



Core-to-Core Programme Final Joint Seminar Innovating Teacher Education for Sustainable Development: Collaborative Approach to the SDGs

Programme Book



Organized by Okayama University, Japan Supported by Japan Society for the Promotion of Science (JSPS)

6-8 November 2024, Okayama, Japan

Welcome Message

Dear Colleagues and Guests,

Welcome to the Final Joint Seminar of the Core-to-Core Programme, "Innovating Teacher Education for Sustainable Development: Collaborative Approach to the SDGs." This seminar is organized by Okayama University, Japan, with the support of the Japan Society for the Promotion of Science (JSPS). We are thrilled to host this event from November 6th to 9th, 2024, at Okayama University. The seminar provides a unique opportunity to discuss advancements and innovative strategies in sustainable teacher education.

Our aim is to strengthen the whole-institution approach to Education for Sustainable Development (ESD) and foster meaningful collaborations across the globe. By sharing knowledge and best practices, we aspire to deepen the impact of ESD within higher education institutions and contribute to achieving the Sustainable Development Goals (SDGs). We are grateful for your participation and contribution to this inspiring event in Okayama, Japan. Your engagement will be instrumental in shaping future educational practices for a sustainable world.

Warm regards,

Hichi Jym

Hiroki Fujii, Ph.D. Director, Okayama University ESD promotion Centre Japanese Coordinator, Core-to-Core Programme "Formation of Centre of Excellence to Promote Teacher Education for ESD: Towards Achieving the SDGs"





Core-to-Core Programme Final Joint Seminar "Innovating Teacher Education for Sustainable Development: Collaborative Approach to the SDGs" Organized by Okayama University, Japan Supported by Japan Society for the Promotion of Science (Okayama, 6-9 Novemver 2024)

Concept Note

1. Background

Education for Sustainable Development (ESD) occupies a prominent place in the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) adopted by the United Nations (UN). It is "a vital means of implementation for sustainable development" and "a key enabler" of all the SDGs, as affirmed by the UN General Assembly in its resolution 72/222. Educators including teachers have a crucial role to play in this global pursuit of sustainable development through education. As UNESCO's new ESD promotion measure "ESD for 2030" recognizes, educators are "key actors in facilitating learners' transition to sustainable ways of life." They can facilitate learning for sustainable development.

Recognizing the critical importance of educators in the SDGs, Okayama University, the only UNESCO Chair on ESD in Asia, obtained a grant sponsored by the Japanese National Commission for UNESCO (FY 2018-2019), and it developed the "Asia-Pacific ESD Teacher Competency Framework" and a guide for effectively disseminating the framework in collaboration with 34 institutions in 16 countries across the Asia-Pacific region and with the support of UNESCO Bangkok, UNESCO Beijing, and Asia-Pacific Cultural Centre for UNESCO. The framework currently comprises a programme guideline for developing ESD teacher education in the Asia-Pacific region and its research and educational achievements.

Subsequently, with the support of the Japan Society for the Promotion of Science (JSPS) (FY2021-2024), the University is working on "Formation of a Network of Advanced Centres of Excellence in ESD Teacher Education" in collaboration with institutions in Europe and North America and elsewhere. The objective is to accelerate the global promotion of ESD teacher education, presenting basic policies for this objective and discussing measures for its dissemination, as well as promoting mutual exchange of researchers and fostering young researchers who will be the core of the next generation. Through joint seminars organised so far in Slovenia in 2022 September and in Norway in 2024 March, these objectives are close to being achieved.

2. Objectives

The objectives of the event are to foster collaborative discussions and knowledge exchange, focusing on curriculum development, pedagogical strategies, competency frameworks, and evaluation methods of ESD, in order to equip future educators with the skills and knowledge to promote sustainable development, and to create recommendations to innovate teacher education for sustainable development. To achieve these objectives, the event will promote the exchange of ESD researchers and the development of young researchers.

3. Expected outputs

- A comprehensive recommendation document about teacher education for sustainable development, outlining best practices, innovative approaches, and actionable strategies for its innovation.
- Enhanced collaboration and networking among experts and practitioners in the field.

4. Participants

The event will bring together approximately 50 participants on-site from centres of excellence in ESD teacher education including Okayama University, as well as online participants from partner institutions in Asia and other regions.

5. Time, venue, and programme overview

6 – 9 November 2024 at Okayama University, Okayama, Japan

Day 1: Opening session, open lecture, panel discussions, poster session, welcome function

Day 2 and Day 3: Collaborative work

Day 4: ESD excursion





Core-to-Core Programme Final Joint Seminar "Innovating Teacher Education for Sustainable Development: A Collaborative Approach to the SDGs" Organized by Okayama University, Japan, Supported by Japan Society for the Promotion of Science (JSPS) (Okayama, 6-9 November 2024)

Programme Schedule

University professors and students who are interested in Education for Sustainable Development (ESD), especially teacher education, will participate in DAY 1 (Wednesday, 6 November 2024) of this seminar either on-site or online.

DAY 1 Wednesd	lay, 6 November 2024 (Open for Public)	Venue
10:15 - 10:45	Registration	Main building
10:45 - 11:00	Opening Session	Room 404
	Moderator: Khalifatulloh Fiel'ardh (Okayama University, Japan)	
	Opening remark by Atsushi TAKASE (Dean, Faculty of Education, Okayama University, Japan)	
11:00 - 11:30	Agenda 1: Keynote speech	
	Past, Present and Future of Teacher Education for Sustainable Development	
	Moderator: Hiroki FUJII (Okayama University, Japan)	
	Speaker: Charles HOPKINS (York University, Canada)	
11:30 - 12:45	Agenda 2: Panel discussion (1)	
	Curriculum and Pedagogy of Teacher Education for Sustainable Development	
	Moderator: Robert DIDHAM (Inland Norway University of Applied Sciences, Norway)	
	Panelists: Patricia Mie MATSUO (University of São Paulo, Brazil)	
	Sweta R. PUROHIT (Centre of Environmental Education, India)	
	Sun-Kyung LEE (Cheongju National University of Education, Republic of Korea)	
	Gregor TORKAR (University of Ljubljana, Slovenia)	

12:45 - 13:15	Agenda 3: Poster session	
	Participants will discuss ESD and GCED research and practice, the two pillars of education for the SDGs.	
13:15 – 14:15	Lunch	Lunch box
14:15 – 15:30	Agenda 4: Panel discussion (2)	Main building Room
	Competency and Evaluation in Teacher Education for Sustainable Development	404
	Moderator: Daniel FISCHER (Leuphana University of Lüneburg, Germany)	
	Panelists: Ari WIDODO (Indonesia University of Education, Indonesia)	
	Tomonori ICHINOSE (Miyagi National University of Education, Japan)	
	Ainur SEILKHAN (Abai Kazakh National Pedagogical University, Kazakhstan)	
	Dorcas OTIENO (Kenyatta University, Kenya)	
15:30 - 15:45	Agenda 5: Summarising and closing of Day 1	
	Speaker: Hiroki FUJII (Okayama University, Japan)	
15:45 —	Move to hotel	
19:00 —	Welcome function	Japanese restaurant
DAY 2 Thursday	y, 7 November 2024 (Invitation Only)	Venue
9:30 - 10:00	Agenda 6: Orientation session of Day 2 and Day 3	Main building
	Hiroki FUJII (Okayama University, Japan)	Room 404
	The session will introduce the purpose and process of the two-day collaborative work to develop a recommen-	
	dations document "Innovating Teacher Education for Sustainable Development."	
10:00 - 12:00	Agenda 7: Sharing experiences of good research and practice and identifying key elements	
	Participants will be divided into two groups to discuss and work through the process.	
	Working group 1: Curriculum and Pedagogy in Teacher Education for Sustainable Development	
	Member: Robert DIDHAM (Inland Norway University of Applied Sciences, Norway)	
	Patricia Mie MATSUO (University of São Paulo, Brazil)	
	Sweta R. PUROHIT (Centre of Environmental Education, India)	
	Sun-Kyung LEE (Cheongju National University of Education, Republic of Korea)	

	Gregor TORKAR (University of Ljubljana, Slovenia)	
	Hiroki FUJII (Okayama University, Japan) and Okayama University's Professors	
	Working group 2: Competency and Evaluation in Teacher Education for Sustainable Development	
	Member: Daniel Fischer (Leuphana University of Lüneburg, Germany)	
	Charles Hopkins (York University, Canada)	
	Ari WIDODO (Indonesia University of Education, Indonesia)	
	Tomonori ICHINOSE (Miyagi National University of Education, Japan)	
	Ainur SEILKHAN (Abai Kazakh National Pedagogical University, Kazakhstan)	
	Dorcas OTIENO (Kenyatta University, Kenya)	
	Okayama University's Professors	
12:00 - 13:30	Lunch	University restaurant
13:30 - 14:30	Agenda 7: Sharing experiences of good research and practice and identifying key elements (continued)	Main building
	Facilitator: Gregor TORKAR (University of Ljubljana, Slovenia)	Room 404
	Each group will present the outcome of group work in the plenary, followed by discussion.	
14:30 - 16:30	Agenda 8: Creating the domain of the recommendations and the content encompassed therein	
	Participants will be divided into two groups to discuss and work through the process.	
DAY 3 Friday, 8	November 2024 (Invitation Only)	Venue
9:30 - 11:00	Agenda 9: Creating the domain of the recommendations and the content encompassed therein (continued)	Main building
	Participants will be divided into two groups to discuss and work through the process.	Room 404
11:00 - 12:00	Agenda 10: Creating the domain of the recommendations and the content encompassed therein (continued)	
	Facilitator: Tomonori ICHINOSE (Miyagi National University of Education, Japan)	
	Each group will present the outcome of group work in the plenary, followed by discussion.	
12:00 - 13:30	Lunch	University restaurant
13:30 - 15:30	Agenda 11: Planning the way forward	Main building
	Participants will break into three groups to consider the requirements for the spread of the recommendation	Room 404
	and finalize it as a supplement of the recommendation.	

	Working group 1:	
	Member: Daniel FISCHER (Leuphana University of Lüneburg, Germany)	
	Robert DIDHAM (Inland Norway University of Applied Sciences, Norway)	
	Gregor TORKAR (University of Ljubljana, Slovenia)	
	Working group 2:	
	Member: Sweta R. PUROHIT (Centre of Environmental Education, India)	
	Ari WIDODO (Indonesia University of Education, Indonesia)	
	Tomonori ICHINOSE (Miyagi National University of Education, Japan)	
	Ainur SEILKHAN (Abai Kazakh National Pedagogical University, Kazakhstan)	
	Sun-Kyung LEE (Cheongju National University of Education, Republic of Korea)	
	Working Group 3:	
	Member: Patricia Mie MATSUO (University of São Paulo, Brazil)	
	Charles Hopkins (York University, Canada)	
	Hiroki FUJII (Okayama University, Japan)	
	Dorcas OTIENO (Kenyatta University, Kenya)	
15:30 – 16:15	Agenda 12: Planning the way forward (continued)	
	Facilitator: Ari WIDODO (Indonesia University of Education, Indonesia)	
	Each group will present the outcome of group work in the plenary, followed by discussion.	
16:15 – 16:30	Agenda 13: Closing of DAY 2 and DAY 3	
	Hiroki Fujii (Okayama University, Japan)	
DAY 4 Saturday,	9 November 2024 (Invitation Only, Optional)	
	Agenda 14: ESD excursion	
	Participants will visit two World Heritage Sites in Hiroshima related to ESD: Miyajima and Peace Park.	

Keynote Speech Past, Present and Future of Teacher Education for Sustainable Development

Speaker: Charles HOPKINS, York University, Canada UNESCO Chair in Reorienting Education towards Sustainability



Charles Hopkins holds the UNESCO Chair in Reorienting Education towards Sustainability at York University in Toronto, Canada. This Chair, established in 1999, was the first to focus on **Education for Sustainable Development (ESD)** as an essential concept for quality education and to position sustainability as a purpose of education. Hopkins' Chair coordinates two global ESD research networks, the International Network of Teacher Education Institutions and the #IndigenousESD, conducting global research projects. Hopkins has a long relationship with education and sustainability, including chairing the writing and adoption processes of UNESCO ESD Declarations and implementation initiatives. Since 2014, he has also been serving as Co-Director of the Asia-Pacific Institute on ESD in Beijing (China). An awarded education leader, he received an honorary doctorate from Okayama University in 2019. Prior to his international career, Hopkins was a teacher, principal, regional superintendent and superintendent of curriculum with the Toronto District School Board.

Moderator: Hiroki FUJII, Okayama University, Japan UNESCO Chair in Research and Education for Sustainable Development



Hiroki Fujii, Ph.D., serves as the Director of the ESD Promotion Centre at Okayama University, Japan and the UNESCO Chair in Research and Education for Sustainable Development. Currently, he is a Honorary Professor at Abai Kazakh National Pedagogical University (2024-present) and a Visiting Professor at both the Mongolian National University of Education (2022-present) and the Indonesia University of Education (2021present). Since 2016, Hiroki has also held a professorship at Okayama University, where he directs initiatives aimed at advancing ESD, contributing to global efforts in achieving the SDGs. Throughout his career, Hiroki has secured significant research grants, enabling him to lead projects focused on teacher education and climate change education across Asia. His leadership in the Core-to-Core Programme Type A, which aims to form a centre of excellence for promoting ESD, has been instrumental in fostering international collaboration and innovation in the field.

Panel Discussion 1: Curriculum and Pedagogy in Teacher Education for Sustainable Development

Moderator: Robert DIDHAM, Inland Norway University of Applied Sciences, Norway UNESCO Chair on Education for Sustainable Lifestyle



Robert J. Didham (Ph.D.) became the current holder of the UNESCO Chair on Education for Sustainable Lifestyles in 2021. He is also the director of Centre for Collaborative Learning for Sustainable Development (CCL) and an associate professor at Inland Norway University of Applied Sciences. With a background in community-based sustainable development, public participation and social learning, Robert has extensive experience in interdisciplinary research and capacity building projects. He has coordinated multicountry research on education for sustainable development, sustainable consumption, and adaptation planning, and he has led policy support projects for several national governments. Previously, Robert was the senior coordinator for capacity development and education at the Institute for Global Environmental Strategies (IGES), based in Japan, where he worked extensively throughout the Asia-Pacific region.

Speaker: Patricia Mie MATSUO University of São Paulo, Brazil



Ecologist and PhD in Science Education from the University of São Paulo. Dr. Patricia Mie Matsuo has dedicated over 20 years in coordinating national and international programmes of environmental education with schools and communities in Brazil, focused on endangered species, biomes, watersheds, and more recently on climate change and disaster risk reduction. Mie worked as researcher at the *National Center for Monitoring and Alerts in Natural Disasters* (Cemaden) and co-created the educational campaign #AprenderParaPrevenir (Learn to Prevent) that is focused to mobilize society for the creation of a culture of disaster prevention. She also participated in a project to create a proposal on Climate Change Education Standards. She is currently a postdoctoral researcher at the *Institute of Advanced Studies at the University of São Paulo*.

Speaker: Sweta R. PUROHIT

Centre for Environment Education, India



Dr. Sweta Purohit is Programme Director, Climate Change at Centre for Environment Education (CEE) India. She brings with her 15+ years of experience in the field of sustainability research and education. She has published many research papers, reports, action plans, and a book. Her studies include policy level studies on emissions incentivisation and decarbonisation strategies, carbon sequestration, valuation of ecosystem services, and climate vulnerability assessments. Collaborations and partnerships with academia, industry and civil society, stakeholder engagement as well as public outreach has been an integral part of her work. Currently, she is leading the Climate Change Education Programme focusing on Teacher Education in partnership with the Ministry of Education, Govt. of India, UNICEF and UNESCO. She is also the lead author of UNESCO State of Education Report 2023 for India on Education to Address Climate Change. She is leading climate adaptation action initiatives by schools and youths with various partners. She is also implementing a community-based climate resilience programme for the most vulnerable group of farmers and rural communities to ensure water, energy and income security. She is also a US State Alumnus under its prestigious International Visitor Leadership Program (IVLP) sponsored by the Bureau of ECA, US Department of States.

Speaker: Sun-Kyung LEE Cheongju National University of Education, Republic of Korea



Dr. Sun-Kyung Lee is Professor of Science Education at Cheongju National University of Education in Republic of Korea. Her research interests lie in policy, curriculum development, teaching-learning strategies, teacher education and the whole school approaches. She has been actively involved in ESD and environmental education (EE) domestically and internationally since her contribution of policy development of national strategy for *UN Decade of ESD* in Korea in 2005. Sun-Kyung served as the president of *Korean Society of Environmental Education* in 2018-2019. She has served as a Chair of *ESD Committee in Korea National Commission of UNESCO* since 2018, and a Co-Chair of *Environmental Education Committee in Ministry of Environment* since 2020. She has also served as a member of Presidential Commission on Carbon Neutrality and Green Growth since 2022. Sun-Kyung well understands the demands of close international cooperation in EE and ESD, and has shown meaningful activities with TEEN (*Tripartite Environmental Education Network among China, Japan and Korea*) and ENSI (*Environment and School Initiatives*).

Speaker: Gregor TORKAR, University of Ljubljana, Slovenia UNESCO Chair on Teacher Education for Sustainable Development



Prof. Dr. Gregor Torkar is full Professor of Biology Didactics and holder of the UNESCO Chair on Teacher Education for Sustainable Development at the University of Ljubljana, Slovenia. He also chairs a programme committee of the Centres for Outdoor Education in Slovenia and is a member of various national commissions for educational policy. In his research and teaching he is active mainly in the field of biology and environmental education. His current research interests include ecology; biodiversity and evolutionary education; sustainability, environmental attitudes and behaviour; outdoor education; ICT in science teaching and learning; and nature conservation.

Panel Discussion 2: Competency and Assessment in Teacher Education for Sustainable Development

Moderator: Daniel FISCHER, Leuphana University of Lüneburg, Germany UNESCO Chair in Higher Education for Sustainable Development



Dr. Daniel Fischer is Professor for Sustainability Education & Communication at Leuphana University of Lüneburg, Germany. He is also holding the UNESCO Chair in Higher Education for Sustainable Development since the beginning of 2024. Daniel's research explores how more sustainable ways of living and consuming can be facilitated through communication and learning. He uses inter- and transdisciplinary approaches to understand how consumption patterns evolve and change over time and in different cultural settings, and what role communication processes play in this. Daniel's strong interest is in intervention research. In recent research projects with his SuCo2 research group, he studied how innovative practices like mindfulness, storytelling, or citizen science can disrupt consumption routines and increase reflexivity in individuals. His work aims, in an educational tradition, to empower people to re-shape their relationships with the consumer societies into which they have been born, encultured, and socialized in the industrialized world. Before he joined Leuphana, Daniel served as Assistant Professor for Sustainability Education at Arizona State University (USA) and Associate Professor for Consumer Communication and Sustainability at Wageningen University (The Netherlands).

Speaker: Ari WIDODO Indonesia University of Education, Indonesia



Prof. Dr. Phil. Ari Widodo, M.Ed., is a seasoned academic with 32 years of teaching experience across undergraduate, master's, and doctorate levels. He has participated in various international research collaborations with countries such as Singapore, the Philippines, Korea, and Japan, further enriching his experience in science education. Dr. Widodo holds a Doctorate in Science Education from the University of Kiel, Germany (2004), a Master's in Science Education from Deakin University, Australia (1997), and a Bachelor's degree in Biology Education from IKIP Bandung, Indonesia (1992). His academic journey has paved the way for his impactful teaching and leadership in science education. Currently, he serves as a Professor in Science Education (2017-present). His previous roles include Vice Dean for Academic Affairs at the Faculty of Mathematics and Science Education (2016-2020), Head of the Graduate School of Science Education Program (2015), Secretary of the Department of Biology Education (2010-2015), and Head of the International Programme on Science Education (2009-2010). Since 1992, he has been a dedicated lecturer at the Faculty of Mathematics and Science Education.

Second Joint Seminar Program Book | 10

Speaker: Tomonori ICHINOSE Miyagi National University of Education, Japan



Prof. Tomonori Ichinose, Ph.D., currently serving as a Professor at the Faculty of Education, Miyagi University of Education since 2021. His expertise lies in teacher training, international education, and disaster education, with a research history spanning over three decades. Prof. Ichinose earned his doctorate from the Graduate School of Letters at Keio University, completing his education in 1995. He has held numerous significant positions at Miyagi National University of Education, including Professor and director at the *Research Institute for Teacher Training and Development* (2018-2020), and Director of the *Centre for Disaster Education and Future Design* (2018-2019). Prior to this, he was the Director of the *Research Centre for International Understanding in Education* (2016-2017) and a key member of the Research Centre for Education in International Understanding, where he served as Professor from 2010 to 2017.Prof. Ichinose's international experience includes his role as a specialist appointed by the Japan Foundation at the Beijing Institute of Japanese Study, Beijing Foreign Studies University (1992-1995). Additionally, he has lectured at Keio University and collaborated in international education research.

Speaker: Ainur SEILKHAN

Abai Kazakh National Pedagogical University, Kazakhstan



Dr. Ainur Seilkhan completed her Ph.D. in Ecology from the Kazakh National Agrarian University in 2020, following her earlier educational achievements of a Master's in Ecology (2010) and a Bachelor's in Geography Education (2008) from Abai Kazakh National Pedagogical University. Recently, she served as a postdoctoral researcher at the same university from 2021 to 2023. Ainur has been an integral part of Abai Kazakh National Pedagogical University since 2011, where she contributes to both teaching and research. In addition to her academic work, she has been actively involved in several professional organizations. She served as a member of the *Appeal Commission for Admission to Graduate School* (2019-2020) and as part of the *Commission of the Republican Center for Gifted Children "Daryn"* (2019-2021).

Speaker: Dorcas OTIENO, Kenyatta University, Kenya

UNESCO Chair on Higher Education Development for a Green Economy and Sustainability



Dr. Dorcas Beryl Otieno holds the UNESCO Chair on *Higher Education Development for a Green Economy and Sustainability* (HEDGES) at Kenyatta University, where she leads critical initiatives aimed at integrating sustainability and green economy principles into higher education. With a Ph.D. in Environmental Education from Kenyatta University, her research and academic work have focused on promoting environmental ethics and sustainability in educational institutions across Kenya. Over the years, Dr. Otieno has been actively involved in various national and international projects related to sustainability and education. She was a key member of the *Kenya Green Universities Network* (KGUN), which works to incorporate sustainability into higher education institutions across the country. Additionally, she contributed to the development of the *Kenya Green Economy Strategy and Implementation Plan* (GESIP), a transformative initiative aimed at promoting low-carbon, resource-efficient, and inclusive economic growth. Her work with UNESCO and other global organizations has positioned her as a leader in advancing ESD in Africa.

Poster Session (ESD Stream)

1. Exploring Mongolian Teachers' Perspectives on Climate Change: Insights from Semi-Structured Interviews Across Geographical Profiles

Gerelkhuu SHINESETSEG, K. F. ARDH, Hiroki FUJII Okayama University Graduate School of Humanities and Social Science, Doctorate Course

Mongolia faces significant climate vulnerabilities, with each region presenting unique environmental challenges that shape local approaches to climate change education (CCE). However, limited research exists on how CCE is implemented across Mongolia's diverse landscapes. This study investigates how elementary school teachers adapt CCE to address the specific environmental needs of Mongolia's varied ecological regions, enhancing local relevance and student engagement. Using semi-structured interviews with 20 teachers from five different natural areas, this research applies Qualitative Content Analysis (QCA) to uncover region-specific educational practices. Findings reveal that teachers tailor CCE to reflect local environmental realities. In the Gobi Desert, teachers prioritize field-based activities that enable students to witness desertification firsthand, fostering a deep understanding of land degradation. In the forest-steppe region, the focus shifts to species conservation, with educators using examples like the endangered saiga antelope to illustrate biodiversity's importance. Meanwhile, teachers in the mountain-taiga region incorporate water conservation into math lessons, having students calculate household water use to raise awareness of resource scarcity. These findings highlight the importance of CCE that is responsive to Mongolia's diverse local contexts, where environmental issues vary significantly by region. By incorporating concrete, locally relevant examples in climate education, teachers can enhance student engagement and inspire proactive environmental action. The findings suggest that teacher training programs should support educators in adapting climate education to address specific environmental challenges in their regions, potentially improving the effectiveness of climate education across Mongolia. This research contributes to the limited studies on climate change education (CCE) in Asia, providing insights into how localized approaches can enhance climate education's effectiveness. By connecting education to local environmental issues, this study highlights the potential of regionally adapted CCE to help young learners understand and address climate challenges within their own communities.

Keywords: Mongolia, Interview, Climate Change Education, Teacher Education

2. Fostering Critical Thinking About Properties of Materials: Development of Middle School Science Lessons

Kyoshiro ITANI, K.F. ARDH, Hiroki FUJII Okayama University, Graduate School of Education, Professional Degree's Course

This study presents the development and implementation of a series of middle school science lessons aimed at fostering critical thinking about material properties within the context of Education for Sustainable Development (ESD) in Japan. Focusing on the concept of "mutuality" and the skills needed to think critically, the lessons are designed to enhance students' understanding of sustainable practices, particularly in relation to synthetic and plastic materials. The curriculum comprises three interconnected lessons: Lesson 1 introduces students to the properties of cotton versus polyester, prompting them to examine why synthetic fibers are widely used. Students engage in discussions comparing absorbency, drying speed, and cost, using these factors to construct arguments about material choices. Lesson 2 involves hands-on experiments with various types of plastic, where students test properties such as flammability, density, and conductivity. Through this process, students gather evidence and analyse experimental results to draw conclusions about plastic characteristics. Lesson 3 requires students to synthesize their findings from previous lessons to make informed arguments about plastic use, considering the environmental and societal impacts of plastic production and disposal. By integrating critical thinking processes with scientific inquiry and real-world issues, this study promotes students' ability to evaluate material choices in light of sustainability. Findings from student reflections and argumentation activities indicate an increased awareness of resource limitations and the environmental implications of material use, supporting ESD competencies in critical thinking, comprehensive analysis, and responsible decision-making.

Keywords: Middle School Science, Critical Thinking, Material Properties

3. How is CO₂ Changing the Seawater? Middle School Lessons on Ocean Acidification

Asami KAJITA, K.F. ARDH, Hiroki FUJII Okayama University, Graduate School of Education, Professional Degree's Course

Climate change is causing several environmental issues, with ocean acidification (OA) being one of the most significant. OA is a reduction in the pH of the ocean, caused by the increase of the concentration of carbon dioxide (CO₂). This phenomenon will inhibit the activity of marine organisms to synthesize calcium carbonate (CaCO₃) and thus inhibit their growth. Because the pH of surface seawater is affected by ocean currents, future predictions of ocean acidification are complex and require further study. Despite its seriousness, OA is not included in the Japanese school science curriculum. Our research aims to fill this gap by developing two lessons to 145 third-year middle school students, focusing on mechanisms, impacts on marine organisms and a characteristic of OA. We developed and implemented two lessons. Lesson (1) detailed the mechanism of OA. Students conducted an experiment developed by Biochemical impacts of Ocean Acidification (2012) to observe a change in the colour in an indicator solution and learned the chemical processes of OA. Lesson (2) detailed the impacts and marine organisms and characteristics of OA. Students read a map of the distribution of pH in global surface seawater (Japan Meteorological Agency, 2023) and learned that the pH of surface seawater is affected by ocean currents. They also constructed a model of CaCO₃ and learned about the processes that inhibit the synthesis of $CaCO_3$. A Wilcoxon signed rank sum test was performed on the medians for each item in the pre- and post-tests. As a result, there was a statistically significant difference between the pre- and post-tests, and the score of post-tests is higher than the pre-ones. This means these lessons enhanced student understanding of mechanisms, impacts on marine organisms and the characteristics of OA. Notably significant changes were observed in students' understanding of the impact of industrial activities on seawater acidity and the effects of OA on shell formation. These results indicate that students can deepen their understanding of OA by devising experiments and lesson content.

Keyword: Ocean Acidification, Middle School, Chemistry, Experiment, Model

4. Teaching Disaster Prevention Through Elementary School Science: A Cross-Curricular Perspective

Mizuki KATSURAGI, K.F. ARDH, Hiroki FUJII Okayama University, Graduate School of Education, Professional Degree's Course

Japan experiences more natural disasters than any other country, and the national educational guidelines, or Courses of Study, emphasize disaster prevention education. Nearly all elementary schools conduct earthquake evacuation drills. However, these drills have become highly procedural, and reports indicate that during unannounced drills, many children chose incorrect actions, such as returning to their classroom desks even if they were elsewhere, such as in the hallway or a neighbouring classroom during recess. To address this, it is essential for children to understand the reasoning behind evacuation actions. This study aims to develop students' ability to critically assess "why they do what they do" and make appropriate, evidence-based evacuation decisions. Our previous research identified two key areas for improvement in current disaster education. First, flood disaster prevention education requires greater emphasis. In the past decade, over 98% of Japanese municipalities have experienced floods or landslides, yet the implementation rate of flood prevention education remains significantly lower than that of earthquake education. Effective disaster preparedness should incorporate science education on the causes of natural phenomena, social studies on historical events, and health and physical education for safe evacuation practices. This underscores the need for cross-curricular lessons in disaster prevention. Additionally, for children to make sound, evidence-based evacuation decisions, it is important to follow systematic procedures for hazard prediction and interpret facts based on relevant knowledge. To further support these goals, we propose a lesson plan using city model to visualize evacuation drill. This model encourages students to apply cross-disciplinary knowledge to realistic scenarios, fostering a deeper understanding and promoting appropriate actions in emergencies.

Keywords: Disaster prevention education, School science, Decision-making, Evacuation drills, City Model

5. Understanding Japanese Middle School Students' Connectedness with Nature: A Pilot Survey

Taichi NISHIYAMA, K.F. ARDH, Hiroki FUJII Okayama University, Graduate School of Education, Professional Degree's Course

Awareness of connectedness with nature has been identified as a factor influencing environmentally conscious behavior (Kuroda et al., 2021). One approach to measure this connectedness is the Inclusion of Nature in Self (INS) scale (Schultz, 2002). This study utilized the INS to assess middle school students' sense of connectedness with nature, aiming to inform science classes that foster environmentally conscious behavior. A questionnaire survey was conducted in June 2024 with second-year students at a public middle school in Okayama Prefecture. Students selected from seven diagrams the one that best reflected their sense of connectedness with nature, and they provided explanations for their choice. Based on figure selection, students were categorized into three groups: low INS score students (who selected diagrams 1–3), middle INS score students (diagram 4), and high INS score students (diagrams 5–7), in line with Bezeljak et al. (2023). Open-ended responses were coded to categorize reasons for figure selection, and response patterns were analyzed by score level. Valid responses were obtained from 157 students, with INS score distribution as follows: 62 low, 40 middle, and 55 high, yielding a mean score of 4.0 and a standard deviation of 1.8. The reasons provided for figure selection were classified into nine distinct categories. Analysis suggests that students with low scores reported less frequent

Second Joint Seminar Program Book | 14

contact with nature compared to those with middle and high scores. In contrast, students with middle and high scores reported more frequent contact with nature, and students with higher scores expressed a greater awareness of nature's importance. Notably, students with the highest score (7), indicating an overlap between self and nature, demonstrated an awareness of the symbiotic relationship between humans and nature. These findings provide a useful foundation for developing science classes in middle school that encourage environmentally conscious behavior by enhancing students' connectedness with nature.

Keywords: Connectedness with nature, Inclusion of Nature in Self, Japanese Middle school students

6. Exploration of Honeybees' Flower Visits in Urban Beekeeping by DNA Metabarcoding

Ayaha TAKAGI, Taro HARADA Graduate School of Education, Master's Course

The Okayama Honeybee Project 'Momotaro Honey Lab.' is the first urban beekeeping initiative run by a private company in the Okayama Prefecture. As the flower-visiting behaviour of honeybees is of interest for both urban landscapes and honey products, the company invites the public to participate in this project, providing a foundation for citizen science. Students from a local private high school participated in this project, exploring plants visited by bees through microscopic observation of pollen as inquiry-based learning. The identification of pollen-source plants by microscopic observation is challenging because it requires extensive labour and knowledge of plant morphology. To facilitate this educational activity, we performed DNA-based analyses using our research equipment and expertise in plant molecular biology. We attempted to comprehensively amplify and detect the internal transcribed spacer region 2, a species-specific (barcode) region in pollen samples, by DNA metabarcoding. With Nanopore sequencing, performed with a portable and cost-effective third-generation sequencer, and subsequent bioinformatics analysis, some of the obtained sequences were found to be derived from plant taxonomic groups predicted by the blooming calendar and map and pollen observation. Therefore, this study contributes to the identification of the major nectar and pollen source plants in urban beekeeping in Okayama City. This collaborative ecosystem exploration activity is aimed at revealing the relationships between plants and insects, and will also contribute to education on biodiversity and sustainability, for example, by raising public plant awareness.

Keyword: Inquiry-based learning, Honeybees, DNA Metabarcoding

7. Japanese Middle School Students' Interest on Socio-scientific Issues (SSIs) : A Pilot Survey

Shuhei YAMAGUCHI, K.F. ARDH, Hiroki FUJII, Okayama University, Graduate School of Education, Professional Degree's Course

This study conducted a questionnaire survey to identify the types of socio-scientific issues (SSIs) that middle school students find engaging, with the aim of developing science classes that effectively incorporate SSIs. Socio-scientific issues, often included "wicked problems" due to their complexity and lack of straightforward solutions (Block et al., 2019), encompass multifaceted social topics intertwined with science and technology, such as genetically modified crops, nuclear power, and marine pollution. SSIs involve political, social, ethical,

Second Joint Seminar Program Book | 15

and moral dimensions, presenting diverse perspectives due to the cutting-edge nature of the scientific knowledge involved and the frequent lack of consensus on risks and safety (Yamada & Utsumi, 2021). By integrating SSIs into science classes, the goal is to cultivate students' abilities to critically discuss and address social problems related to science and technology (Nozoe, 2023). Prior research highlights that students' interest and familiarity with SSIs shape their engagement and attitudes toward learning (Stenseth et al., 2016), while a high degree of interest and enjoyment in SSI-related learning enhances educational outcomes (Jack et al., 2024). Consequently, it is essential to evaluate both teaching strategies and content selection in SSI-based classes. Results from this study indicate that students' interest in SSIs is strongly linked to their perceived importance of these issues and their exposure to them. Additionally, themes combining multiple SSIs appeared to increase students' responsiveness, suggesting that integrating diverse SSIs may deepen interest and support students in grasping the complexity of socio-scientific challenges.

Keywords: socio-scientific issues, middle school science, questionnaire

Poster Session (GCED Stream)

8. Fostering The Skill of Legal Thinking in Social Studies in Japan -Focusing on the Elementary School Level

Ayuha MIYAMOTO

Okayama University, Graduate School of Humanities and Social Sciences, Doctorate Course

The purpose of this study is to clarify the characteristics and issues of Law-Related Education a citizenship education in elementary social studies. To this end, we will analyse the Law-Related education research at the elementary level that has been conducted so far from the perspective of citizenship education, clarify its characteristics, and discuss its challenges. Until now, Law-Related Education research in elementary education has been conducted based on developmental psychology represented by Kohlberg et al. In elementary Law-Related Education, while the principles of lesson structure for constitutional law education based on American Law-Related Education and the approach for the connecting period have been systematized, research on Lesson Design other than constitutional law education, the development of lesson structure principles, and their systematization have not yet progressed. Based on these previous studies, this study Designed a lesson structure principle to reconstruct children's value judgment criteria. This principle consists of three stages. The novelty here lies in the fact that the child does not examine his or her own legal standards of judgment based on existing laws, but rather examines the extent to which his or her own standards are appropriate based on the cases in question. This is because, in order to examine the validity and problems of existing laws when entering the upper primary and secondary education stages, it is necessary to have a standard for how one judges cases based on one's current values at this stage. The intention is to develop citizens who critically perceive and discuss current laws and their own standards of judgment, rather than citizens who only comply with the law.

Keywords: Law-Related Education, Elementary School Level, Social Studies

9. The Practice and Challenges of Intercultural Understanding Education at Japanese Universities: Aiming to Cultivate Global Talent

Helian RUYU

Okayama University, Graduate School of Humanities and Social Science, Doctorate Course

With the rapid increase in opportunities for intercultural contact due to globalization, the importance of understanding different cultures and intercultural communication has gained significant attention. Encounters with different cultures prompt individuals to reconsider their own culture and values and foster acceptance of the cultures and perspectives of others. This study targets university students with the aim of exploring issues related to intercultural understanding and fostering awareness of different cultural backgrounds from diverse perspectives. The objective goes beyond simply acquiring communication skills, aiming instead to cultivate a deepened understanding of intercultural sensitivity by respecting the backgrounds and unique characteristics of other cultures and fostering an inclusive perspective on cultural diversity. This study conducted 15 sessions involving 67 Japanese university students, with two sessions featuring international students. These sessions provided an opportunity for intercultural exchange and encouraged mutual understanding between international and Japanese students through collaborative learning activities. Furthermore, for the reflective improvement of intercultural education practices, it is essential to clarify the effects of such education on students. This study measured students' understanding of other cultures, their recognition of multicultural coexistence, and their readiness to engage with different cultures using five factors. These factors, drawn from Jun Numata's (2011) study, include "Diverse Values," "Indifference to Minorities," "Conservative Thinking," "Stereotypical Understanding," and "Self-Centeredness." Pre- and postcourse surveys were conducted, and the changes in Japanese students' attitudes based on these five factors were analyzed using SPSS. The results demonstrated significant differences in the scores for "Indifference to Minorities," "Conservative Thinking," and "Stereotypical Understanding," indicating a positive effect of the course. However, no significant differences were found for "Diverse Values" and "Self-Centeredness." Specific reasons for this lack of significant change will be explained in the presentation.

Keywords: Intercultural Understanding, Cultural Diversity, Attitudinal Change

10. A Study on the Effectiveness of Global Citizenship Education (GCED) Teacher Training Programs: Insights from Participants' Perspective

LUO Guoyue Okayama University, Graduate School of Education, Master's Course

Global Citizenship Education (GCED) is a UNESCO-driven initiative that promotes the acquisition of the knowledge, skills, values, and attitudes needed to navigate a globalized world. According to UNESCO (2015), GCED seeks to foster students' understanding of their roles in a global society by emphasizing principles such as respect for diversity, social justice, and sustainability. However, limited research exists on the practical outcomes of GCED training from the teachers' viewpoint. To address this gap, this study employed semi-structured interviews to gather in-depth feedback, allowing for thematic analysis of participants' experiences. This study examines the effectiveness of Global Citizenship Education (GCED) teacher training programs from the perspective of participants, with a focus on how these programs influence teaching practices, professional **Final Joint Seminar Programme Book | 18**

growth. Utilizing qualitative data gathered from interviews with in-service teachers in Japan, the research explores the types of knowledge and skills teachers acquire, the practical application of these skills, and the impact of GCED training on their mindsets. Key findings indicate that GCED training contributes significantly to enhancing teachers' cross-cultural understanding, communication strategies, and awareness of global interconnectedness. Participants noted a notable shift in their teaching philosophy, linking GCED principles directly to daily life and community involvement. Challenges, including language barriers and integrating GCED into standardized curricula, were also highlighted, suggesting areas for program improvement. This study contributes to a deeper understanding of GCED's impact on teaching and calls for further support in resource development and curriculum integration to foster effective implementation.

Keywords: Global Citizenship Education, Teacher training

11. Improving Inquiry-Based Learning for Education for Sustainable Development in Ghana: Views of Ghanaian Teachers on Japanese Integrated Studies Period Activities.

Nicholas Okota WILSON Okayama University, Graduate School of Education, Master's Course

With sustainable development being one of the underlying rationales of the new Common Core Program curriculum in Ghana's pre-tertiary education combined with a philosophy of learning and teaching that responds to the opportunities and challenges facing Ghana currently and in the future and emphasis on pedagogical approaches anchored on inquiry-based learning as well as cross-disciplinary learning, this study seeks to explore the extent to which Ghanaian teachers are using inquiry-based learning for the practice of Education for Sustainable Development (ESD) in schools. It will also expose Ghanaian teachers to innovative educational practices by introducing them to Japanese Integrated Studies period activities (Sougou-Tekina-Gakushuu) and seek their views on adapting it to improve inquiry-based learning for ESD practice in schools in Ghana. This study is a qualitative study. A Japanese junior high school was sampled for the study. Five Ghanaian teachers were also sampled. The purposive sampling technique will be used for the study. It employs lesson observations and interviews to collect data on the practice of ESD in Integrated Studies period activities in a Japanese junior high school. A focus group interview will be conducted with Ghanaian teachers to explore the use of inquiry-based learning in the practice of ESD as captured in the new Common Core Program. The teachers will be introduced to Integrated Studies period activities in Japanese schools and then discuss with them their views on adapting it in Ghanaian schools to improve inquiry-based learning for the practice of ESD in Ghana to achieve the goals of the Common Core Program. Thematic analysis will be used to analyse the data collected.

Keywords: Inquiry-based learning, Integrated studies period activities, Education for Sustainable Development (ESD), Common Core Program, Ghana

12. Developing the Unit for Reconstructing Self-Decision-Making Regarding Discrimination: Focusing on the Examination of the Decision-Making of "Ordinary People" and the Promotion of Historical Empathy

Miku KIYOKAWA

Okayama University, Graduate School of Education, Master's Course

In this presentation, I will clarify the principle of unit structure aimed at reconstructing one's own decisionmaking regarding discrimination, and develop a unit in the history (subject) of high school, which named "Why couldn't people stop the Holocaust?". Specifically, I will develop a unit by applying the principles of decisionmaking learning in Japan's social studies pedagogy proposed by Mizoguchi (2001, 2002) and Dohi (2009, 2011), and referring to historical empathy. Sociologist Yoshii (2016) argues that we need to see the connection between "me" and discrimination, that is, positioning oneself as a possibility of discrimination. In other words, by viewing discrimination not as a problem between the perpetrator and the victim, but as a problem that concerns "me", it leads us to think about how to live in our daily lives, where discrimination can occur at any time. In order to grasp the connection between "me" and discrimination, in the unit I am developing in this study, I will focus on decision learning and historical empathy. Historical empathy is the process of understanding and contextualizing historical figures from cognitive and emotional perspectives to their lived experiences, decisions, and behaviors (Endacott 2013). This time, as a decision-making approach to discrimination, I will focus on resistance, perpetration, and bystander to discrimination, and I would like to make students empathize with each act so that they can grasp the connection between "me" and discrimination. Based on the possibility that discrimination is not done by "special people" but by "ordinary people," I propose a unit that examines the decision-making of "ordinary people" during the Holocaust era. In addition, through role-playing (roles such as resistor, perpetrator, and bystander) that utilizes historical empathy, I aim to reconstruct students' decision-making regarding discrimination.

Keywords: History education, decision-making, historical empathy, discrimination, Holocaust

13. An exploratory study on interpersonal conflict among Chinese students in Japan

ZHAO Bei

Okayama University, Graduate School of Education, Master's Course

In recent years, the number of international students in Japan has been increasing. A significant proportion of these students originate from neighbouring countries, with Chinese students representing approximately 40% of the total. International students face challenges not only in adapting to a different culture but also in forming interpersonal relationships with Japanese people. This study aims to clarify the interpersonal difficulties experienced by Chinese students in intercultural contact situations with Japanese people in Japan. Data were collected via semi structured interviews, and 21 participants answered the open-ended questions about the difficulties in forming interpersonal relationships with Japanese people. The participants were selected using the nepotistic method and snowball technique commonly used in qualitative studies. During the interviews, the participants were first explained the research objectives and ethical considerations, and then asked about their attributes such as the length of stay in Japan and their major. They were then asked **Second Joint Seminar Program Book | 20**

questions such as "Have you ever been troubled or confused by differences in how to interact with Japanese people due to cultural differences?" and talked about their interpersonal difficulties. The language used was Chinese, and two interviews were conducted in person and 19 were conducted online. The analysis was conducted through the creation of a verbatim transcript of the recorded speech, the extraction of content corresponding to the identified difficulties, the grouping of similar content into concise items, and the counting of the number of items corresponding to the interpersonal difficulties. The total number of items of interpersonal difficulties analysed was 96, with an average of 4.57 items per person (SD=1.47). These items were analysed using the KJ method. The analysis of participants' responses suggested four major categories of difficulties in forming interpersonal relationships with Japanese people: (1) relationship norms, (2) etiquette, (3) social conventions, and (4) daily life.

Keywords: Interpersonal relationship formation; cross-cultural adaptation; qualitative research; study abroad; Chinese students in Japan