208-J	Learner
SAITO Kotone	Chiba University	2202	Timekeeper	2208-L	Learner
SAITO Yuta	Chiba University	2201	PC Assistant	2208-I	Learner
SAKUMA Kazuki	Chiba University	2204	PC Assistant	2208-K	Learner
SATO Hayate	Chiba University	2201	Audience	2208-J	Learner
SEKINE Tomoya	Chiba University	2205	Audience	2207-E	Learner
SHOJI Yuya	Chiba University	2203	PC Assistant	2207-D	Learner
SUGIYAMA Towa	Chiba University	2201	Audience	2208-L	Learner
SUZUKI Hikari	Chiba University	2203	Audience	2208-K	Learner
TAKADA Moe	Chiba University	2203	Timekeeper	2208-L	Learner
TAKAHASHI Wakana	Chiba University	2205	Timekeeper	2208-J	Learner
TAKASHINA Haru	Chiba University	2205	Audience	2207-G	Learner
TAKEHARA Keito	Chiba University	2204	Audience	2208-P	Learner
TATESAKA Tamaki	Chiba University	2201	Presenter	2207-B	Learner
UEKI Akane	Chiba University	2205	Audience	2208-I	Learner
WATABE Taisuke	Chiba University	2201	Audience	2208-K	Learner
YAMAMOTO Kodai	Chiba University	2202	Audience	2208-M	Learner
YAZAKI Kazuto	Chiba University	2204	PC Assistant	2207-A	Learner
YOKOYA Kazuki	Chiba University	2202	Audience	2208-N	Learner

■Chiba University (International Students)

Name	Faculty	Research Session		Workshop	
Fakih Irsyadi	Graduate School of Science and Engineering	2203	Panelist	2208-O	Facilitator
Huixin Wang	Graduate School of Horticulture	2202	Panelist	2207-E	Facilitator
Joceline Theda Kadarman	Graduate School of Medical and Pharmaceutical Sciences	2201	Panelist	2207-D	Facilitator
Margaret Bro	Faculty of Education	2204	Panelist	2207-B	Facilitator
Punnat Changsalak	Graduate School of Science and Engineering	2201	Panelist	2207-H	Facilitator
Rabiatul Hazirah binti Idris	Faculty of Education	2201	Panelist	2207-G	Facilitator
Regmi Loknath	Graduate School of Science and Engineering	2202	Panelist	2208-I	Facilitator
Rizvon Suleimanov	Graduate School of Humanities and Studies on Public Affairs	2205	Panelist	2207-A	Facilitator
Roxana Mayhin Del Rocio Quispe Cuadros	Faculty of Education	2202	Panelist	2208-L	Facilitator
Savira Aristi	Graduate School of Science and Engineering	2204	Panelist	2208-P	Facilitator
Savira Salsabila	Graduate School of Science and Engineering	2203	Panelist	2207-C	Facilitator
Sihan Zhang	Graduate School of Horticulture	2204	Panelist	2208-J	Facilitator
Yuhui Liao	Graduate School of Horticulture	2203	Panelist	2207-F	Facilitator
Yunchen Xu	Graduate School of Horticulture	2205	Panelist	2208-M	Facilitator
Zai Qurratu' Ainie Zainal Abbidin	Faculty of Education	2205	Panelist	2208-N	Facilitator

Online Presentation Session

■ Faculty and Graduate Students from Partner Universities & Faculty from Partner High Schools

Name	University	Presentation Session		Workshop Session	
Janejira Arsarkij	Chiang Mai University	S3-R1	Chairperson	WR-1	Supervisor
Changju Wu	Chiang Mai University	S3-R1	Session Asst	WR-1	Facilitator
Sarawan Pomsuk	Chiang Mai University	-	-	WR-1	Facilitator
Muhammad Irfan Afif	IPB University	S1-R1	Chairperson	WR-2	Facilitator
Intan Rabiyanti	IPB University	-	-	WR-2	Facilitator
Jauhar Zainal Arifin	IPB University	S1-R1	Session Asst	-	-
Saat Mubarrok	Institut Teknologi Bandung	S3-R2	Chairperson	-	-
Daffa Zettira Mazdhania	Institut Teknologi Bandung	S3-R2	Session Asst	-	-
Chatree Faikhamta	Kasetsart University	S2-R1	Chairperson	WR-3	Supervisor
Methin Intaraprasit	Kasetsart University	S2-R1	Session Asst	WR-3	Facilitator
Patcharaporn Boonkitti	Kasetsart University	S2-R1	Session Asst	WR-3	Facilitator
Poschanan Niramitchainont	Mahidol University	S1-R2	Chairperson	-	-
Suthiporn Sajjapanroj	Mahidol University	-	-	WR-4	Supervisor
Jiaxin Li	Mahidol University	S1-R2	Session Asst	-	-
Jiejun Dong	Mahidol University	S1-R2	Session Asst	-	-
Silin Li	Mahidol University	-	-	WR-4	Facilitator
Yanyi He	Mahidol University	-	-	WR-4	Facilitator
Yi-Fen Yeh	National Taiwan Normal University	S1-R3	Chairperson	WR-5	Facilitator
Chun-Hao Lin	Taipei First Girls High School	-	-	WR-5	Facilitator
Putu Ayu Asty Senja Pratiwi	Universitas Udayana	S2-R2	Chairperson	WR-6	Facilitator
Made Cinthya Puspita Shara	Universitas Udayana	-	-	WR-6	Facilitator
I Gusti Ngurah Bagus Pramana Putra	Universitas Udayana	S2-R2	Session Asst	-	-
I Putu Oka Pradnyana	Universitas Udayana	S2-R2	Session Asst	-	-
Pande Made Giopany	Universitas Udayana	-	-	WR-6	Asst Facilitator
I Putu Edwin Wahyu Saputra	Universitas Udayana	-	-	WR-6	Asst Facilitator
Faiz Husnayain	Universitas Indonesia	S3-R3	Chairperson	WR-7	Supervisor
Mufiedah	Universitas Indonesia	-	-	WR-7	Facilitator
Khansa Nitisara Ramadhani	Universitas Indonesia	-	-	WR-7	Facilitator
Rolando V. Obiedo	University of San Carlos	S1-R4	Chairperson	-	-
Rhey L. Dizon	University of San Carlos	S1-R4	Chairperson	-	-
Jerwina Mariel Arnejo	University of San Carlos	S1-R4	Session Asst	-	-
Emmanuel Cañares	University of San Carlos	S1-R4	Session Asst	-	-
Rita May P. Tagalog	University of San Carlos	-	-	WR-8	Facilitator
Andrew Dy	University of San Carlos	-	-	WR-8	Facilitator
Nguyen Chi Thanh	Vietnam National University	S2-R3	Chairperson	-	-
Nguyen Thi Hoa	Vietnam National University	S2-R3	Session Asst	-	-

■ High School Students

Name	High School	Presentation Session		Workshop Session	
Worakamol Charernsom	Kasetsart University Laboratory School	S1-R1	Presenter	WR-3	Learner
Shimbun Kittitaweesin	Kasetsart University Laboratory School	S2-R2	Presenter	WR-8	Learner
Panisara Limpapawich	Ongkharak Demonstration School	S3-R2	Presenter	WR-1	Learner
Hizkia Naratyaga Suwanto	SMA Negeri 9 Depok	S1-R3	Presenter	WR-1	Learner
Adinda Maharani Azliarita Nariswari	SMA Negeri 9 Depok	S1-R1	Presenter	WR-8	Learner
Adinda Rahmania Victoria	SMA Negeri 9 Depok	S3-R3	Presenter	WR-3	Learner
Dhammawit Haemanwichian	Chiang Mai University Demonstration School	S1-R2	Presenter	WR-2	Learner
Weerat Kanchanaratchataphong	Chiang Mai University Demonstration School	S1-R2	Presenter	-	-
Wirada Rithikupt	Chiang Mai University Demonstration School	S2-R1	Presenter	WR-1	Learner
Papichaya Nakpon	Chiang Mai University Demonstration School	S2-R1	Presenter	-	-
Ponpomkwan Chanhom	Chiang Mai University Demonstration School	S3-R2	Presenter	WR-3	Learner
Pongkhwan Sounno	Chiang Mai University Demonstration School	S3-R2	Presenter	-	-
Adil Athary Arifin	Kornita High School	S1-R2	Presenter	WR-1	Learner
Harun Zayyan Nasution	Kornita High School	S2-R1	Presenter	WR-4	Learner
Nadhratannaim	Kornita High School	S2-R3	Presenter	WR-3	Learner
Fatih Ahmad Azadiprasya	SMA Negeri 6 Yogyakarta	S2-R1	Presenter	WR-1	Learner
Chutikan Phachongsin	Wat Rai Khing Wittaya School	S1-R1	Presenter	WR-1	Learner
Pattaranuch Phuwichai	Wat Rai Khing Wittaya School	S3-R1	Presenter	WR-2	Learner
Teeratep Liwluk	Wat Rai Khing Wittaya School	S2-R3	Presenter	WR-5	Learner
Made Indira Saraswati Devi	Regents Secondary School Bali	S3-R2	Presenter	WR-6	Learner
Delynn Marcella Dinessya	Regents Secondary School Bali	S3-R1	Presenter	WR-2	Learner
Putu Anindhita Indivara Disty Dananjaya	Regents Secondary School Bali	S1-R4	Presenter	WR-5	Learner
BONTILAO, Jeally Belle	San Carlos School of Cebu Inc.	S1-R4	Presenter	WR-6	Learner
CHUA, Aaron Jefferson	San Carlos School of Cebu Inc.	S1-R4	Presenter	WR-4	Learner
YAP, Dominic John	San Carlos School of Cebu Inc.	S1-R4	Presenter	WR-7	Learner
Darlene Bernice Dano	San Carlos School of Cebu Inc.	S1-R2	Presenter	WR-4	Learner
Brielle Cagasan	San Carlos School of Cebu Inc.	S1-R2	Presenter	WR-6	Learner
Wyn Hannah Therese Montera	San Carlos School of Cebu Inc.	S1-R2	Presenter	WR-7	Learner
Jiberlen Mae Morales	San Carlos School of Cebu Inc.	S1-R2	Presenter	WR-8	Learner
Vinceberg Renalde Palamos	San Carlos School of Cebu Inc.	S1-R2	Presenter	WR-5	Learner
Cyza Denisse Polido	San Carlos School of Cebu Inc.	S2-R1	Presenter	WR-3	Learner
Jhanna Maika Odron	San Carlos School of Cebu Inc.	S2-R1	Presenter	WR-5	Learner
Chloe Pacotilla	San Carlos School of Cebu Inc.	S2-R1	Presenter	WR-8	Learner
Hannah Gezyl Sangcap	San Carlos School of Cebu Inc.	S2-R1	Presenter	WR-6	Learner
Athena Grace Veñas	San Carlos School of Cebu Inc.	S2-R1	Presenter	WR-4	Learner
Karnsinee Jaksemasatitkul	Chulalongkorn University Demonstration Secondary School	S3-R2	Presenter	WR-7	Learner
Worasikarn Warutama	Chulalongkorn University Demonstration Secondary School	S2-R2	Presenter	WR-2	Learner
Danisha 'Afranovia	SMA Negeri 1 Bandung	S2-R2	Presenter	WR-7	Learner
Alia Shibaa Fathia Abidin	SMA Negeri 1 Bandung	S1-R3	Presenter	WR-2	Learner
Adriel Riandra Dhiaurrahman	SMA Negeri 1 Bandung	S1-R2	Presenter	WR-4	Learner
Nguyen Ha Linh	High Schoool of Education and Sciences	S1-R4	Presenter	WR-6	Learner
Dang Ba Thanh	High Schoool of Education and Sciences	S1-R4	Presenter	WR-7	Learner
Nguyen Huy Hoang	High Schoool of Education and Sciences	S3-R3	Presenter	WR-5	Learner
YU, YU-CHI	Taipei First Girls High School	S1-R3	Presenter	WR-4	Learner
SHEN, LING-YI	Taipei First Girls High School	S1-R3	Audience	WR-5	Learner
HSU, I-EN	Taipei First Girls High School	S1-R3	Audience	WR-8	Learner
WANG, ATHENA	Taipei First Girls High School	S1-R4	Presenter	-	-
PEK, YU-XI	Taipei First Girls High School	S1-R4	Presenter	-	-
YANG, CHING-LAN	Taipei First Girls High School	S1-R4	Presenter	-	-
CHANG, YU-JIE	Taipei First Girls High School	S3-R3	Presenter	WR-6	Learner
SHIH, AN-YU	Taipei First Girls High School	S3-R3	Presenter	WR-7	Learner
Alyaa Aqila Zen	SMA Alfa Centauri	S2-R3	Presenter	WR-2	Learner
Ameera Nadhifah Salam	SMA Alfa Centauri	S2-R3	Presenter	WR-3	Learner
Atsuki Narahashi	Yokohama Soei Senior High School	S1-R3	Presenter	WR-8	Learner
Akane Kubota	Chiba Meitoku High School	S1-R1	Presenter	WR-2	Learner
Kotaro Inui	Hiroo Gakuen Senior High School	S3-R1	Presenter	WR-4	Learner
Jun Kang	Hiroo Gakuen Senior High School	S2-R3	Presenter	WR-3	Learner
Kensei Iida	Hiroo Gakuen Koishikawa Senior High School	-	-	WR-6	Learner

■Chiba University

Name	Faculty	Research Session		Workshop	
FUJIKAWA Daisuke	Dean Faculty of Education	-	-	-	-
KATO Tetsuya	Faculty of Education	-	-	-	-
MATSUI Satoshi	Faculty of Education	2203	Chairperson	2208	-
MORISHIGE Hina	Institute for Excellence in Educational Innovation	2202	Chairperson	-	-
NOMURA Jun	Faculty of Education	2201	Chairperson	-	-
SHIMONAGATA Shuji	Faculty of Education	2205	Chairperson	-	-
TSUJI Koji	Faculty of Education	-	-	2207	-
Wang Qian	Institute for Excellence in Educational Innovation	2204	Chairperson	-	-